

APPENDIX U

Groundwater Technical Report

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

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1 Introduction

1.1 Project overview and objectives

The Australian Rail Track Corporation (ARTC) proposes to construct and operate the Border to Gowrie section of the Inland Rail program ('the Project') which would be approximately 217.48 kilometres (km) of single track railway, built to accommodate double stack freight trains initially up to 1,800 metres (m) long. The Project will utilise a combination of existing rail corridors (brownfield) and new rail corridor (greenfield).

The objectives of the Project are to:

- Provide rail infrastructure that meets the Inland Rail specifications, to enable trains using the Inland Rail route to travel from the New South Wales (NSW) and Queensland (QLD) border to Gowrie, connecting with other sections of Inland Rail to the north and south
- Minimise the potential for adverse environmental, social and economic impacts.

The objectives of Inland Rail as a whole are to:

- Provide a rail link between Melbourne and Brisbane that is interoperable with train operations to Perth, Adelaide and other locations on the standard gauge rail network. This will serve future rail freight demand and stimulate growth for inter-capital and bulk rail freight.
- Provide an increase in productivity that will benefit consumers through lower freight transport costs
- Provide a step-change improvement in rail service quality in the Melbourne to Brisbane corridor and deliver a freight rail service that is competitive with road
- Improve safety, congestion and reduce environmental impacts by moving freight from road to rail
- Bypass bottlenecks within the existing metropolitan rail networks and free up train paths for other services along the coastal routes
- Act as an enabler for regional economic developments along the Inland Rail corridor.

1.2 Project location and existing land use

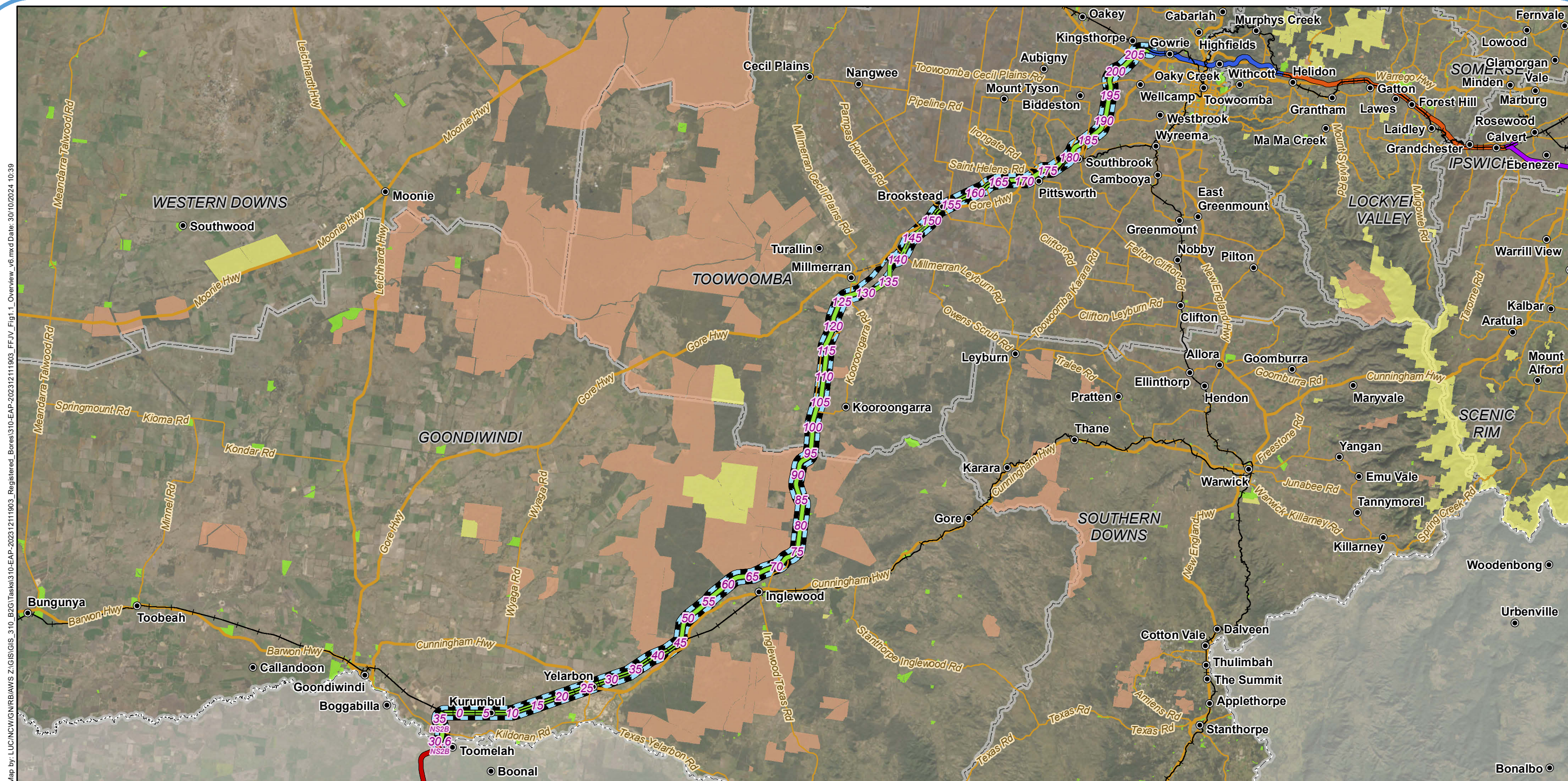
The Project is located within the Toowoomba Regional Council and Goondiwindi Regional Council local government areas in south-east Queensland. The Project commences at the NSW/QLD border, the median line of the Macintyre River, approximately 18 km to the south-east of Goondiwindi near Kurumbul. The Project then extends for 208.48 km in a north-north-east direction where it finishes at Gowrie Junction. The Project in its local context is shown in Figure 1.1.

At each end, the Project connects into adjoining Inland Rail projects, being the North Star to NSW/QLD Border Project at the southern end and the Gowrie to Helidon (G2H) Project at the northern end.

The impact assessment area for the Project is primarily characterised by rural and rural-residential land uses on a variety of property sizes. The diversity in rural land use is reflected through the various rural allotment sizes.

The Project passes through, or within proximity to, several townships such as Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook, Athol, Gowrie Mountain and Kingsthorpe. It is also aligned in proximity to numerous existing agricultural, industrial and commercial operations, such as feedlots, the Commodore Mine and the Toowoomba Wellcamp Airport.

The Project traverses a number of floodplains associated with the Macintyre River, Macintyre Brook, Pariagara Creek, Cattle Creek, Native Dog Creek, Bringalily Creek, Nicol Creek, Back Creek, Condamine River, Westbrook Creek and Gowrie Creek, as mapped on the Queensland Reconstruction Authority Indicative Flood Assessment Overlay.



Map by: LUC/NCW/IGW/BI/MS 2:GIS/IGS 310_B203/Task310-EAP-202312111903_Registered_Bores310-EAP-202312111903_FF.V_Fig1.1_Overview_v6.mxd Date: 30/10/2024 10:39

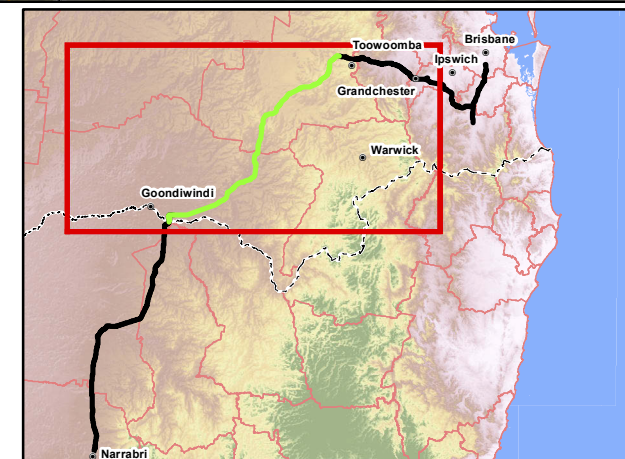
Legend

- 5 Chainage (km)
- Localities
- North Star to NSW/QLD border alignment
- Border to Gowrie alignment
- Gowrie to Helidon alignment
- Helidon to Calvert alignment
- Calvert to Kagaru alignment
- Existing rail (operational)
- Existing rail (non-operational)

- Major roads
- Minor roads
- NSW/QLD border
- Groundwater impact assessment area
- Local Government Areas

Tenure, other than freehold

- National Park
- Reserve
- State Forest



A3 scale: 1:800,000
0 6 12 18 24 30 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 30/10/2024 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 1.1:
Project location overview

1.3 Project description

The Project consists of the key permanent and temporary features listed in Table 1.1.

Table 1.1 Key features of the Project

Aspect	Description
Permanent features	
New track	- Approximately 217.48 km of new single track railway, consisting of: 7.0 km of standard gauge rail (1,435 millimetres (mm)) 210.48 km of dual gauge rail (standard (1,435 mm) and narrow (1,067 mm)). - Railway infrastructure and the corridor will initially be constructed for 1,800 m long trains.
Rail corridor	- Establishment of approximately 149.48 km of new rail corridor and use of approximately 68.00 km of existing rail corridor - The rail corridor is generally a minimum width of 30 m - Wider sections of corridor are required to accommodate earthworks, drainage structures, rail infrastructure, access tracks, crossing loops and fencing - The rail corridor will be of sufficient width to accommodate all proposed railway infrastructure, including the crossing loops.
Crossing loops and turnouts	- Crossing loops are places on a single-line track where trains in opposing directions can pass each other. Five crossing loops will be constructed as part of the Project, at a minimum of 2,200 m in length for each loop - Turnouts allow the train to be guided from one section of track to another. Turnouts that connect in to crossing loops and Queensland Rail's (QR's) existing South Western Line, Millmerran Branch Line and sidings have been incorporated into the reference design.
Bridges	Bridges to accommodate topographical variation, crossings of waterways or other infrastructure. No tunnels have been incorporated into the design of the B2G Project.
Drainage	- Cross-drainage is provided by reinforced concrete pipe culverts and reinforced concrete-box culverts - Scour protection measures will be installed around culverts and abutments to prevent erosion.
Rail crossings	Rail crossings, including level crossings, grade separated crossings (rail or road overbridges) and occupational/private crossings.
Embankments and cuttings	Embankments and cuttings will be required along the length of the rail alignment. The cuttings will be permanently drained.
Construction features (temporary)	
Land	- Temporary access tracks will be used to access construction sites. Where possible, access tracks will be retained to serve as rail maintenance access road during the operation of the Project - Land requirements for construction will include temporary workspaces, site offices and laydown facilities. These requirements are encompassed within the nominated temporary footprint for the Project - Laydown areas will be located to avoid or minimise potential impacts to environmental and social receptors, avoiding one per cent annual exceedance probability (AEP) floodplains, where possible).
Non-resident workforce accommodation facilities	Non-resident workforce accommodation sites have been included in the temporary footprint to accommodate the Project construction workforce requirements, one at Inglewood and another at Yelarbon. A third non-resident workforce accommodation site will be required in the Millmerran area and feasibility assessments will be undertaken to identify the optimal location for the site. The site selection and due diligence associated with locating a Millmerran based non-resident workforce accommodation will be undertaken during detailed design.

1.4 Environmental Impact Statement scope and purpose

This objective of this report is to support the revised draft Environmental Impact Statement (EIS) by addressing groundwater related requirements of the *Terms of Reference (ToR) for an environmental impact statement: Inland Rail – Border to Gowrie Project November 2018* (Department of State Development, Manufacturing, Infrastructure and Planning, 2018) as well as, address the additional requests for information issued by the Office of the Coordinator - General in January 2022 following the public notification stage.

This groundwater assessment includes a description of the existing groundwater resources, an assessment of groundwater environmental values (EVs), conceptualisation of the existing hydrogeological regime, and the anticipated potential impacts to groundwater resources.

The key objectives of this groundwater assessment were to:

- Identify and describe existing groundwater resources, users, values and conditions within the groundwater impact assessment area (defined in Section 1.5)
- Identify and assess potential Project impacts on groundwater environmental values
- Identify mitigation measures to be factored into the Project design
- Identify mitigation measures that will be implemented during future stages of the Project
- Evaluate the significance of the identified Project impacts on groundwater, with built-in mitigation and identify whether further mitigation measures are required and reassess significance
- Provide an assessment of the potential for cumulative impacts on groundwater resources as a result of the Project, in combination with other known projects where there is a potential overlap in impacts (either spatially or temporally).

1.5 Impact assessment area

The groundwater impact assessment area is generally defined as the area within a 1 km distance from the centre line of the Project alignment, in the first instance, as is industry-standard practice for a significance assessment. The depth of interest (potential impact on groundwater resources) for the Project is 90 m below ground level (BGL). This depth of interest was adopted based on the depth of the deepest design earthworks being 21 m BGL and the deepest aquifer with potential to be intersected by Project, being the Walloon Coal Measures (WCM). The maximum screened depth of a registered bore targeting the WCM within the impact assessment area is ~90 m BGL.

In some instances, where appropriate data to inform a particular value was unavailable within the 1 km distance, the impact assessment area was increased to account for a 5 km distance to appropriately characterise certain sensitive EVs. For example, an impact assessment area of 5 km distance from the centreline was adopted to inform of potential groundwater dependent ecosystems (GDEs) that could be impacted by the Project as a conservative approach for ecosystems that can potentially source groundwater, and potential Project impacts, beyond the 1 km radius. Where an expansion of the impact assessment area was required to assess EVs (e.g. GDEs), this expansion is stated in the relevant discussions defined within Section 5.

The Project's permanent footprint is wholly within the impact assessment area. The permanent Project footprint has been established to encompass all land, including any groundwater bores, and permanent infrastructure required for the Project, including the new rail track, bridges and drainage structures, level crossings, road realignments, possible upgrades to adjacent roads and infrastructure, a rail maintenance access road, fencing and signage. The Project disturbance footprint also includes land required on a temporary basis to enable construction of the Project, including for construction laydown, stockpile and storage areas, temporary erosion control structures, concrete batching and access track(s).

For clarity in this report, chainages between Ch 30.60 km (NS2B) and Ch 39.86 km (NS2B) are south of the South Western Line rail corridor and zero-point of the B2G alignment. These chainages are presented with suffix '(NS2B)'. Chainages north of this point, along the B2G alignment, are presented without the suffix. For example, Ch 38.00 km (NS2B) and Ch 38.00 km relate to two different locations along the Project alignment.

The impact assessment area and Project location are presented in Figure 1.1.

2 Legislation, policy, standards and guidelines

The subsections below summarise the relevant Commonwealth and Queensland legislation, policies, and plans that apply to the Project with respect to groundwater resources. These have been considered during preparation of this groundwater technical report.

2.1 Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) states that any action (i.e. a project, development, undertaking, activity or series or activities) that has, will have or is likely to have a significant impact on matters of national environmental significance (MNES), or other matters protected under the EPBC Act such as the environment of Commonwealth land, requires approval from the Australian Government Minister for the Environment.

Groundwater can provide habitat conditions for and/or provide linkage to habitat for threatened species and ecological communities that are MNES.

On 9 April 2018, the Australian Government Minister for the Environment determined the Project to be a 'controlled action' under the EPBC Act, due to the likely potential impacts on MNES (reference number EPBC 2018/8165). It was established through referral and subsequent determination that the Project does not have the potential for significant impacts on water resources.

2.1.2 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (Qld) (EP Act) aims 'to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends' (EP Act, Part 2). Under the EP Act, environmental protection policies are developed to cover specific aspects of the environment.

The EP Act identifies EVs of Queensland waters, including those located within the impact assessment area, which are protected under the EP Act and the subordinate legislation. The EP Act defines an EV as:

- A quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety or
- Another quality of the environment identified and declared to be an EV under an environmental protection policy or regulation.

Further information regarding EVs is included in Section 2.2.1.

2.1.3 Water Act 2000

The *Water Act 2000* (Qld) (Water Act) provides for the sustainable management of water and the management of impacts on underground water amongst other purposes. The main objective of the Water Act is to provide a framework for:

- Sustainable management of Queensland's water resources by establishing a system for the planning, allocation and use of water
- Sustainable and secure water supply and demand management for the southeast Queensland region and other designated regions

- Management of impacts on underground water caused by the exercise of underground water rights by the resource sector
- Effective operation of water authorities.

The Water Act covers water in a watercourse, lake or spring, underground water (or groundwater), overland flow water, or water that has been collected in a dam.

The Project involves works which may intersect shallow groundwater units and as such the provisions of the Water Act apply.

2.1.4 Water Regulation 2016

The *Water Regulation 2016* is a subordinate legislation made under the Water Act and details administrative and operational matters for the Act. Matters governed by the *Water Regulation 2016*, with relevance to the Project include, but are not limited to:

- Provide matters for the Minister's report on water plans
- Prescribe the purpose and conditions for which a constructing authority may take water
- Prescribes activities for which the taking of, or interfering with, water is authorised without an entitlement
- Provide for matters relating to water licences
- Provide matters for water supply and demand management
- Allow for seasonal water assignments and prescribe associated rules
- Provide criteria for establishing water allocations and prescribe water allocation dealing rules
- Prescribe requirements for decommissioning water bores
- Provide for works that are self-assessable and assessable development for the *Planning Act 2016* and prescribe the associated codes
- Make declarations about underground water taken to be water in a watercourse
- Provide rules for managing underground water that is not managed through a water plan.

2.1.5 Acquisition of Land Act 1967

The *Acquisition of Land Act* establishes authority for the Queensland Government to acquire land for specific purposes. The Act enables 'constructing authorities' to acquire land for public purposes, including government agencies, local governments, roads, railways, soil conservation, dams, and drainage as some examples. The acquisition includes for groundwater bores established on properties acquired.

2.2 Policies and plans

2.2.1 Basin Plan 2012

The *Basin Plan 2012* is a Commonwealth instrument, made under subparagraph 44(3)(b)(i) of the *Water Act 2007* (Cth), that provides a framework to manage the water resources of the Murray-Darling Basin and sets out limits for sustainable use of surface water and groundwater in each water resource plan area.

The impact assessment area is located within the Condamine and Balonne (groundwater unit GW21) and the Border Rivers and Moonie (groundwater unit GW19) water resource plan area, which are covered by the *Basin Plan 2012*. Both of these water resource areas have water plans, which are discussed further in Sections 2.2.2 and 2.2.4.

2.2.2 Healthy Waters Management Plans

Healthy Waters Management Plans (HWMPs) are a planning mechanism to improve the quality of Queensland waters under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water and Wetland Biodiversity)). HWMPs provide an ecosystem-based approach to integrated water management and include:

- Identification and mapping of EVs, desired levels of aquatic ecosystem protection and management goals for Queensland waters
- Water quality objectives (WQOs) under the *National Water Quality Management Strategy* (Environment Protection and Heritage Council, 2009a) to protect the EVs
- Management responses, which address point and diffuse emission sources, and may include market-based instruments, best management practice and adaptive management. In addition to meeting requirements under the EPP (Water and Wetland Biodiversity), the HWMPs have also been prepared to meet requirements of a Water Quality Management Plan under the *Basin Plan 2012*.

In addition to meeting requirements under the EPP (Water and Wetland Biodiversity), the HWMPs have also been prepared to meet requirements of a Water Quality Management Plan under the *Basin Plan 2012*.

The HWMPs/Water Quality Management Plans apply to the surface waters (including lakes and wetlands) and groundwaters across the following river basins of relevance to the Project include:

- Ch 30.6 km (NS2B) to Ch 116.5 km: within the boundaries of the Border Rivers catchment. The relevant EVs for the impact assessment area are described in the *Healthy Waters Management Plan: Queensland Border Rivers and Moonie River Basins* (Department of Environment and Science (DES), 2019a).
- Ch 116.5 km to Ch 208.2 km: within the boundaries of the Condamine-Balonne River catchment. The relevant EVs for the impact assessment area are described in the *Healthy Waters Management Plan: Condamine River Basin* (DES, 2019b).

Environmental values relevant to the Project are presented in detail in Section 5.

2.2.3 Environmental Protection (Water and Wetland Biodiversity) Policy 2019

Under the EP Act, the EPP (Water and Wetland Biodiversity) achieves the objectives of the Act in relation to Queensland waters. The policy provides:

- Identify EVs and management goals for Queensland waters
- Providing state water quality guidelines and water WQOs to enhance or protect the EVs
- Providing a framework for making consistent, equitable and informed decisions about Queensland waters.

Groundwater resources within the impact assessment area occur within the *Queensland Murray-Darling and Bulloo River Basins – Groundwater Environmental Values and Water Quality Objectives* (DES, 2020) under Schedule 1 of the EPP (Water and Wetland Biodiversity). These basins are:

- Queensland Border Rivers catchment from Ch 30.6 km (NS2B) to Ch 116.5 km
- Condamine River Basin from Ch 116.5 km to Ch 208.2 km.

EVs relevant to the Project are presented in detail in Section 5.

2.2.4 Water plans

Water plans were developed under the Water Act to sustainably manage and allocate water resources in Queensland. The plans apply to water in watercourses and lakes, water in springs, overland flow water, and groundwater and allow for identification of availability of water options for project uses.

Three water sharing plans, and associated groundwater units, are relevant to the Project. Each of these are described below.

2.2.4.1 Water Plan (Border Rivers and Moonie) 2019

The Water Plan (Border Rivers and Moonie) is applicable to the Border Rivers catchment, south of Millmerran. The Border Rivers Alluvium (BRA), as defined in this plan, is relevant to the Project.

2.2.4.2 Water Plan (Condamine and Balonne) 2019

This plan is applicable to the Project north of Millmerran, where the following groundwater units occur, as defined in this plan:

- Upper Condamine Alluvium (Central Condamine alluvium)
- Toowoomba City Basalts (i.e. Main Range Volcanics).

2.2.4.3 Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017

This plan is applicable to the following groundwater units within the impact assessment area:

- Kumbarilla Beds
- Walloon Coal Measures.

2.3 Guidelines

2.3.1 Australia and New Zealand Guidelines for Fresh and Marine Water Quality

The objective of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Governments (ANZG), 2018) is to provide authoritative guidance on the management of water quality in Australia and New Zealand. The guidelines include setting water quality and sediment quality objectives designed to sustain current, or likely future, community values for natural and semi-natural water resources.

The Water Quality Guidelines provide:

- A platform for consistent water quality management and planning
- Technical support for Australia's *National Water Quality Management Strategy* (EPHC, 2009a) and New Zealand's National Policy Statement for Freshwater Management
- Sound tools for governments and the community to assess and manage ambient water and sediment quality.

The ANZG have been used to assess potential groundwater suitability for use within the impact assessment area.

2.3.2 Australian Drinking Water Guidelines

The *Australian Drinking Water Guidelines* (ADWG) (National Health and Medical Research Council (NHMRC) and National Resource Management Ministerial Council (NRMMC), 2011) provide guidance to water regulators and suppliers on monitoring and managing drinking water quality. The ADWG provides details on the framework for management of drinking water quality, which is a preventive management approach that encompasses all steps in water production from catchment to consumer, and aims to assure safe, good quality drinking water. The ADWG is used by state and territory health departments, local health authorities and water utilities.

The ADWG were used to assess potential potable groundwater use within the impact assessment area.

2.3.3 Guideline: Application requirements for activities with impacts to water

The Department of Environment, Science and Innovation *Guideline: Application requirements for activities with impacts to water* (DES, 2021a) focuses on the types of impacts that environmentally relevant activities (ERAs) can have on water and outlines the information to be provided to the department as part of the ERA application process. This guideline is applicable to the following ERAs:

- Controlled/planned releases to water
- Uncontrolled/unplanned releases to water
- Changes to the quantity and quality of stormwater runoff from the site of the ERA
- Indirect impacts
 - Disturbance to the bed or banks of waters
 - Turbidity due to disturbance or clearing of riparian vegetation during construction
 - Changes to groundwater formation characteristics
 - Changes to groundwater ecology (and surface water ecology).

Based on the proposed works associated with the Project, this guideline is not considered relevant to groundwater in the impact assessment area.

2.3.4 Water – EIS information guideline

The *Water—EIS information guideline* (DES, 2022) has been developed to assist in the assessment of water resources for EIS submissions. The intent of this guideline has been considered in developing the methodology, approach, and data sources for this groundwater impact assessment.

The guideline is complimentary to the Project-defined ToR, established in November 2018 by the Coordinator-General.

2.3.5 Queensland Water Quality Guidelines 2009

The *Queensland Water Quality Guidelines 2009* (Department of Environment, Heritage and Protection, 2009) provide the approach to determine guideline values for physical and chemical stressors. The guidelines indicate the ANZG (2018) includes default guidelines values however local water quality information is the first reference point and the water quality guideline values for physical and chemical stressors follows the hierarchy defined below:

1. EPP (Water and Wetland Biodiversity) scheduled EVs and WQOs
2. End of catchment anthropogenic pollutant reduction targets in Great Barrier Reef catchments
3. Queensland water quality guidelines (in the absence of EPP (Water and Wetland Biodiversity) scheduled EVs and WQOs
4. Water monitoring protocols contained in the *Monitoring and Sampling Manual* (DES, 2018).

This assessment includes EVs and WQOs provided in the EPP (Water and Wetland Biodiversity), which is the priority source for water quality guideline values as they are developed based on local water quality conditions (Section 4.7.3).

2.3.6 Monitoring and Sampling Manual

The *Monitoring and Sampling Manual* (DES, 2018) is the key guiding document to be taken into account when developing an environmental sampling program in Queensland. The manual identifies best practices for groundwater monitoring programs from program design to field operations. It details the types of samples required, the quantity and spatial distribution under various conditions. It describes methods for record keeping and outlines health and safety and permitting requirements. It sets standards for sample collection, quality control, transport, preservation and laboratory submission.

3 Methodology

3.1 Impact assessment area

An impact assessment area has been established to delineate the spatial extent for the groundwater assessment. The impact assessment area is described in Section 1.5.

The impact assessment area and Project location are presented in Figure 1.1.

3.2 Approach

A staged approach has been adopted for the groundwater assessment for the Project based on DES (2022) guideline.

Stages adopted for the groundwater study included:

- Stage 1 – Desktop study
- Stage 2 – Hydrogeological investigations
- Stage 3 – Groundwater impact assessment
- Stage 4 – Significance Assessment.

The significance assessment herein should be updated should any fundamental design changes be needed. The mitigation measures defined in this chapter should be assessed against any change in the updated significance assessment outcomes, as warranted, to maintain and protect groundwater environmental values.

3.2.1 Stage 1– Desktop study

Available geological and hydrogeological literature and site data were compiled and reviewed to develop a detailed description of the current hydrogeological regime(s), plus the identification of groundwater EVs.

Interrogation of publicly available databases, including the Department of Regional Development, Manufacturing and Water (DRDMW) groundwater bore data database and water entitlements database. The databases provide bore construction and lithology information on registered groundwater bores and licenced groundwater extraction within the impact assessment area. Published studies and reports of relevance were also reviewed to further inform the understanding of regional geological and hydrogeological characteristics. Data sources accessed for this assessment are specified in Section 3.2.1.1.

3.2.1.1 Data sources

The groundwater impact assessment has been developed in reference to information obtained from publicly available datasets and reports and from site-specific geotechnical and hydrogeological investigations. The information sources listed in Table 3.1. have been referenced in establishing an understanding of the existing hydrogeological regime within the impact assessment area(s) and in the assessment of potential impacts on groundwater resources.

Table 3.1 Primary data sources for the groundwater technical report

Data	Source
Hydrology/climate	- Historical Climate Database – Bureau of Meteorology (BoM) (http://www.bom.gov.au/climate/data/) - Station 041047 – Inglewood Post Office - Station 041504 – Glen Royal - Station 041525 – Warwick - Queensland Globe datasets (qldglobe.information.qld.gov.au/) - EIS Chapter 13: Surface Water - EIS Appendix T: Hydrology and Flooding Technical Report.
Soil types	<i>Inland Rail: Phase 2 – Border to Gowrie – Geotechnical Interpretive Report</i> (Future Freight Joint Venture (FFJV), 2019) <i>Inland Rail: Phase 2 – North Star to NSW/QLD Border; Geotechnical Interpretive Report</i> (FFJV, 2020) - EIS Chapter 9: Land Resources - EIS Appendix J: Soil Assessment Report - Queensland Globe datasets (qldglobe.information.qld.gov.au/) - Australian Soil Resource Information System (ASRIS) 'Atlas of Australian Soils' (asris.csiro.au/mapping/viewer.htm) (Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2014a).
Geology/hydrostratigraphy	<i>Inland Rail: Phase 2 – Border to Gowrie – Geotechnical Interpretive Report</i> (FFJV, 2019) <i>Inland Rail: Phase 2 – Border to Gowrie – Geotechnical Factual Report</i> (Golder, 2019a) <i>Inland Rail: Condamine River Valley Geotechnical Investigation – Factual Report, Inland Rail Project – Border to Gowrie Section</i> (Golder, 2019b) <i>Inland Rail: Border to Gowrie – 100% Feasibility Design Scope of Works – Hydrogeology</i> (Golder, 2019c) <i>Inland Rail – North Star to Border Section – Geotechnical Factual Report</i> (Golder, 2019d) <i>Inland Rail: Phase 2 - North Star to NSW/QLD Border; Geotechnical Interpretive Report</i> (FFJV, 2020) - Goondiwindi 1:250,000 Geological Sheet (Mond, A, Burger, D. et al., 1972) - DRDMW groundwater database - Queensland Globe geological map datasets (qldglobe.information.qld.gov.au/) <i>Groundwater connectivity between the Condamine Alluvium and the Walloon Coal Measures - A hydrogeological investigation report</i> (Department of Natural Resources and Mines (DNRM), 2016a). <i>Hydrogeological conceptualisation report for the Surat Cumulative Management Area</i> (DNRM, 2016b).
Groundwater levels and quality	- DRDMW Groundwater Database (online) - Queensland Globe datasets (https://qldglobe.information.qld.gov.au/) <i>Inland Rail: Border to Gowrie – 100% Feasibility Design Scope of Works – Hydrogeology</i> (Golder, 2019c) <i>Inland Rail: Section 270 (North Star to Border), 100% Feasibility Design Scope of Works – Hydrogeology</i> (Golder, 2019e) <i>Inland Rail: Border to Gowrie – Project Groundwater Bore Visit and Data Collection Factual Memo</i> (FFJV, 2021) <i>Inland Rail: Border to Gowrie – Ongoing baseline groundwater monitoring</i> (In progress).
Groundwater dependent ecosystems (GDEs)	- GDE Groundwater Dependent Ecosystems Atlas (bom.gov.au/water/groundwater/gde/map.shtml) (BoM, 2022) - Queensland Globe datasets (qldglobe.information.qld.gov.au/) - EIS Appendix L: Terrestrial and Aquatic Ecology Technical Report.

Data	Source
Groundwater use and management	■ DRDMW groundwater database ■ Water Plan (Border Rivers and Moonie) 2019 ■ Water Plan (Condamine and Balonne) 2019 ■ Water Plan (Great Artesian Basin and Other Regional Aquifers (GABORA)) 2017.

3.2.2 Stage 2 – Hydrogeological investigations

Data obtained during the Project geotechnical investigations and subsequent baseline groundwater investigations, undertaken between May 2018 and March 2022, were adopted to inform this assessment.

Direct impacts by new freight rail infrastructure on groundwater resources within the Project are typically associated with construction activities that intersect the shallow groundwater resources, such as locations of deep cuts (defined as >10 m BGL considered a 'deep cut') and bridge piling works. Project groundwater monitoring bores were installed adjacent to the planned bridge structures and deep cuts during the initial reference design stage. These locations have been reviewed and assessed against the revised reference design.

The site-based groundwater investigative works have been ongoing from 2018 into 2023 and comprise two drilling campaigns for the installation and construction of monitoring bores to align with the evolution of the revised reference design. The outcome is that the groundwater monitoring network closely aligns with the revised reference design. The scope and findings of the groundwater investigations are discussed in Sections 6.2 and 7.

3.2.3 Stage 3 – Groundwater impact assessment

Potential impacts of the Project construction and operation on the existing groundwater regime, at local and regional scales, were identified and assessed based on review of planned Project activities with respect to the current geological and hydrogeological environment.

Impacts on groundwater resources resulting from interception of groundwater at deep cuttings were assessed through predictive groundwater modelling, using SEEP/W¹ a finite element software product for modelling groundwater flow in porous media. SEEP/W two-dimensional (2-D) cross sectional models were constructed to simulate potential seepage at select locations where deep cuts (> 10 m BGL) are proposed as part of the revised reference design. Modelling results were reviewed and interpreted to assess potential impacts of seepage (groundwater volumes and drawdown) on groundwater resources, users and determine the need for secondary approvals (i.e. water licence).

A discussion of the modelling results is provided in Section 6.3.

3.2.4 Stage 4 – Significance assessment

The significance of potential impacts on groundwater resources has been assessed using a qualitative risk-based approach. The significance of an impact is dependent upon the sensitivity of the groundwater EVs (i.e. the quality of the environment to be impacted) and the magnitude (i.e. intensity, duration and potential spatial extent) of the identified potential impact.

Risks were assessed and ranked with and without mitigation, for construction works and operations stages of the Project. These mitigation measures have been used as a basis for developing an outline for a Groundwater Monitoring and Management Program (GMMP) for the Project, as discussed in Section 8.3.

EIS Chapter 4: Assessment Methodology provides further details.

¹ geoslope.com/products/seep-w

3.2.5 Impact assessment methodology

A qualitative impact assessment for groundwater has been applied in the form of a significance-based impact assessment framework to identify and assess Project-related impacts in relation to environmental receptors.

For the purpose of this assessment, a 'significant impact' is dependent upon the sensitivity of the groundwater EV, the quality of the environment to be impacted, and the intensity, duration, magnitude, and potential spatial extent of the identified potential impact. Determination of the sensitivity/vulnerability of the groundwater EVs and the magnitude of the potential impact facilitate the assessment of the significance of potential groundwater impacts. The following sections discuss and define impact magnitudes, receptor sensitivity, and impact significance.

3.2.6 Magnitude of impacts

The magnitude of a potential impact is essential to the determination of its level of significance on EVs/receptors. For the purposes of the groundwater assessment, impact magnitude is defined as being comprised of the nature and extent of the potential impacts, including direct and indirect impacts.

The impact magnitude is divided into five classifications, as included in Table 3.2. The magnitude of a potential impact is determined with techniques and tools that facilitate an estimation of the extent, duration, and frequency of the potential impacts.

Table 3.2 Magnitude classifications of potential impacts

Magnitude	Description
Major	An impact that is widespread, permanent and results in substantial irreversible change to the environmental value. Avoidance through appropriate design responses or the implementation of environmental management controls are required to address the impact.
High	An impact that is widespread, long lasting and results in substantial and possibly irreversible change to the environmental value. Avoidance through appropriate design responses or the implementation of site-specific environmental management controls are required to address the impact.
Moderate	An impact that extends beyond the area of disturbance to the surrounding area but is contained within the region where the Project is being developed. The impacts are short term and result in changes that can be ameliorated with specific environmental management controls.
Low	A localised impact that is temporary or short term and either unlikely to be detectable or could be effectively mitigated through standard environmental management controls.
Negligible	An extremely localised impact that is barely discernible and is effectively mitigated through standard environmental management controls.

Table 3.3 presents the timeframes for impact duration terms utilised to inform the magnitude of a potential impact.

Table 3.3 Timeframes for duration terms

Duration term	Timeframe – to be defined for each receptor type if required
Temporary	Days to months (e.g. 1 to 2 seasons; 3 to 12 months)
Short term	Up to 2 years (i.e. 12 to 24 months)
Medium term	From 2 to 10 years ¹
Long term/long lasting	From 11 to 20 years ²
Permanent or irreversible	More than 21 years ³

Table notes:

- 1 Derived from the term 'moderate' EAM Risk Management Framework 2009 (Great Barrier Reef Marine Park Authority, 2009)
- 2 Derived from the term 'major' EAM Risk Management Framework 2009 (Great Barrier Reef Marine Park Authority, 2009)
- 3 Derived from the term 'catastrophic' EAM Risk Management Framework 2009 (Great Barrier Reef Marine Park Authority, 2009).

Potential impacts identified for the Project are presented in Section 7; the impact assessment performed for the Project with respect to groundwater resources is presented in Section 8.3.4.1.

3.2.7 Sensitivity of impacts

To assess the significance of potential impacts on groundwater resources, sensitivity categories are applied to each of the identified groundwater EVs. The sensitivity categories are split into five discrete groups as described in Table 3.4. These groupings are based on qualitative assessments utilising information related to the sensitivity or vulnerability of the EV and the magnitude of the potential impact (Table 3.2).

Through the determination of sensitivity categories for each of the identified groundwater EVs, the potential impacts are then able to be assessed through a matrix against the magnitude of the potential project impact to indicate the level of significance for each of the impact types on the groundwater EVs.

Table 3.4 Sensitivity criteria

Sensitivity	Description
Major	- The environmental value is listed on a recognised or statutory state, national or international register as being of conservation significance and/or - The environmental value is entirely intact and wholly retains its intrinsic value and/or - The environmental value is unique to the environment in which it occurs. It is isolated to the affected system/area, which is poorly represented in the region, state, country or the world and/or - It has not been exposed to threatening processes, or they have not had a noticeable impact on the integrity of the environmental value - Project activities would have an adverse effect on the value.
High	- The environmental value is listed on a recognised or statutory state, national or international register as being of conservation significance and/or - The environmental value is intact and retains its intrinsic value and/or - The environmental value is unique to the environment in which it occurs. It is isolated to the affected system/area, which is poorly represented in the region and/or - The environmental value has not been exposed to threatening processes, or they have not had a noticeable impact on the integrity of the sensitive value - Project activities would have an adverse effect on the value.
Moderate	- The environmental value is recorded as being important at a regional level, and may have been nominated for listing on recognised or statutory registers and/or - The environmental value is in a moderate to good condition despite it being exposed to threatening processes. It retains many of its intrinsic characteristics and structural elements and/or - It is relatively well represented in the systems/areas in which it occurs, but its abundance and distribution are exposed to threatening processes and/or - Threatening processes have reduced its resilience to change. Consequently, changes resulting from Project activities may lead to degradation of the prescribed value and/or - Replacement of unavoidable losses is possible due to its abundance and distribution.
Low	- The environmental value is not listed on any recognised or statutory register. It might be recognised locally by relevant suitably qualified experts or organisations e.g. historical societies and/or - The environmental value is in a poor to moderate condition as a result of threatening processes, which have degraded its intrinsic value and/or - It is not unique or rare and numerous representative examples exist throughout the system/area and/or - It is abundant and widely distributed throughout the host systems/areas and/or - There is no detectable response to change or change does not result in further degradation of the environmental value and/or - The abundance and wide distribution of the environmental value ensures replacement of unavoidable losses is achievable.
Negligible	- The environmental value is not listed on any recognised or statutory register and is not recognised locally by relevant suitably qualified experts or organisations and/or - It is not unique or rare and numerous representative examples exist throughout the system/area and/or - There is no detectable response to change or change does not result in further degradation of the environmental value.

3.2.8 Significance of impact

The significance of a potential impact is a function of the sensitivity of the EV and the magnitude of the potential impact. Although the sensitivity of the EV will not change (i.e. is generally determined qualitatively by the interaction of the receptor's condition, adaptive capacity, and resilience), the magnitude of the potential impact is variable and may be categorised quantitatively to facilitate the prediction of the significance of the potential impact.

Once the EV has been identified, and the sensitivity of the value and the magnitude of the potential impact have been determined, a significance assessment of the potential impact can be conducted via application of a five by five matrix as detailed in Table 3.5.

Table 3.5 Significance assessment matrix

Magnitude of impact	Sensitivity				
	Major	High	Moderate	Low	Negligible
Major	Major	Major	High	Moderate	Low
High	Major	Major	High	Moderate	Low
Moderate	High	High	Moderate	Low	Low
Low	Moderate	Moderate	Low	Negligible	Negligible
Negligible	Moderate	Low	Low	Negligible	Negligible

Definitions for each of the significance classifications are provided in Table 3.6.

Table 3.6 Significance classifications

Significance rating	Description
Major	Arises when an impact will potentially cause irreversible or widespread harm to an environmental value that is irreplaceable because of its uniqueness or rarity. Avoidance through appropriate design responses is the only effective mitigation.
High	Occurs when the proposed activities are likely to exacerbate threatening processes affecting the intrinsic characteristics and structural elements of the environmental value. While replacement of unavoidable losses is possible, avoidance through appropriate design responses is preferred to preserve its intactness or conservation status.
Moderate	Results in degradation of the environmental value due to the scale of the impact or its susceptibility to further change even though it may be reasonably resilient to change. The abundance of the environmental value ensures it is adequately represented in the region, and that replacement, if required, is achievable.
Low	Occurs where an environmental value is of local importance and temporary or transient changes will not adversely affect its viability provided standard environmental management controls are implemented.
Negligible	Does not result in any noticeable change and hence the proposed activities will have negligible effect on environmental values. This typically occurs where the activities are located in already disturbed areas.

Upon identification of the level of significance of a potential impact, mitigation measures can then be applied to the potential (unmitigated) impact to identify the residual (mitigated) impact.

3.3 Cumulative impact assessment

It is a requirement of the Project that the potential for cumulative impacts be considered. Projects with spatial and/or temporal overlap can result in cumulative impacts. Cumulative impacts may:

- Differ from those of an individual project when considered in isolation
- Be positive or negative
- Differ in severity and duration depending on the spatial and temporal overlap of projects occurring in an area.

The overarching cumulative impact assessment methodology is presented in EIS Chapter 23: Cumulative Impact Assessment.

3.4 Hydrogeological investigations

Geotechnical and hydrogeological investigations have been undertaken within and adjacent to the Project footprint to inform the Project's revised reference design and the revised draft EIS.

In the absence of tunnels, direct impacts on groundwater resources by the Project freight rail infrastructure are typically associated with construction activities that can potentially intersect shallow groundwater resources, such as locations of deep cuts and bridge piling works.

Project monitoring bores were primarily located near proposed design features with potential to impact on the shallow groundwater resources, primarily deep cuts (defined for the Project as > 10 m BGL) and large embankments proposed to be constructed on compressive geology and the proximity of any potential sensitive receptors.

The site-based groundwater investigative works have been ongoing from 2018 into 2023, and comprise:

- Two campaigns for the drilling and installation of monitoring bores to align with the evolution of the revised reference design
- Aquifer permeability tests
- Groundwater level monitoring and
- Groundwater quality monitoring.

The Project groundwater investigation works completed to date and proposed future groundwater monitoring works are presented below.

The results of these investigations have been utilised to develop this revised draft EIS.

3.4.1 Groundwater monitoring bore installation 2018

The 2018 groundwater monitoring program was developed to inform potential impacts of the feasibility reference design on groundwater resources and development of the draft EIS. The site-specific investigations included:

- Installation of 34 Project groundwater monitoring bores where the Project had greatest potential to interface with groundwater
- Hydraulic aquifer tests (falling head test or rising head test) in groundwater monitoring bores
- Groundwater level monitoring
- Groundwater quality sampling
- Laboratory analysis and data assessment.

3.4.1.1 Monitoring bore installation campaign 2018

The drilling and installation of groundwater monitoring bores in 2018 was conducted according to the *Minimum Construction Requirements for Water Bores in Australia* (Edition 3) (National Uniform Drillers Licensing Committee (NUDLC), 2012). In each instance, the groundwater monitoring bore was designed by a qualified hydrogeologist, with installation conducted by the drilling contractor under the supervision of a qualified field engineer and licenced water bore driller.

Groundwater monitoring bores were equipped with 50 mm diameter class 18 PVC screw jointed casing; factory-slotted screen with 0.4 mm slot size. A borehole diameter of 96 mm was drilled for the installation of the bore casing. A gravel pack (1 to 3 mm washed and graded gravel) was placed in the annulus of the borehole around the screen section that was then capped with a bentonite seal. The annular space above the bentonite seal was grouted (cement – bentonite) to the surface. Each monitoring bore was complete with a protective monument or gatic cover. Installation and construction details for the groundwater monitoring bores are also presented in bore logs provided in EIS Appendix G1: Geotechnical Reports - Investigation Results.

Completed groundwater monitoring bores were developed by purging, either by manual bailing or with a 12 volt Twister groundwater pump, in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (Edition 3) (NUDLC, 2012) and the *Monitoring and Sampling Manual* (DES, 2018).

Field parameters for groundwater quality were monitored during development to quantify when drilling influences had been removed and groundwater from the surrounding aquifer had entered the bore. The groundwater bore was considered developed when purge water was free of sediment and field parameters had stabilised over subsequent readings or the bore was purged dry.

3.4.1.2 Permeability

In situ hydraulic tests for aquifer hydraulic permeability were conducted using the variable head slug test method. Slug tests involve inducing a marked and measurable change in groundwater level within the bore by inserting (falling head) and then removing (rising head) a solid slug, while measuring the water level response over time. In each instance, water level recovery was monitored until it returned to 90 per cent of the pre-test water level, as is industry standard practice. The recorded data allows for an estimation of hydraulic conductivity (k) of the bore's screened material.

The hydraulic testing conducted as part of the Project feasibility investigations are reported in the *100% Feasibility Design Scope of Works – Hydrogeology* (Golder, 2019c). Additional hydraulic testing (slug test) was conducted at five Project monitoring bores as part of the baseline groundwater monitoring program to review and confirm the results of the initial assessment. This hydraulic testing is reported in the *Project Groundwater Bore Visit and Data Collection Factual Memo* (FFJV, 2021) The hydraulic conductivity estimates derived from hydrogeological investigation data are discussed for each of the relevant aquifer units in Section 4.7.

3.4.1.3 Groundwater level monitoring

Dedicated automatic water level pressure transducers (data loggers) were installed in groundwater monitoring bores, with sufficient water, for continuous groundwater level monitoring. The loggers record a pressure measurement once an hour and are checked (calibrated) against manual static water level (SWL) measurements (gauging) collected as a part of site-specific groundwater monitoring events. Monitoring bores were manually gauged using an oil-water interface meter to determine the depth to groundwater (SWL), and tag lines were used to measure the total well depth at the time of logger installation. The transducers record total pressure on the sensor (water column above the sensor and atmospheric/barometric pressure) which is then converted to a groundwater level. Measurements are recorded by the pressure transducers at one-hour intervals and are calibrated by manual static water level measurements (gauging) during each groundwater sampling event. Monitoring wells are gauged using an oil-water interface probe to determine the depth to groundwater (SWL) and tag lines are used to measure the total well depth.

The transient groundwater level data obtained from the transducers are discussed for each relevant aquifer in Section 4.7.

3.4.1.4 Groundwater quality sampling

After the bores were installed and developed in 2018, a groundwater monitoring event was performed and quality samples collected in accordance with the *Monitoring and Sampling Manual* (DES, 2018), where there was sufficient water available to do so. The groundwater quality data obtained after drilling are discussed for each of the relevant aquifer units in 4.7.1.

3.4.2 Baseline groundwater monitoring events 2018 to 2022

3.4.2.1 Groundwater level monitoring

The groundwater data loggers installed in bores after construction in 2018 were downloaded as a part of each site-specific monitoring event. The depth to water was measured manually in all groundwater monitoring bores visited; the manual measurements are used to calibrate the data loggers. A hydrograph was developed for all bores with a record of groundwater level measurements over time. The hydrographs are included and discussed in the relevant aquifers in Section 4.7.

3.4.2.2 Groundwater quality monitoring

Groundwater samples were procured from monitoring bores via the Hydrasleeve™ passive sampling technique. Field physicochemical parameters were measured and recorded including pH, dissolved oxygen, oxygen reduction potential, electrical conductivity (EC), and temperature. Groundwater quality samples were collected into laboratory supplied pre-preserved bottles and stored on ice in an insulated cooler box whilst on-site and in transit to a National Association of Testing Authorities (NATA) accredited laboratory for analyses.

3.4.2.3 Laboratory analyses of groundwater samples

All primary groundwater samples were submitted under chain of custody documentation to ALS Brisbane, a NATA accredited laboratory. Bore locations and sampling comments are detailed in Appendix A. Inter-laboratory triplicate samples were sent to Eurofins Brisbane (a NATA accredited laboratory) under chain of custody documentation for analyses. Collected groundwater samples were analysed for, and corresponding results are discussed, in Section 6.3.

Samples submitted for analysis for quality control purposes include:

- Intra-laboratory duplicate sample (1 in 20 primary samples)
- Inter-laboratory triplicate sample (1 in 20 primary samples)
- Equipment rinsate (one per sampling round)
- Field blank (one per workorder).

All groundwater samples were laboratory analysed for the chemical analytes as follows:

- Major anions and cations: calcium (Ca²⁺), magnesium (Mg²⁺), sodium (Na⁺), potassium (K⁺), chloride (Cl⁻), fluoride (F⁻), sulfate (SO₄²⁻), carbonate and bicarbonate alkalinity and hardness
- pH
- EC
- Total dissolved solids (TDS)
- Total and dissolved metals: arsenic, boron, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, iron, nickel, lead, selenium, vanadium, zinc, and mercury
- Nutrients: nitrate, nitrite, ammonia, reactive phosphorous, total nitrogen, total Kjeldahl nitrogen and total Phosphorus
- Sodium adsorption ratio (SAR).

Select samples were laboratory analysed for additional chemical parameters, as a conservative measure upon review of the draft EIS Chapter 8: Land Use and Tenure for registered contaminated land near shallow groundwater and/or surface water features, as follows:

- Total recoverable hydrocarbons
- Benzene, toluene, ethylbenzene, xylenes, and naphthalene
- Polycyclic aromatic hydrocarbons
- Polychlorinated biphenyls
- Organochlorine/Organophosphorus pesticides.

Table 3.7 Baseline monitoring data summary

Bore	Aquifer	No. of sampling events	Comments
310-01-BH2213	BRA	3	Historical site access restraints.
310-01-BH2217	BRA	8	No access during November 2021 and March 2022 baseline event due to local flooding.
310-01-BH2218	BRA	7	No access during November 2021 and March 2022 baseline event due to local flooding.
310-01-BH2201	Kumbarilla Beds	6	Historical site access restraints.
310-01-BH2302	WCM	0	Bore dry since commencement of baseline monitoring.
310-01-BH2203	WCM	10	These sample events were obtained despite no access during November 2021 baseline event due to local flooding.
310-01-BH2304	WCM	0	Bore dry since commencement of baseline monitoring.
310-01-BH2305	WCM	0	Bore dry since commencement of baseline monitoring.
310-01-BH2206	WCM	10	Notwithstanding there was no access during November 2021 baseline event due to local flooding 10 samples were obtained.
310-01-BH2308	WCM	0	Historical site access restraints.
310-01-BH2309	WCM	5	Historical site access restraints.
310-01-BH2210	WCM	6	Historical site access restraints.
310-01-BH2311	Eurombah Formation (WCM)	0	Bore dry since commencement of baseline monitoring.
310-01-BH2214	WCM	7	Historical site access restraints.
310-01-BH2215	WCM	7	Historical site access restraints.
310-01-BH2216	WCM	10	These sample events were obtained despite no access during November 2021 baseline event due to local flooding.
310-01-BH2617	BRA (Canning Creek)	3	Historical site access restraints.
310-01-BH2341	WCM	0	Bore dry since commencement of baseline monitoring.
310-01-BH2323	Eurombah Formation (WCM)	0	Bore dry since commencement of baseline monitoring.
310-01-BH2355	MRV	0	Bore dry since commencement of baseline monitoring.
310-01-BH2326	WCM	0	Bore dry since commencement of baseline monitoring.
310-01-BH2229	WCM	0	Bore dry since commencement of baseline monitoring.
310-01-BH2233	CA	5	Historical site access restraints.
310-01-BH2234	CA	5	Historical site access restraints.
310-01-BH2235	CA	5	Historical site access restraints.

Bore	Aquifer	No. of sampling events	Comments
310-01-BH2231	CA	1	Bore compromised – root intrusion.
310-01-BH2337	MRV	0	Bore dry since commencement of baseline monitoring.
310-01-BH2338	MRV	0	Bore dry since commencement of baseline monitoring.
310-01-BH2343	MRV	10	These sample events were obtained despite no access during November 2021 baseline event due to local flooding.
310-01-BH2344	Alluvium/MRV	7	No access during November 2021 and March 2022 baseline event due to local flooding. Initial access restraints.
310-01-BH2345	MRV	10	These sample events were obtained despite no access during November 2021 baseline event due to local flooding.
310-01-BH2347	MRV	10	These sample events were obtained despite no access during November 2021 baseline event due to local flooding.
310-01-BH2248	MRV	9	No access during May and November 2021 baseline events due to local flooding.
310-01-BH2352	MRV	0	Bore dry since commencement of baseline monitoring.

Table 3.8 Baseline monitoring event summary

Event dates	Project bores sampled	Climatic conditions
October 2018	270-01-BH2217, 270-01-BH2218, BH2203, BH2206, BH2216, BH2214, BH2215, BH2201, BH2309, BH2210, BH2308, BH2229, BH2302, BH2304, BH2305, BH2311, BH2323, BH2326, BH2343, BH2345, BH2347, BH2248, BH2344, BH2355, BH2337, BH2338, BH2341, BH2352, BH2233, BH2234, BH2235, BH2231, BH2617.	76.6 mm rainfall recorded during October 2018.
31/03/2020 to 03/04/2020 (Levels Only)	BH2206, BH2214, BH2215, BH2216, BH2341, BH2323, BH2617, BH2355, BH2326, BH2229, BH2337, BH2338, BH2343, BH2344, BH2345, BH2347, BH2248, BH2352, BH2203, BH2304, BH2305, BH2646.	1.0 mm rainfall recorded in 5 days preceding event.
15/06/2020 to 23/06/2020	BH2305, BH2304, BH2203, BH2206, BH2214, BH2215, BH2201, BH2303, BH2302, BH2311, BH2216, BH2617, BH2341, BH2323, BH2355, BH2326, BH2229, BH2337, BH2338, BH2343, BH2344, BH2345, BH2248, BH2347, BH2352.	16.0 mm rainfall recorded in 5 days preceding event.
22/02/2021 to 25/02/2021	BH2302, BH2305, BH2304, BH2203, BH2206, BH2308, BH2311, BH2216, BH2326, BH2341, BH2323, BH2617, BH2229, BH2337, BH2338, BH2343, BH2345, BH2347, BH2352.	0.0 mm rainfall recorded in 5 days preceding event.
25/05/2021 to 3/06/2021	270-01-BH2218, 270-01-BH2217, BH2302, BH2302, BH2305, BH2304, BH2203, BH2206, BH2308, BH2311, BH2216, BH2617, BH2341, BH2323, BH2326, BH2337, BH2338, BH2343, BH2345, BH2352, BH2347, BH2229.	0.0 mm rainfall recorded in 5 days preceding event.
28/06/2021 to 1/07/2021	270-01-BH2217, 270-01-BH2218, BH2347, BH2229, BH2305, BH2304, BH2203, BH2206, BH2326, BH2355, BH2308, BH2311, BH2216, BH2341, BH2617, BH2337, BH2338, BH2323, BH2343, BH2345, BH2248, BH2352, BH2302, BH2344.	24.6 mm rainfall recorded in 5 days preceding event.
12/09/2021 to 18/09/2021	270-01-BH2218, 270-01-BH2217, BH2235, BH2234, BH2233, BH2231, BH2352, BH2347, BH2248, BH2229, BH2326, BH2323, BH2341, BH2617, BH2216, BH2215, BH2214, BH2309, BH2210, BH2305, BH2304, BH2203, BH2206, BH2311, BH2308, BH2302, BH2355, BH2337, BH2338, BH2343, BH2344, BH2345.	0.0 mm rainfall recorded in 5 days preceding event.

Event dates	Project bores sampled	Climatic conditions
25/10/2021 to 29/10/2021	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2201, BH2347, BH2233, BH2235, BH2234, BH2231, BH2341, BH2355, BH2323, BH2305, BH2210, BH2214, BH2302, BH2311, BH2308, BH2203, BH2304, BH2309, BH2215, BH2206, BH2229, BH2344, BH2345, BH2216, BH2248, BH2337, BH2343, BH2617, BH2326, BH2338, BH2352.	0.0 mm rainfall recorded in 5 days preceding event.
29/11/2021 to 30/11/2021	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2248.	33.6 mm rainfall recorded in 5 days preceding event. Further, 29.0 mm rainfall recorded during event causing localised flooding.
13/12/2021 to 21/12/2021	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2248, BH2355, BH2311, BH2214, BH2215, BH2302, BH2203, BH2305, BH2304, BH2206, BH2216, BH2617, BH2337, BH2338, BH2309, BH2341, BH2323, BH2229, BH2345, BH3361, BH2352, BH2210, BH2343, BH2344, BH2201, BH2233, BH2234, BH2235, BH2231, BH2308, BH2326, BH2347.	37.0 mm rainfall recorded in 5 days preceding event.
7/03/2022 to 11/03/2022	270-01-BH2217, BH2347, BH2345, BH2343, BH2337, BH2338, BH2341, BH2617, BH2216, BH2311, BH2302, BH2305, BH2304, BH2203, BH2206, BH2308, BH2323, BH2309, BH2210, BH2214, BH2215, BH2326, BH2229, BH2352.	0.0 mm rainfall recorded in 5 days preceding event.
19/04/2022 to 24/04/2022	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2347, BH2352, BH2345, BH2229, BH2326, BH2323, BH2341, BH2617, BH2216, BH2311, BH2210, BH2309, BH2308, BH2305, BH2304, BH2203, BH2206, BH2302, BH2201, BH2235, BH2234, BH2233, BH2355, BH2215, BH2337, BH2343, BH2214, BH2338, BH2344, BH2248.	0.0 mm rainfall recorded in 5 days preceding event.
25/10/2023 to 29/10/2023	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2201	0.0 mm rainfall recorded in 5 days preceding event.
29/11/2023 to 30/11/2023	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2201.	33.6 mm rainfall recorded in 5 days preceding event. Further, 29.0 mm rainfall recorded during event causing localised flooding.
13/12/2021 to 21/12/2023	270-01-BH2213, 270-01-BH2217, 270-01-BH2218, BH2201, BH2355*, BH2311*, BH2214*, BH2215*, BH2302*, BH2203*, BH2305*, BH2304*, BH2206*, BH2216*, BH2617*, BH2337*, BH2338*, BH2309*, BH2341*, BH2323*, BH2229*, BH2345*, BH3361*, BH2352*, BH2210*, BH2343*, BH2344*, BH2201*, BH2233*, BH2234*, BH2235*, BH2231*, BH2308*, BH2326*, BH2347*.	37.0 mm rainfall recorded in 5 days preceding event.

Table note:

* sampled up until 21 April 2022

3.4.3 Monitoring bore installation campaign 2023

The groundwater monitoring bore network installed in 2018 was constructed to inform the reference design as presented in the draft EIS. Since installation in 2018, localised design revisions resulted in the Project shifting away from some of the original groundwater bores in the monitoring network. The data gaps between the existing groundwater monitoring network and the updated revised reference design (this revised draft EIS) have been remedied by ARTC with the installation of additional groundwater monitoring bores to align closer with the revised reference design.

Twenty-two new groundwater monitoring bores were installed, and eight existing monitoring bores (BH2352, BH2355, BH2304, BH2305, BH2308, BH2311, BH2323, BH2617) were decommissioned in 2023 in accordance with *Minimum Construction Requirements for Water Bores in Australia* (Edition 4) (NUDLC, 2020).

Locations of registered and site investigation bores are shown on Figure 4.26. The resultant updated groundwater monitoring network as of 2023, including borehole locations, installation detail, and hydraulic records (as available) are included by Project chainage in Table 3.7. Construction details are presented in EIS Appendix G1: Geotechnical Reports – Investigation Results.

3.4.4 Baseline groundwater monitoring

Site-based groundwater monitoring events are on hold until the detailed design stage of the Project. Site-based monitoring will resume, in accordance with the *Monitoring and Sampling Manual* (DES, 2018) over sufficient time to achieve a baseline dataset. Site-specific WQOs can be developed and used to prepare the construction works stage GMMP for the Project.

When the site-based groundwater monitoring events resume, pressure transducers (loggers) will be installed and groundwater level datasets will be collected and utilised to update the baseline hydrographs for each bore, and the ambient groundwater level (or range) identified.

Groundwater quality samples will resume collection via site-based monitoring events during the detailed design stage of the Project, for a time period sufficient to inform a suitable baseline quality dataset that impacts can be identified, with consideration for seasonal variation, in accordance with the *Using monitoring data to assess groundwater quality and potential environmental impacts* (DES, 2021b). The additional bores to be collected ensure the requirements of the guideline are satisfied.

Table 3.9 Project monitoring bore and results

Chainage (approximate)	Project bore ID	Screened interval (m BGL)	Bore depth (m BGL)	Screened lithology	Aquifer ¹	Surface elevation (m AHD) ²	Median SWL (m AHD)	SWL range from level logger during the field investigation works (m AHD)	Average hydraulic conductivity ³ , k (m/day)	2023 network status
Ch 30.7 km (NS2B)	310-01-BH2213	13.5 to 19.5	20	Sandy gravel and sand	BRA	227.0	215.3	214.8 to 218.2	0.19	Existing bore part of revised GMMP
Ch 32.8 km (NS2B)	310-01-BH2217	9.2 to 15.2	16	Sand and gravelly sand	BRA	227.6	214.8	214.6 to 216.4	0.42	Existing bore part of revised GMMP
Ch 34.8 km (NS2B)	310-01-BH2218	8.8 to 14.8	14.8	Clayey Gravel and gravelly sand	BRA	225.6	213.7	213.5 to 213.8	0.16	Existing bore part of revised GMMP
Ch 35.1 km	310-01-BH2201	20.2 to 29.2	29.2	Extremely weathered sandstone	Pilliga Sandstone/ Springbok Sandstone (Kumbarilla Beds)	256.5	248.5	248.4 to 249.0	0.3	Existing bore RN77771 part of revised GMMP
Ch 49.6 km	310-01-BH2302	9.0 to 15.0	15.0	Sandstone	Walloon Coal Measures (WCM)	300.9	Dry bore			Existing bore RN77767
Ch 52.8 km	310-01-BH2203	16.0 to 25.0	25.7	Sandstone	WCM	278.7	258.4	254.6 to 260.9	0.0003	Existing bore RN77769 part of revised GMMP
Ch 53.0 km	310-01-BH2304	2.6 to 8.6	8.6	Siltstone	WCM	289.8	Dry bore			Decommissioned
Ch 53.5 km	310-01-BH2305	9.0 to 15.0	15.0	Siltstone	WCM	287.2	Dry bore			Decommissioned
Ch 54.9 km	310-01-BH2206	16.5 to 25.5	25.5	Weathered mudstone/ sandstone	WCM	272.4	263.3	263.1 to 263.6	0.05	Existing bore RN77763 part of revised GMMP
Ch 59.1 km	310-01-BH2308	9.0 to 15.0	15.0	Weathered clayey sandstone	WCM	301.6	Dry bore			Decommissioned
Ch 63.7 km	310-01-BH2309	9.0 to 15.0	15.0	Extremely weathered sandstone/ mudstone	WCM	277.1	261.6	260.1 to 263.0	0.003	Existing bore RN77768 part of revised GMMP
Ch 65.8 km	310-01-BH2210	21.0 to 30.0	29.95	Siltstone	WCM	283.4	273.9	273.8 to 274.1	0.0001	Existing bore RN77765 part of revised GMMP

Chainage (approximate)	Project bore ID	Screened interval (m BGL)	Bore depth (m BGL)	Screened lithology	Aquifer ¹	Surface elevation (m AHD) ²	Median SWL (m AHD)	SWL range from level logger during the field investigation works (m AHD)	Average hydraulic conductivity ³ , k (m/day)	2023 network status
Ch 71.1 km	310-01-BH2311	9.0 to 15.0	15.0	Extremely weathered sandstone/mudstone	Eurombah Formation (WCM)	296.7	Dry bore			Decommissioned
Ch 87.4 km	310-01-BH2214	14.0 to 20.0	20.0	Extremely weathered sandstone	WCM	321.6	209.5	208.0 to 210.9	0.002	Existing bore RN77761 part of revised GMMP
Ch 88.3 km	310-01-BH2215	21.0 to 30.0	30.0	Extremely weathered sandstone	WCM	225.1	213.0	211.5 to 214.4	3.3	Existing bore RN77669 part of revised GMMP
Ch 94.0km	310-01-BH2216	12.5 to 18.5	18.5	Extremely weathered mudstone	WCM	320.8	312.1	305.2 to 317.0	0.0008	Existing bore RN77762 part of revised GMMP
Ch 112.6 km	310-01-BH2341	9.0 to 15.0	15.0	Mudstone/sandstone	WCM	446.3	Dry bore			Existing bore RN192202 excluded from revised GMMP
Ch 114.3 km	310-01-BH2323	9.0 to 15.0	15.0	Extremely weathered sandstone/mudstone	Eurombah Formation (WCM)	458.6	Dry bore			Decommissioned
Ch 115.5 km	310-01-BH2617	2.0 to 5.0	5.0	Sand	BRA	323.3	Dry bore			Decommissioned
Ch 116.4 km	310-01-BH2355	17.0 to 20.0	20.0	Basalt	Main Range Volcanics (MRV)	477.5	Dry bore			Decommissioned
Ch 122.1 km	310-01-BH2326	9.0 to 15.0	15.0	Extremely weathered mudstone	WCM	477.0	Dry bore			Existing bore RN192245 excluded from revised GMMP

Chainage (approximate)	Project bore ID	Screened interval (m BGL)	Bore depth (m BGL)	Screened lithology	Aquifer ¹	Surface elevation (m AHD) ²	Median SWL (m AHD)	SWL range from level logger during the field investigation works (m AHD)	Average hydraulic conductivity ³ , k (m/day)	2023 network status
Ch 127.8 km	310-01-BH2229	24.0 to 30.0	30.0	Sandstone	WCM	406.6	Dry bore			Existing bore RN192211 excluded from revised GMMP
Ch 137.6 km	MW100	9.0 to 15.0	-	Siltstone and basalt	MRV	430.3	NS			New bore RN192747 part of revised GMMP
Ch 138.5 km	310-01-BH2231	11.4 to 17.4	17.4	Sandy gravel/ Clayey sand/ Gravely sand	Condamine Alluvium (CA)	377.8	Dry bore			Existing bore excluded from revised GMMP
Ch 138.6 km	MW118	19.0 to 25.0	-	Siltstone	MRV	432.7	NS			New bore RN192748 part of GMMP
Ch 141.7 km	MW101	12.5 to 18.5	-	Basalt	MRV	500.5	NS			New bore RN192749 part of revised GMMP
Ch 142.8 km	310-01-BH2233	9.5 to 12.5	24.5	Clayey sand/ Clay/Sand	CA	378.9	363.8	363.5 to 364.9	0.12	Existing bore RN192244 excluded from revised GMMP
Ch 143.2 km	310-01-BH2234	16.4 to 22.4	22.4	Clayey sand/ Gravely sand	CA	379.2	362.2	358.9 to 363.1	0.29	Existing bore RN172705 excluded from revised GMMP
Ch 145.0 km	MW102	15.5 to 21.5	-	Basalt	MRV	535.5	NS			New bore RN192751 part of revised GMMP
Ch 148.7 km	310-01-BH2235	31.0 to 40.0	40	Sandy clay	CA	381.3	357.9	357.8 to 358.4	0.02	Existing bore RN172704 excluded from revised GMMP

Chainage (approximate)	Project bore ID	Screened interval (m BGL)	Bore depth (m BGL)	Screened lithology	Aquifer ¹	Surface elevation (m AHD) ²	Median SWL (m AHD)	SWL range from level logger during the field investigation works (m AHD)	Average hydraulic conductivity ³ , k (m/day)	2023 network status
Ch 150.0 km	MW103	4.0 to 10.0	-	Gravelly clay	MRV	532.4	NS			New bore RN192752 part of revised GMMP
Ch 156.0 km	MW104	18.0 to 24.0	-	Basalt	MRV	586.5	NS			New bore RN192743 part of revised GMMP
Ch 160.5 km	MW105	23.0 to 29.0	-	Basalt	MRV	580.8	NS			New bore RN192745 part of revised GMMP
Ch 163.2 km	MW106	10.5 to 16.5	-	Clay	MRV	526.7	NS			New bore RN192750 part of revised GMMP
Ch 165.7 km	310-01-BH2337	9.0 to 15.0	15.0	Basalt	MRV	487.1	Dry bore			Existing bore excluded from revised GMMP
Ch 166.6 km	310-01-BH2338	9.0 to 15.0	15.0	Basalt/clay	MRV	504.8	Dry bore			Existing bore excluded from revised GMMP
Ch 168.1 km	MW123	17.5 to 23.5	-	Basalt	MRV	504.0	NS			New bore RN192742 part of revised GMMP
Ch 169.6 km	MW121	17.5 to 23.5	-	Basalt and siltstone	MRV	500.0	NS			New bore RN192741 part of revised GMMP
Ch 185.4 km	310-01-BH2343	12.0 to 15.0	15.0	Basalt	MRV	532.8	520.7	518.7 to 521.5	-	Existing bore RN192209 excluded from revised GMMP
Ch 186.1 km	MW119	18.0 to 24.0	-	Sandy clay, gravelly clay, gravel	CA	382.2	NS			New bore RN192759 part of revised GMMP

Chainage (approximate)	Project bore ID	Screened interval (m BGL)	Bore depth (m BGL)	Screened lithology	Aquifer ¹	Surface elevation (m AHD) ²	Median SWL (m AHD)	SWL range from level logger during the field investigation works (m AHD)	Average hydraulic conductivity ³ , k (m/day)	2023 network status
Ch 188.0 km	310-01-BH2344	9.0 to 15.0	15.0	Sandy gravel/basalt	Alluvium/MRV	524.8	310.1	306.0 to 311.3	0.06	Existing bore RN192206 part of revised GMMP
Ch 189.4 km	310-01-BH2345	21.0 to 30.0	30.0	Basalt	MRV	536.1	515.7	512.4 to 515.9	0.007	Existing bore RN164151 excluded from revised GMMP
Ch 191.6 km	MW120	13.0 to 19.0	-	Clayey sand and sandy clay	CA	378.9	NS			New bore RN192760 part of revised GMMP
Ch 191.9 km	MW114	9.0 to 15.0	-	Clayey sand and sandy clay	CA	377.8	NS			New bore RN192755 part of revised GMMP
Ch 194.1 km	310-01-BH2347	17.0 to 20.0	20.0	Gravelly silt	MRV	463.0	453.6	453.3 to 454.4	0.3	Existing bore RN192205 part of revised GMMP
Ch 196.1 km	310-01-BH2248	19.0 to 25.0	25.0	Sandy clay/clayey sand	WCM	432.9	425.9	417.1 to 426.3	0.2	Existing bore excluded from revised GMMP
Ch 196.2 km	MW116	9.0 to 15.0	-	Clayey gravel and clayey sand	CA	378.2	NS			New bore RN192762 part of revised GMMP
Ch 202.3 km	310-01-BH2352	12.0 to 15.0	15.0	Basalt	MRV	487.3	Dry bore			Decommissioned
Ch 205.2 km	MW107	6.0 to 12.0	-	Sandy clay	WCM	415.0	NS			New bore RN192781 part of revised GMMP
Ch 208.1 km	MW115	4.0 to 10.0	-	Sandy clay and clay	WCM	405.0	NS			New bore RN192756 part of revised GMMP

Chainage (approximate)	Project bore ID	Screened interval (m BGL)	Bore depth (m BGL)	Screened lithology	Aquifer ¹	Surface elevation (m AHD) ²	Median SWL (m AHD)	SWL range from level logger during the field investigation works (m AHD)	Average hydraulic conductivity ³ , k (m/day)	2023 network status
Ch 214.0 km	MW108	11.0 to 17.0	-	Siltstone and coal	WCM	479.0	NS			New bore RN192757 part of revised GMMP
Ch 220.0 km	MW109	7.5 to 13.5	-	Silty clay, siltstone, basalt	WCM or Eurombah Formation	470.0	NS			New bore RN172706 part of revised GMMP
Ch 231.7 km	MW110	9.0 to 15.0	-	Siltstone	WCM	349.0	NS			New bore RN188692 part of revised GMMP
Ch 235.7 km	MW111	7.0 to 13.0	-	Sandy clay and sand	WCM	332.1	NS			New bore RN192758 part of revised GMMP
Ch 261.0 km	MW112	3.0 to 9.0	-	Clayey sand, gravel, sand	CA	309.5	NS			New bore RN77815 part of revised GMMP
Ch 275.0 km	MW113	13.5 to 19.5	-	Shale and siltstone	WCM	295.7	NS			New bore RN77813 part of revised GMMP

Table notes:

RL = reference level

AHD = Australian Height Datum

NS = No sample yet available (results will be obtained to enable derivation of WQOs)

RN = Queensland Registered bore number

4 Existing environment

4.1 Land use

Understanding the use of the land surface in the groundwater study area informs potential impacts on the local groundwater regime and, as such, used to inform of the baseline monitoring analytes of potential concern. For example, in areas where land is used for agricultural/cropping purposes, the shallow groundwater has potential for elevated concentrations of nitrates from fertiliser than non-producing land uses. Whereas in the vicinity of a retail petrol station, there is potential for hydrocarbons to be present in the shallow groundwater. This information aids in identifying the potential quality of groundwater that could be encountered during construction and/or operation of the Project.

Land use within the groundwater impact assessment area is shown by the Queensland Land Use Mapping Program as predominately grazing land. The next most common land uses are also predominately of an agricultural nature including cropping. Other land uses which exceed one per cent of the Project footprint include land classified as other minimal use (that consists of areas of land that are largely unused, for example, residual native cover or land reserved for stock routes), production forestry and transport and communication (which includes transportation infrastructure and commercial services).

Stock grazing on native and modified pasture is distributed throughout most of the impact assessment area whilst cropping occurs across floodplain areas. Irrigated cropping (cotton and grain) is focused within the river floodplains of the Macintyre and Dumaresq rivers, Macintyre Brook, Condamine River, and Gowrie Creek.

The Commodore Mine is located south of Millmerran. At its closest point, the Project (centre of the alignment) is situated approximately 600 m to the west of the current mining operations. The nearest CSG production bores are located over 40 km from the Project, near Cecil Plains (refer location overview for proximity of Cecil Plains to the Project alignment in Figure 1.1).

The land uses of the Project area, and within the groundwater impact assessment area, were considered and incorporated into the locations and depths for the 2023 bore installation campaign. Additional details of the land use within the groundwater impact assessment area are provided in EIS Chapter 8: Land Use and Tenure and was used to inform the groundwater assessment and groundwater monitoring events.

4.2 Catchments

The Project is located across two surface water catchment areas (drainage basins), the Condamine River and the Border Rivers catchments (Figure 4.1). The Project alignment extends through the Borders Rivers catchment from the NSW/QLD border to approximately 15 km southwest of Millmerran (Ch 116.5km). From this point, the Project alignment is located within the Condamine River catchment until its northern end point at Ch 208.2 km.

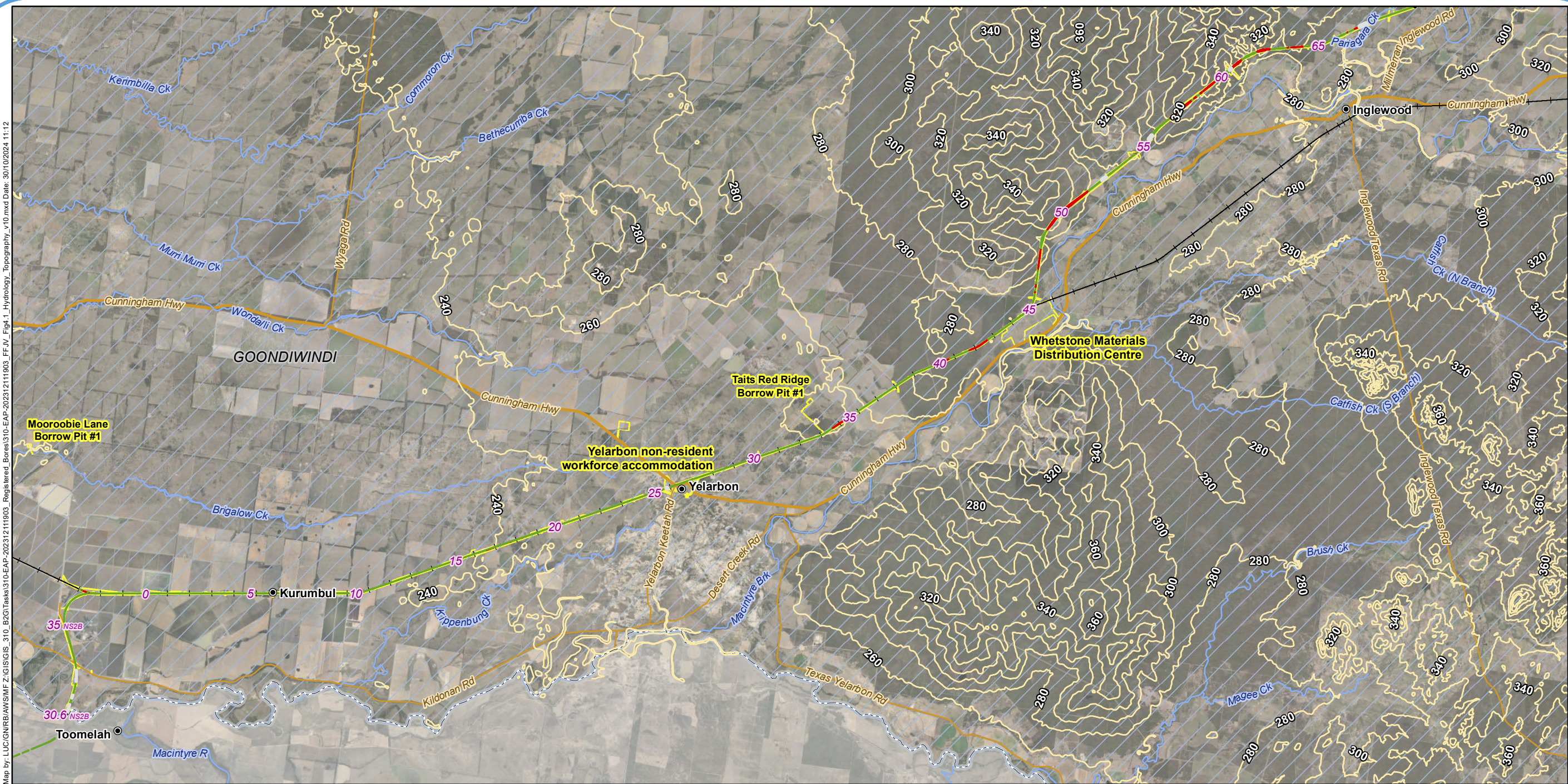
4.3 Watercourses

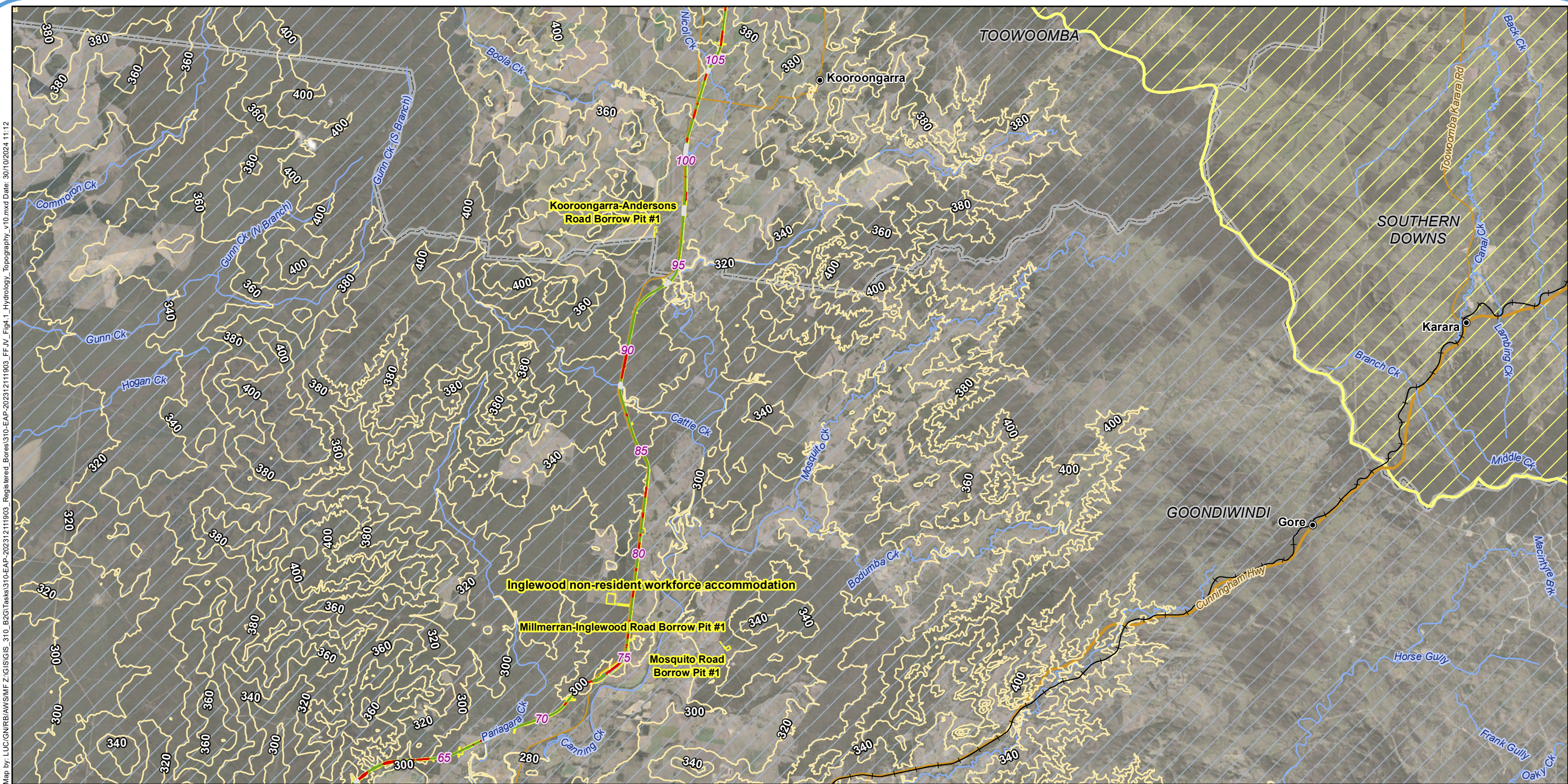
Under the Water Act a watercourse is defined as a river, creek or other stream, which includes a stream in the form of an anabranch or a tributary, where water flows either permanently or intermittently regardless of the frequency of flow events. A watercourse, however, does not include any section of a feature that has a tidal influence or is upstream or downstream of a defined limit between potential estuarine and fresh water. The current defined watercourses within the impact assessment area are listed below under their respective drainage basins. Where the watercourse is intersected by the Project alignment, the approximate chainage is given:

- Borders Rivers Catchment:
 - Macintyre River – Ch 30.6 km (NS2B)
 - Macintyre Brook
 - Canning Creek
 - Pariagara Creek – Ch 67.3 km
 - Cattle Creek – at Ch 88.2 km
 - Bringalily Creek – Ch 100.6 km
 - Nicol Creek – Ch 104.4 km.
- Balonne-Condamine Catchment:
 - Back Creek unnamed tributary – Ch 126.9 km
 - Back Creek – Ch 128.0 km
 - Grasstree Creek – Ch 139.9 km
 - Condamine River (Main Branch) – Ch 144.2 km
 - Condamine River (North Branch) – Ch 149.9 km
 - Umbiram Creek unnamed tributary – Ch 184.8 km
 - Half Mile Gully – Ch 190.0 km
 - One Mile Gully – Ch 193.1 km
 - Westbrook Creek – Ch 198.5 km
 - Dry Creek – Ch 199.3 km
 - Gowrie Creek.

Defined watercourses within the impact assessment area have been identified in reference to DRDMW's Water identification map—watercourses—Queensland (2022). One unmapped water feature was noted within the current impact assessment area. The feature was an upstream reach of Pine Creek, a section of which occurred within the Turallin Facility footprint. Determination by DRDMW (in August 2023) confirmed this reach of Pine Creek as a drainage feature under the Water Act.

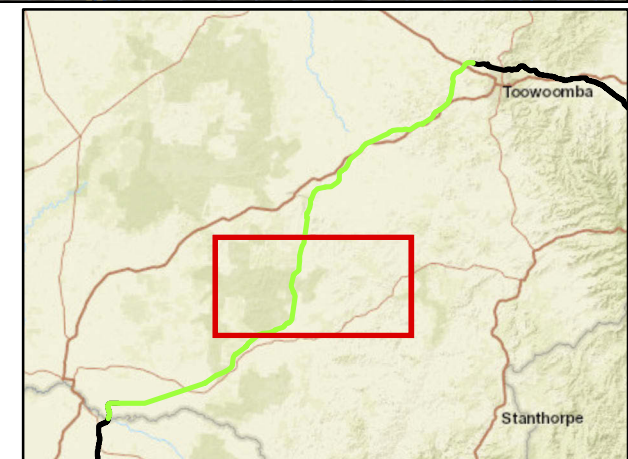
Detailed discussion of watercourses and other drainage features that the Project intersects are discussed in EIS Chapter 13: Surface Water. The primary watercourses which the Project intersects are presented on Figure 4.1.





Legend

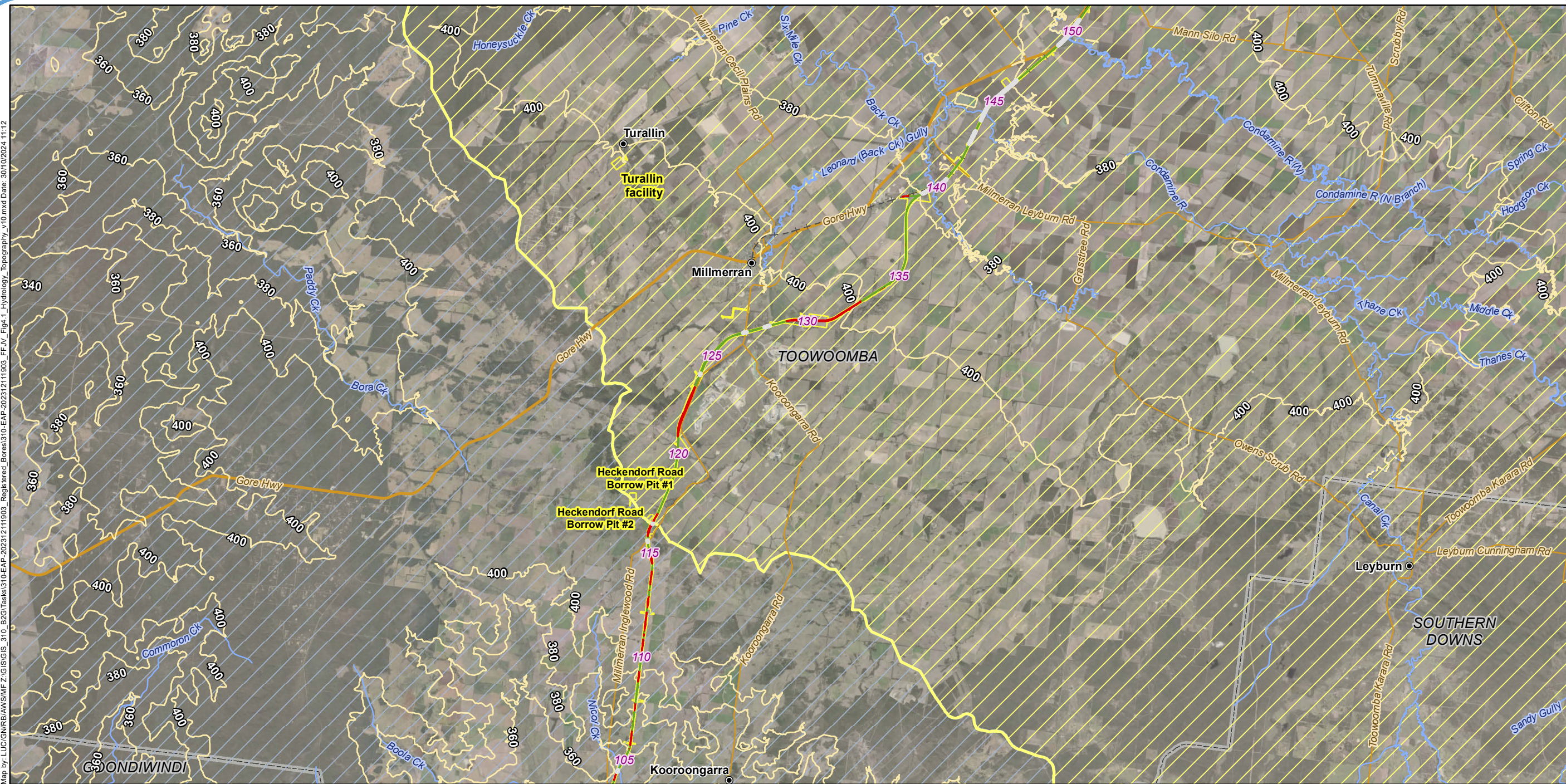
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Bridges
- Major roads
- Minor roads
- Watercourses
- 20 m Contour
- Rail Earthworks Cut
- Rail Earthworks Fill
- Border Rivers catchment
- Condamine and Balonne catchment
- Local Government Areas
- Impact assessment area**
- Temporary footprint



A3 scale: 1:200,000

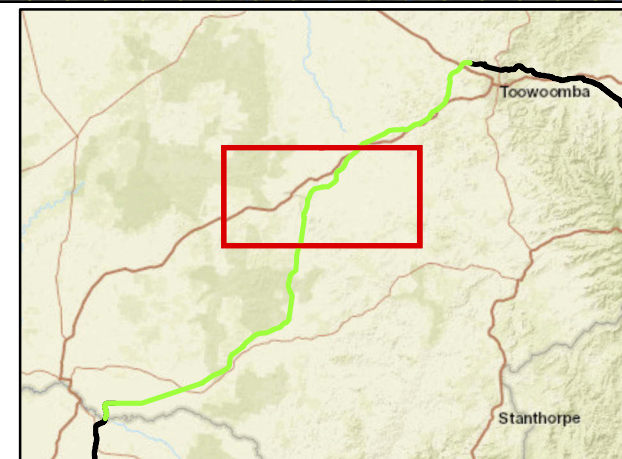
0 2 4 6 8 10 km

Map by: LUC/GNIRB/ANSMF Z:GIS/CIS_310_B2G/Tasks/310-EAP-2023/2111903_Registered_Bores/310-EAP-2023/2111903_FF_V_Fig4.1_Hydrology_Topography_v10.mxd Date: 30/10/2024 11:12

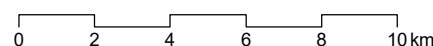


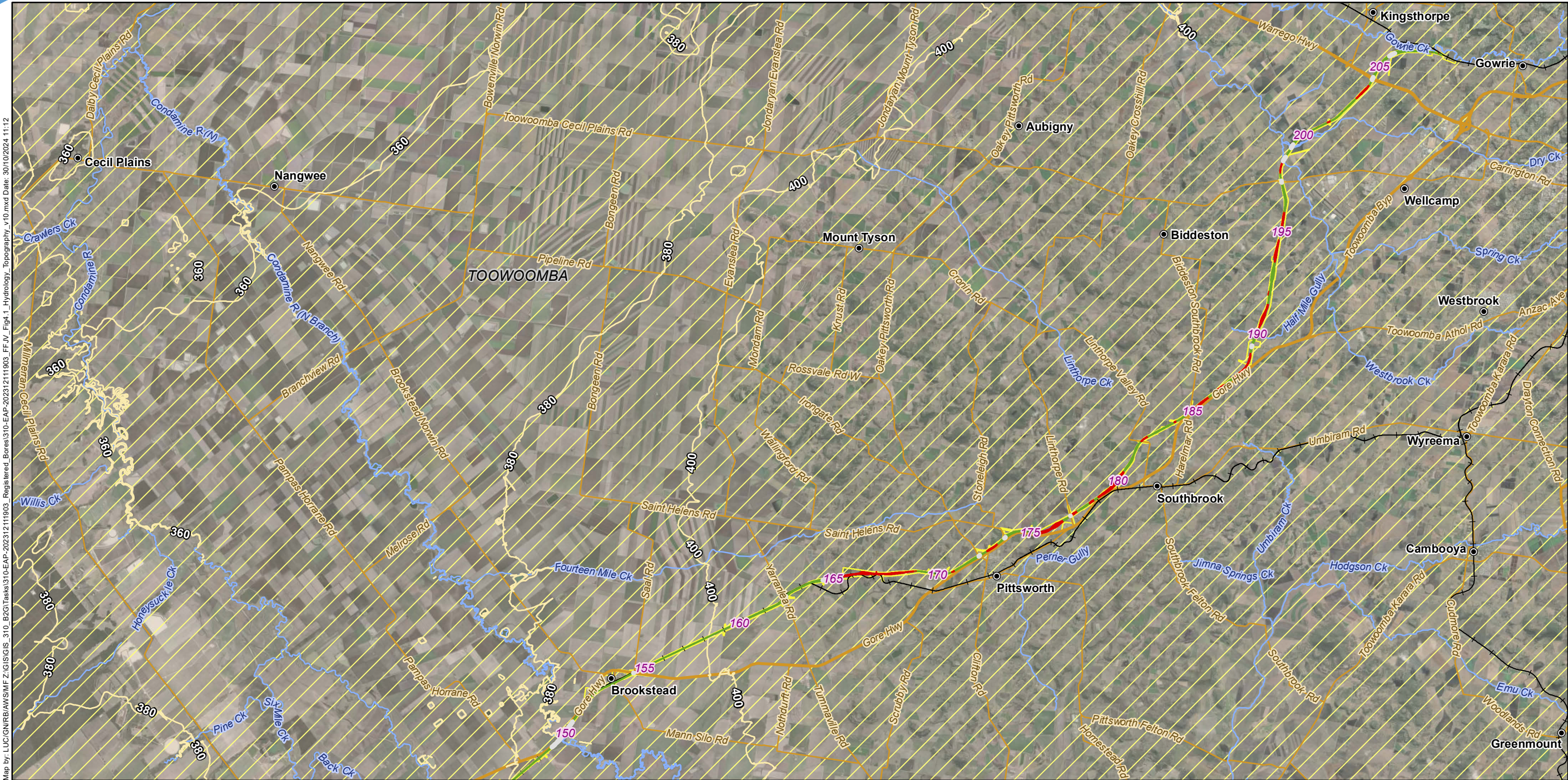
Legend

- | | |
|---------------------------------|---------------------------------|
| 5 Chainage (km) | Rail Earthworks Cut |
| Localities | Rail Earthworks Fill |
| Existing rail (operational) | Border Rivers catchment |
| Existing rail (non-operational) | Condamine and Balonne catchment |
| Bridges | Local Government Areas |
| Major roads | Impact assessment area |
| Minor roads | Temporary footprint |
| Watercourses | |
| 20 m Contour | |

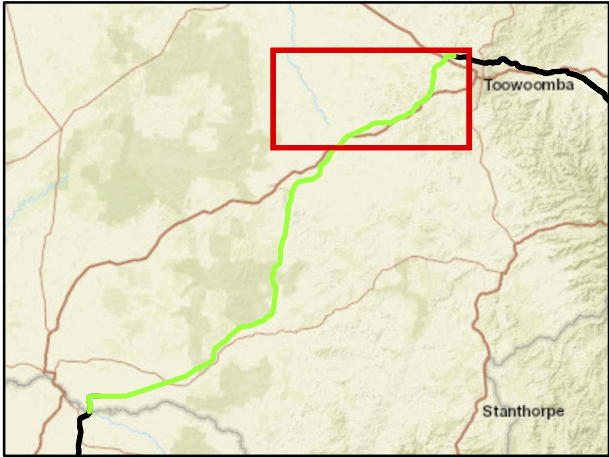


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- Legend**
- 5 Chainage (km)
 - Localities
 - Existing rail (operational)
 - Existing rail (non-operational)
 - Bridges
 - Major roads
 - Minor roads
 - Watercourses
 - 20 m Contour
 - Rail Earthworks Cut
 - Rail Earthworks Fill
 - Condamine and Balonne catchment
 - Local Government Areas
 - Impact assessment area**
 - Temporary footprint



A3 scale: 1:200,000

0 2 4 6 8 10 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure 4.1d:

Topography and surface water features

4.4 Climate

A review of the BoM climate data was undertaken using data sourced from the monitoring station, Pittsworth (041082) (BoM, 2023), proximal to Inglewood. The region has a typical hot and dry climate and typically experiences warm to hot summers and mild to cool winters. Rainfall is seasonally distributed with a distinct wet season occurring during the summer months of December through February and an extended dry season during the months of April through September. Mean maximum monthly temperatures typically range from 29.9°C in the summer to 16.7°C in the winter.

4.4.1 Rainfall

Rainfall data was collected from seven weather stations across the impact assessment area to assess rainfall and evaporation rates from 1883 to 2023. Both currently active and inactive stations indicated that the area receives more than 600 mm but less than 700 mm of annual rainfall (BoM, 2023).

Table 4.1 identifies the recorded rainfall data for the seven weather stations across the impact assessment area. The region receives its heaviest rainfall in summer, with the highest recorded single rainfall event occurring in January 2010 with 433.6 mm. During the winter months, the area predominantly receives low to no rainfall (BoM, 2023).

Table 4.1 Weather stations within proximity of the Project and rainfall data

Station number	Name	Approximate distance from Project (km)	Operation date	Annual rainfall average (mm)	Month of highest rainfall/record amount (mm)	Month of lowest rainfall/record amount (mm)
041391	Woodspring	5	1954-2023	637.9	Dec (330.7)	Aug (0.0)
041047	Inglewood Post Office	2	1883-2023	653.5	Jan (400.4)	Jul (0.0)
41069	Millmerran Post Office	2	1900-2014	662.6	Jan (343.6)	Aug (0.0)
041110	Turallin	10	1909-2022	643.2	Dec (333.5)	Jul (0.0)
41250	Pampas	<1	1959-2023	628.0	Dec (318.0)	Jul (0.0)
41314	Brookstead Post Office	<1	1958-2023	650.0	Dec (370.2)	Jun (0.0)
41082	Pittsworth	<1	1886-2023	698.4	Dec (433.6)	Aug (0.0)

Source: BoM (2023)

To provide information about the conditions of the shallow aquifer in the existing groundwater environment, Section 4.7, three specific weather stations were assessed. These stations were chosen because their locations are relevant to the shallow groundwater resources. This assessment aimed to understand and characterise the various hydrogeologic conditions and weather patterns in the groundwater impact assessment area. The three weather stations considered for this purpose include:

- Inglewood Post office (Station 041047) – located 2.5 km south of Ch 65.5 km – Rainfall data only
- Glen Royal (Station 041504) – located 4 km north-west of Ch 151 km – Rainfall data only
- Warwick (Station 041525) – located 78 km south-west of Ch 157 km – Rainfall and evaporation data.

Rainfall data and evaporation data (Warwick only) is summarised in Table 4.2 and presented on Figure 4.2. A seasonal rainfall pattern exists along the alignment with stable dry winters and warm to hot summers. Moderate to high rainfall is typical during summer storm activity.

Evaporation data from Warwick indicates a net water deficit throughout the year (Table 4.2). The closest BoM weather station that records daily evaporation is the Oakey Aero station (041359), located approximately 13 km north-west of Gowrie and 11 km from the impact assessment area. From 1973 to 2023, the evaporation data related to the impact assessment area demonstrated that there was typically greater evaporation during the summer months and lesser evaporation during the winter months. In January, the average evaporation rate was 7.2 mm/day, whereas in June, the average evaporation rate was 2.6 mm/day (BoM, 2023).

Table 4.2 Summary of rainfall and evaporation data for Inglewood Post Office (041047), Glen Royal (041504) and Warwick (041525)

Month	Mean rainfall (mm)			Minimum rainfall (mm)			Maximum rainfall (mm)			Warwick mean evaporation (mm)
	Inglewood	Glen Royal	Warwick	Inglewood	Glen Royal	Warwick	Inglewood	Glen Royal	Warwick	
January	83.3	84.2	81.6	0	0	3.6	400.4	285.7	176.2	207.4
February	70.8	75.1	68.8	1	0	3.4	261.2	194.0	188.2	184.14
March	61.1	62.9	81.5	0	0	0.0	392.9	329.4	299.8	141.78
April	32.9	35.2	28.1	0	0	0.6	309.8	253.0	74.6	100
May	42.0	41.2	44.9	0	0	3.4	227.8	289.6	187.6	61.77
June	39.6	32.0	34.3	0	0	3.0	201.5	121.5	109.8	40.48
July	38.7	34.4	24.3	0	0	0.0	144.5	140.5	101.6	43.68
August	32.2	29.5	26.6	0	0	0.6	130.2	104.7	108.6	70.35
September	37.6	30.1	34.5	0	0	0.6	167.5	109.4	125.6	111.39
October	55.5	62.3	69.9	1.2	0	0.6	210.2	210.9	183.5	156.6
November	69.0	69.4	82.7	0	0.6	2.6	194	240.7	198.6	186.12
December	81.2	99.6	103.7	2	2.0	12.4	258.2	385.6	282.4	201.28

Table note:

Rainfall statistics sourced from BoM and are representative for the following periods: Inglewood Bridge – 1883 to 2023; Glen Royal – 1928 to 2023; Warwick – 1994 to 2023.

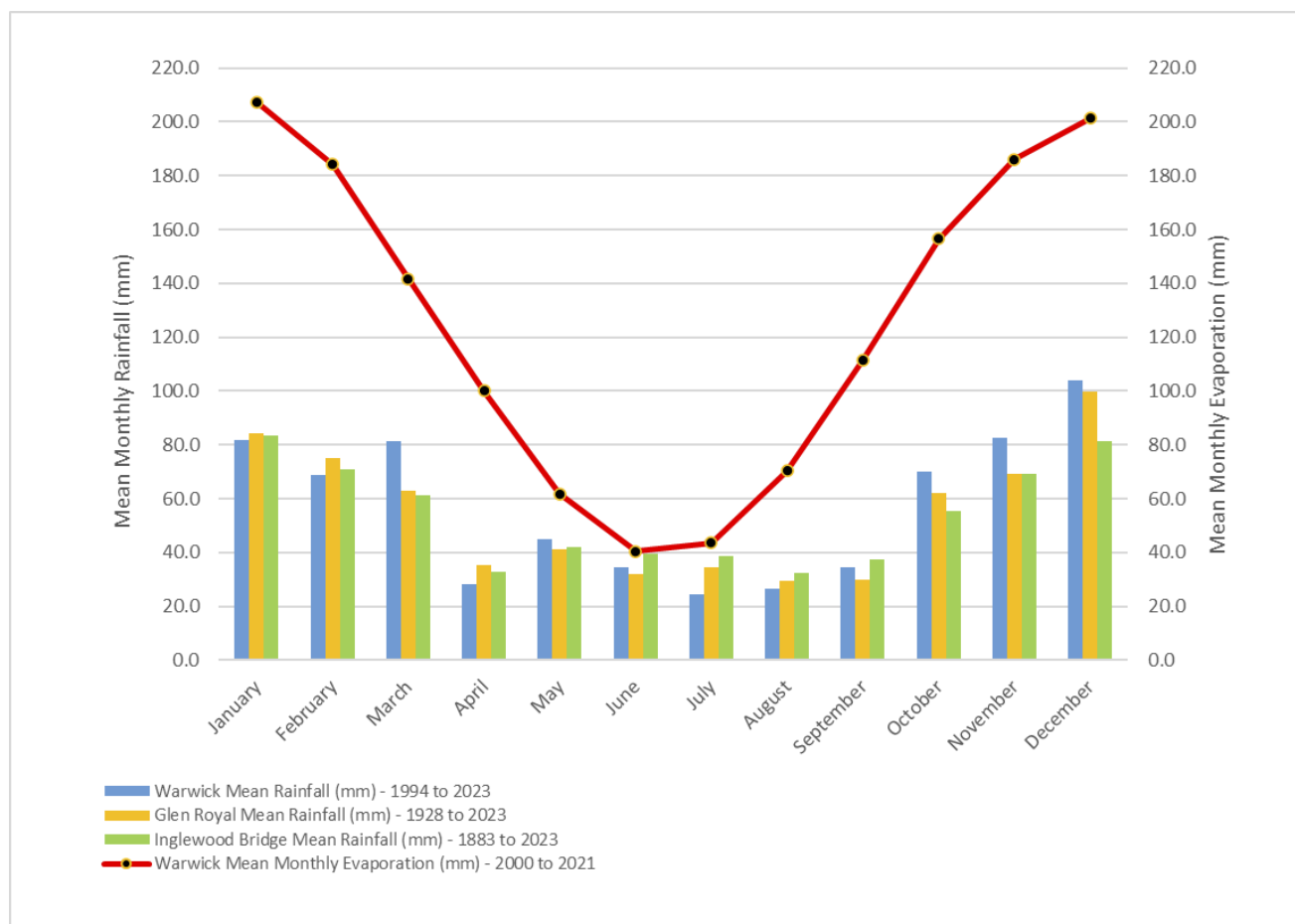


Figure 4.2 Representative mean monthly rainfall and evaporation data along the Project

Cumulative rainfall deviation from long-term monthly rainfall records at Glen Royal are presented in Figure 4.3. Under steady state conditions (i.e. no groundwater abstraction taking place), the trends in this plot may provide an indication of water level response in unconfined aquifers which receive direct rainfall recharge. A positive trend indicates periods of above average rainfall where increased groundwater recharge can occur in unconfined aquifers. A negative slope indicates periods of below average rainfall where decreased groundwater recharge may occur in unconfined aquifers.

The period 1928 to 2023 at Glen Royal (Station 041504) presented in Figure 4.3 is considered representative of conditions along the Project. The graph indicates the following:

- From 1928 to 1946, the cumulative rainfall trend remains relatively flat with minor variations around the average rainfall
- From 1946 to 1951, there is a period of reduced rainfall that falls below the average rainfall, thereby causing a decline in the cumulative rainfall deviation trend
- Rainfall between 1951 and 1975 (drying period) remains below the average rainfall, potentially causing an extended period of inadequate recharge
- An increasing trend from 1975 to 1990 characterised by above average rainfall
- A decreasing trend from 1990 to 1995 characterised by below average rainfall
- A brief increasing trend followed by a prolonged decreasing trend from 1995 to 2010, characterised by below average rainfall
- A general increasing trend from 2010 to 2017 characterised by below average rainfall
- A decreasing trend from 2017 to 2021 characterised by below average rainfall
- An increasing trend from 2021 to 2022 marked by rainfall that surpasses the typical average rainfall. This is then followed by a period of decline until 2023.

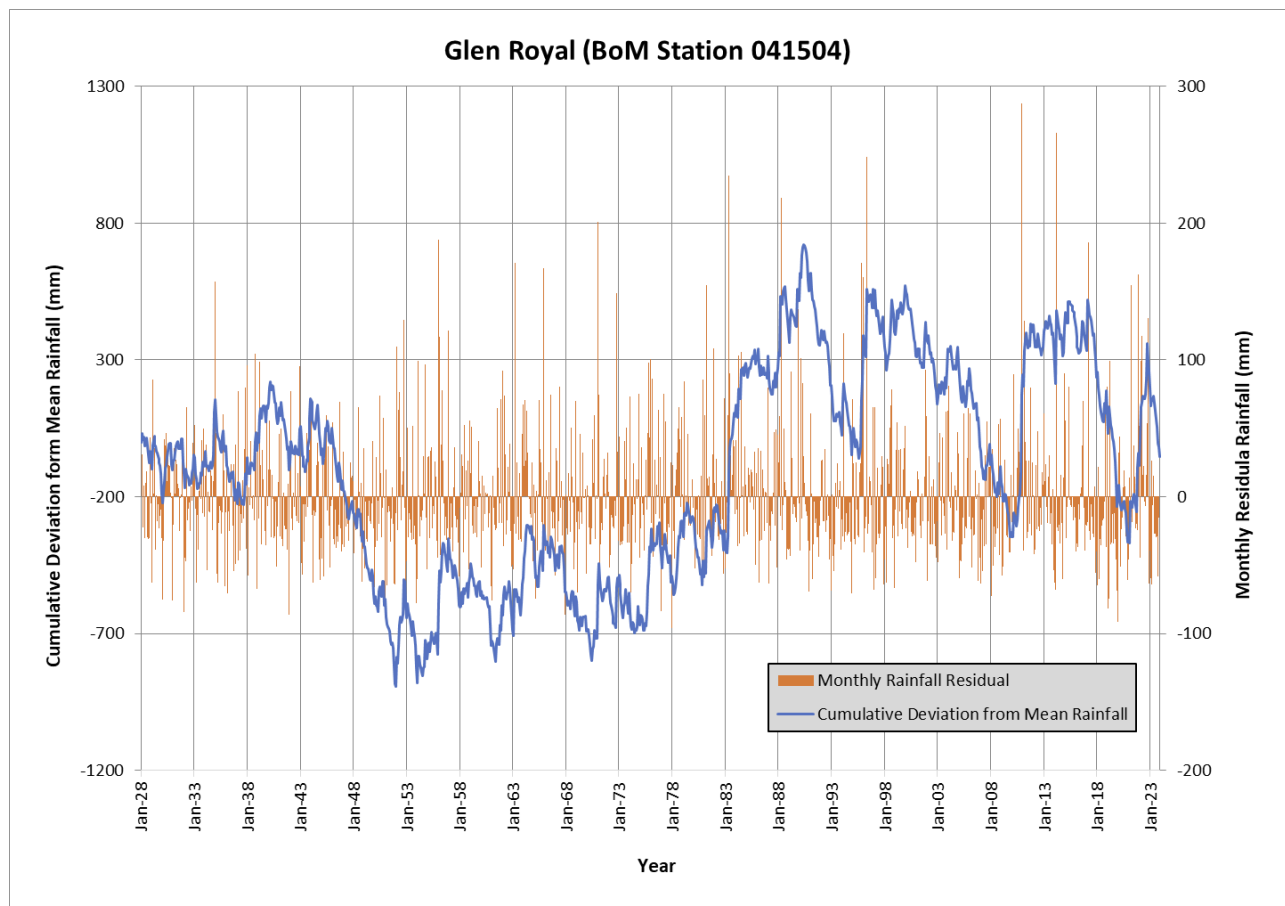


Figure 4.3 Cumulative deviation for monthly rainfall at Glen Royal (BoM station 041504) from 1928 to 2023

Modelling of future aquifer recharge trends due to global warming suggests much of Eastern Australia, including the Border Rivers and Condamine River catchments, could experience a decrease in recharge (CSIRO, 2011). This decrease is projected for the period 2030 to 2050, which may have impacts on the land use, watercourses, and shallow aquifers in the region.

4.4.2 Temperature

The climate of the impact assessment area remains relatively warm all year round with cooler temperatures occurring during winter nights and early mornings. Data was collected from the Texas Post Office (041100) weather station, which is located approximately 46 km southeast of Yelarbon and the Project. Between 1969 and 2023 an average maximum temperature of 26.7°C during summer and an average minimum temperature of 11.6°C during winter was recorded. The hottest day recorded for the impact assessment area occurred in January 1980 where it reached 44.6°C, whilst the coldest ever day record reached by the area was -7.6°C in June 1971. Figure 4.4 provides the mean maximum and minimum temperature recorded at the Texas Post Office (041100).

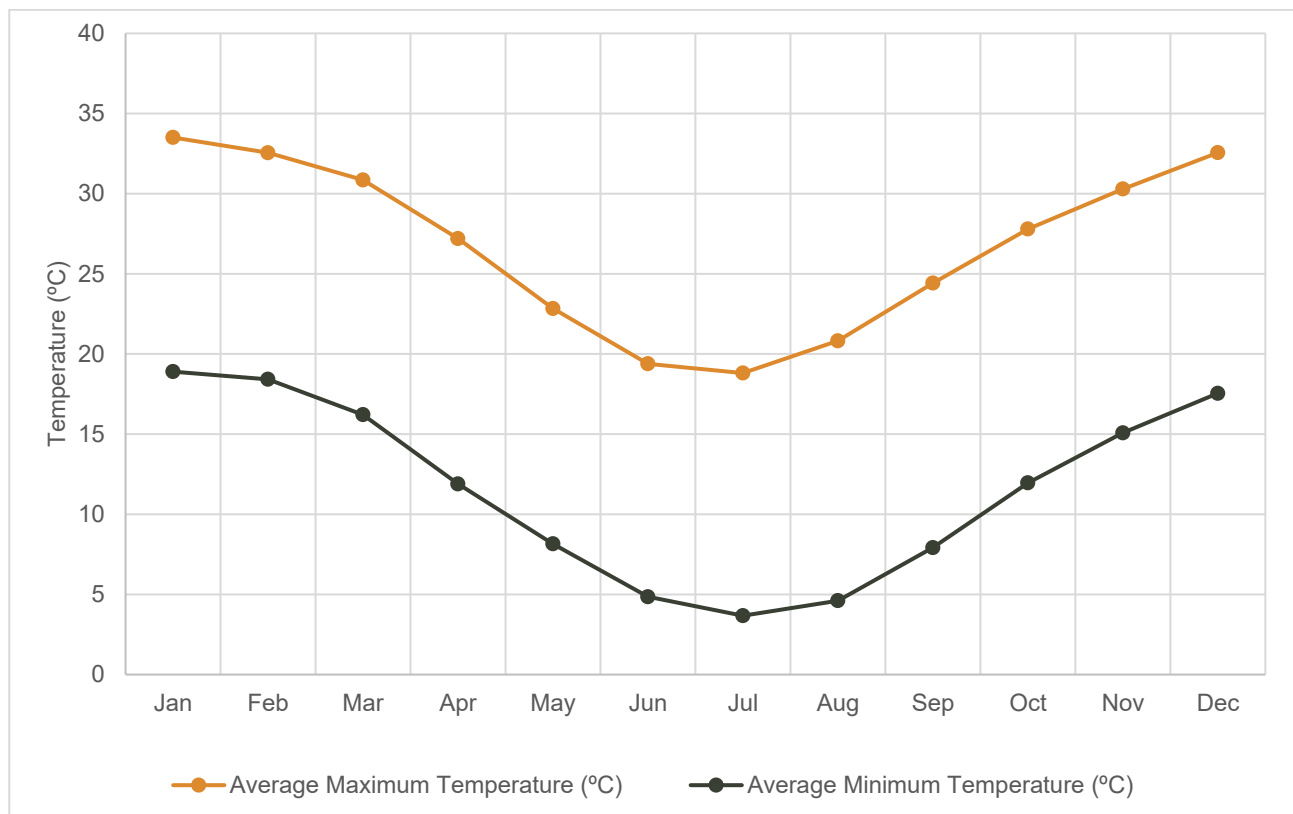


Figure 4.4 Summary of the maximum and minimum temperature recorded at Texas Post Office between 1969 and 2023 (041100)

Source: BoM (2023)

4.5 Topography

The impact assessment area features two distinct areas of high elevation along flat to undulating terrain as the Project alignment passes through the floodplains of the Border Rivers and Condamine River basins. The Project's lowest point of elevation occurs at the southern end of the Project alignment at the Macintyre River with an approximate elevation of 227 m. From this point, elevation along the Project alignment generally increases steadily in a northward direction towards Mount Domville and Commodore Peak, south of Millmerran.

The Project alignment peaks at 484 m at Ch 122.3 km as it passes through the Clontarf and Millmerran area before dropping into the Condamine River floodplain, a shallow topographical parabola between Millmerran and Yarranlea with a low point of 373 m. From Yarranlea, the Project alignment increases in elevation until Ch 180.1 km near Southbrook, where a maximum elevation of 595 m is reached. From this high point, elevation of the Project alignment decreases to an end point at Ch 208.2 km of 458 m.

Topographical contours across the impact assessment area are shown on Figure 4.1.

4.6 Geology

4.6.1 Regional geology

4.6.1.1 Geological setting

The Project is underlain by the Jurassic to Cretaceous aged Surat and Clarence-Moreton basins, which overlie the depositional Permo-Triassic aged Bowen Basin. The Surat and Clarence-Moreton basins are separated by the north – south trending Kumbarilla Ridge. This ridge forms a subsurface bedrock high which the Project alignment encounters at Ch 116.5 km. The Bowen Basin, due to its position below the Surat and Clarence – Moreton basins and the depth of interest, is not considered further.

The Texas Beds are shown to outcrop ~2.5 km east of the alignment at Ch 110 km. The Texas Beds are part of the New-England Oregon geological province and consist of metamorphosed beds of greywacke, conglomerate, siltstone, mudstone, slate, phyllite, chert, basalt, limestone and rare tuff of Silurian age. As the Texas Beds are not considered a regionally significant aquifer, they are not considered further.

The geology considered relevant to the groundwater impact assessment is presented in the subsections below.

4.6.1.2 Surat Basin

The Surat Basin is the sedimentary basin underling the rail alignment between Ch 30.60 km (NS2B) to Ch 116.5 km. Here, the basin generally consists of south-west dipping clastic Jurassic and Cretaceous aged marine sediments (Exon, 1976). The basin began forming during a new phase of thermal subsidence after the Hunter-Bowen orogeny (Fielding et. al. 1993). The base of the Surat Basin is an unconformable contact over the Triassic age Precipice Sandstone and underlying units, including the Moolayember Formation of the Bowen Basin.

4.6.1.3 Clarence-Moreton Basin

The Clarence – Moreton Basin is an extensive intracratonic basin which extends from the Kumbarilla Ridge in the west to the east coast of Australia (O'Brian, et al. 1993). This basin underlies the eastern portion of the Project (east of the Kumbarilla Ridge), approximately between Ch 116.5 km to Ch 208.2 km and is dominated by non-marine clastic sedimentary units.

Understanding of the tectonic setting and structural elements in the basin is still evolving (Rassam et al., 2014). It is suggested that a strike-slip fault regime was initiated during major tectonic activity in the Late Carboniferous period, some 300 million years ago. Strike-slip movement occurred along several major faults which are inferred to control the magnitude of extension during evolution of the basin. As a result, the basin comprises three sub-basins: Cecil Plains sub-basin, Laidley sub-basin, and Logan sub-basin.

Structural features with a major influence on the development of depositional centres include:

- West Ipswich Fault: forms part of the Great Moreton Fault System and forms the eastern limit of the Laidley sub-basin

- Gatton Arch: a broad basement ridge over which sedimentary rocks of the Clarence – Moreton Basin are folded over and become relatively thin; the Gatton arch separates the Cecil Plains and Laidley sub-basins
- South Moreton Anticline: a broad structural high over which the basin strata are folded and thin. This structure is bounded to the west by the West Ipswich Fault and to the east by the East Richmond Fault.

The Project traverses the Cecil Plains sub-basin of the Clarence – Moreton Basin which extends from the Kumbarilla Ridge to the Toowoomba Straight (DNRm, 2016b). The Cecil Plains sub-basin forms a broad undeformed depression overlying the Horrane trough and reaches a maximum thickness of 1.3 km. Further discussion with respect to structural elements is presented in Section 4.6.1.5.

4.6.1.4 Regional stratigraphy

The key stratigraphic units within the Surat and Clarence – Moreton basins are summarised in Table 4.3. Where equivalent units exist for the Surat and Clarence-Moreton Basins, these are shown side-by-side.

Table 4.3 Summary stratigraphic column of the Project

Age	Basin		Main lithology	Thickness	Extent and comments
	Surat	Clarence-Moreton			
Quaternary to Tertiary	Border Rivers Alluvium and Condamine Alluvium	Condamine Alluvium	Clay, silt, sand and gravel.	Border Rivers Alluvium: up to 100 m Condamine Alluvium: up to 150 m	Aquifer (water table) associated with modern river sediments, paleochannels and old alluvial fans. Clay in upper portion of both the Border Rivers and Condamine Alluvium is common. This is likely to reduce recharge via rainfall (Hillier, 2010)
Tertiary		Main Range Volcanics	Basalts, tuff and agglomerate.	Typically, 30 to 150 m, highly variable (DNRm, 2016b)	Aquifer (fractured) Outcrop and sub-crop at higher elevations along the eastern portion of the rail alignment between Ch 163.0 km and Ch 208.2 km.
Cretaceous	Wallumbilla Formation*	-	Mudstone and siltstone	~ 100 m	Aquitard
	Bungil Formation	Kumbarilla Beds	Mudstone, siltstone, and carbonaceous sandstone.	< 200 m	Partial aquifer
	Mooga Sandstone		Clayey sandstone, siltstone and mudstones.	< 100 m	Aquifer
	Orallo Formation		Interbedded siltstone and mudstone	~ 150 to 250 m	Aquitard
	Gubberamunda Sandstone		Poorly sorted sandstone with minor conglomerates and siltstone	~100 m	Aquifer

Age	Basin		Main lithology	Thickness	Extent and comments
	Surat	Clarence-Moreton			
Jurassic	Westbourne Formation		Fine-grained sandstone, interbedded with siltstone, claystone and (minor) coal	Up to 250 m	Aquiclude
	Springbok Sandstone		Porous, fine to coarse massive sandstone and conglomerate	~100 to 300 m	Aquifer
	Walloon Coal Measures	Walloon Coal Measures	Claystone, shales, sandstones and major coal seams	~ 200 to 400 m	Leaky aquitard
	Eurombah Formation		Conglomeritic sandstone, mudstone and siltstone	-	Leaky aquitard – not regionally extensive
	Hutton Sandstone	Marburg Subgroup	Porous quartz rich sandstone.	120 to 180 m	Aquifer
	Evergreen Formation		Siltstone and mudstone	Average thickness is ~150 m	Aquitard
Jurassic to Triassic	Precipice Sandstone	Ripley Road Sandstone	Medium to coarse sandstone	Up to 110 m	Aquifer
Triassic to Permian	-	Raceview Formation	Thinly interbedded, fine to medium grained sandstone, siltstone, claystone, and (minor) carbonaceous material	-	Aquitard
	Basement				

Source: Jell (2013), Great Artesian Basin Consultative Council (1998) and DNRM (2016b)

Table note:

* Indicates stratigraphically significant unit, however not mapped on geological mapping within impact assessment area.

4.6.1.5 Structural geology

Key structural features for the region are displayed on Figure 4.5 and mapped faults of the Surat and Clarence – Moreton basins are presented on Figure 4.6.

The majority of structures identified in the Surat Basin are spatially controlled by deep faults within the underlying Bowen Basin and basement units. The primary structural feature of the Surat Basin is the Mimosa Syncline which formed the main depocenter of the basin. A major north-south trending fault, the Goondiwindi-Moonie Fault, bounds the eastern edge of the Mimosa Syncline (Figure 4.5). The Texas Block lies to the east of the impact assessment area.

A key structural element which separates the Surat and Clarence – Moreton basins is the north-south trending Kumbarilla Ridge (DNRM, 2016b). Sedimentary units of the two basins lap over the Kumbarilla Ridge and some are hydraulically connected in this area. The Surat Basin strata between the Goondiwindi Fault and the Kumbarilla Ridge dip gently to the west (DNRM, 2016b).

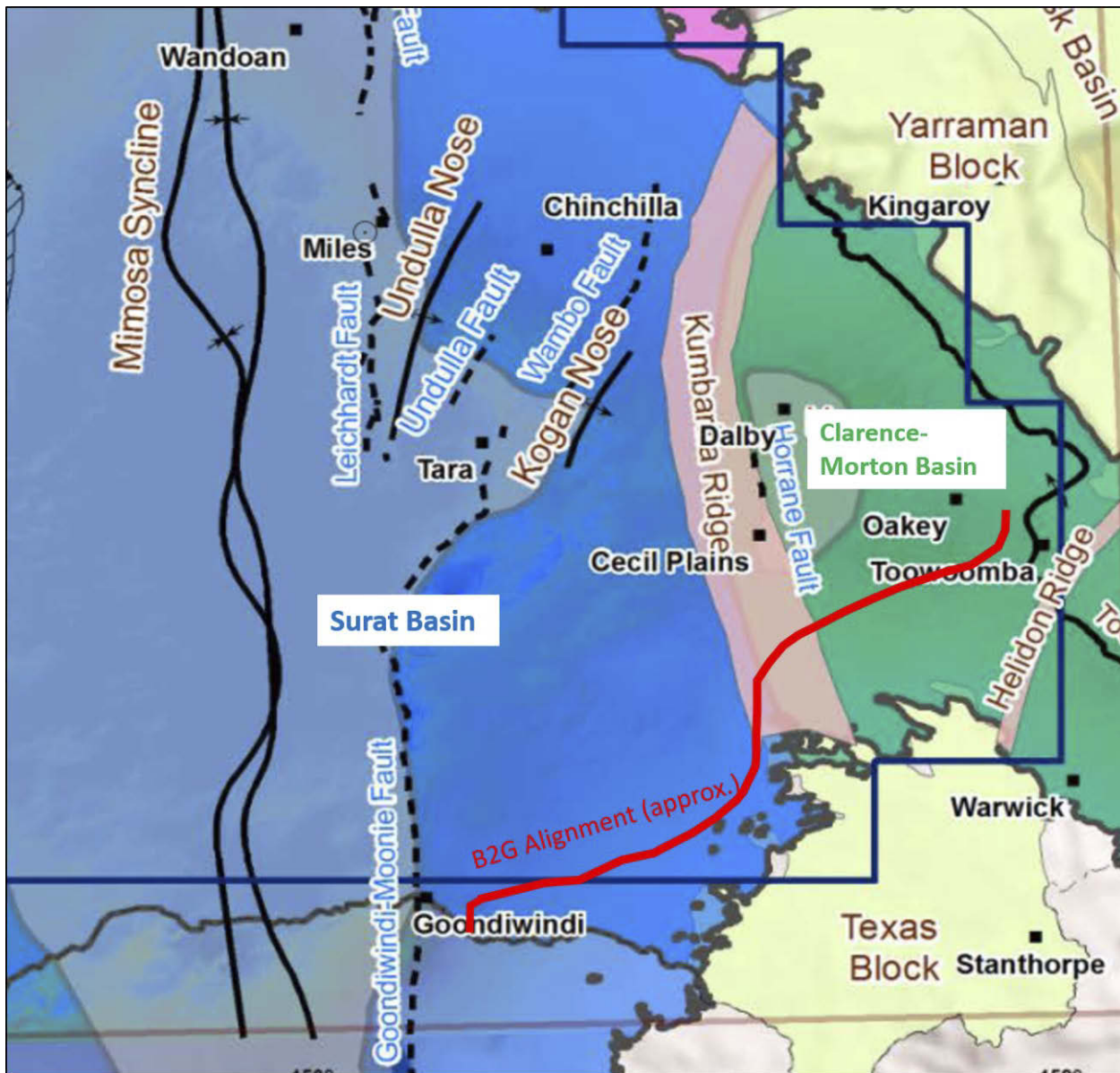


Figure 4.5 Regional structural features

Figure note: Red line indicates the alignment

Modified from DNRM 2016b

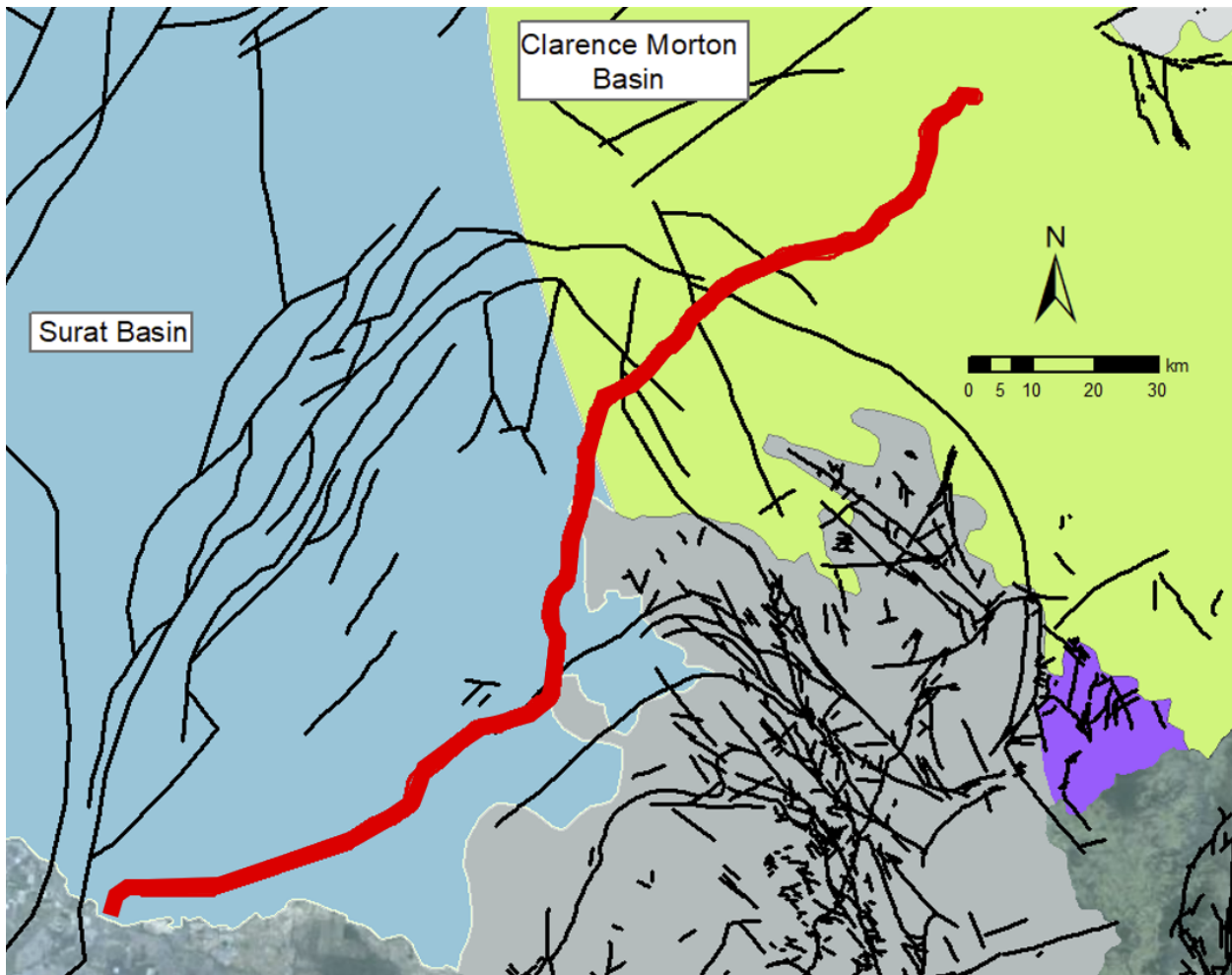


Figure 4.6 Mapped faults in proximity to the Project

Figure note: Red line indicates the alignment

Fault traces sourced from the DRDMW detailed structural geology spatial dataset published November 2020

A large dryland salinity scald near Yelarbon has been associated with the offset Peel Fault, a major north trending thrust system to the west of Yelarbon (Knight, et al., 1989). The Peel Fault offset is postulated to act as a conduit for saline groundwater to the soil profile creating sodic dispersive soils in the area. The *Salinity Management Handbook* suggests geological faulting can provide a preferential flow path for groundwater to the surface, resulting in springs (Department of Environment and Resource Management (DERM), 2019).

This salinity scald occurs along the Project alignment between Ch 24 km to Ch 27 km.

Other mapped faults traversed by the Project include:

- Ch 64.0 km and Ch 78.0 km: An inferred fault trending north-east to south-west of unknown displacement direction
- Ch 128.5 km: north-south trending fault inferred from geophysics of unknown displacement direction
- Ch 146.5 km: north-west to south-east trending fault through the Condamine River floodplain inferred from geophysics of unknown displacement direction
- Ch 160.8 km: north-west to south-east trending fault inferred from geophysics of unknown displacement direction.

Figure 4.7 presents a conceptualisation of the Peel Fault depicting the inferred mechanism for the salinity scald.

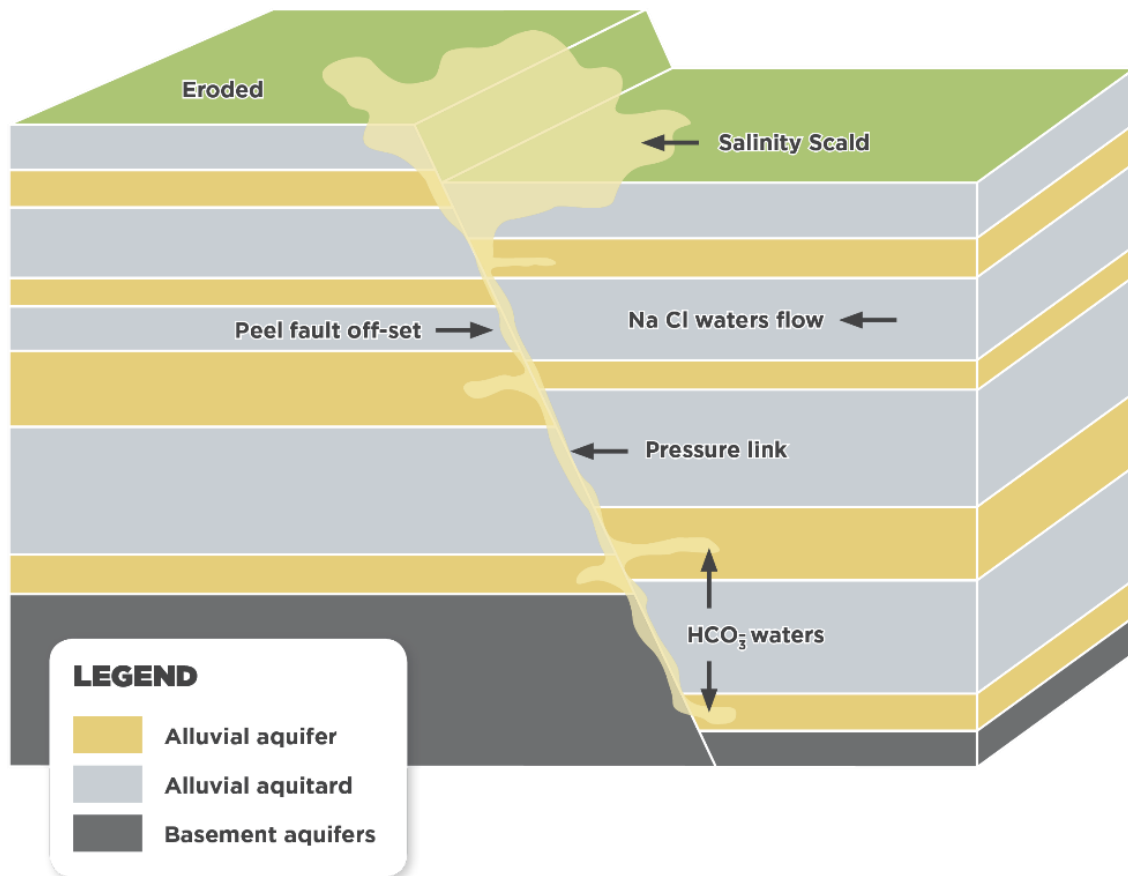


Figure 4.7 Conceptualisation of the Peel Fault

Source: DERM (2019)

4.6.2 Project geology

The geological units within the impact assessment area, inclusive of those which outcrop and sub-crop, are described below, from youngest to oldest (based on Rassam et al., 2014 and Golder, 2019a).

Where provided, borehole references (BH) relate to boreholes installed during the reference design stage investigations (Section 1).

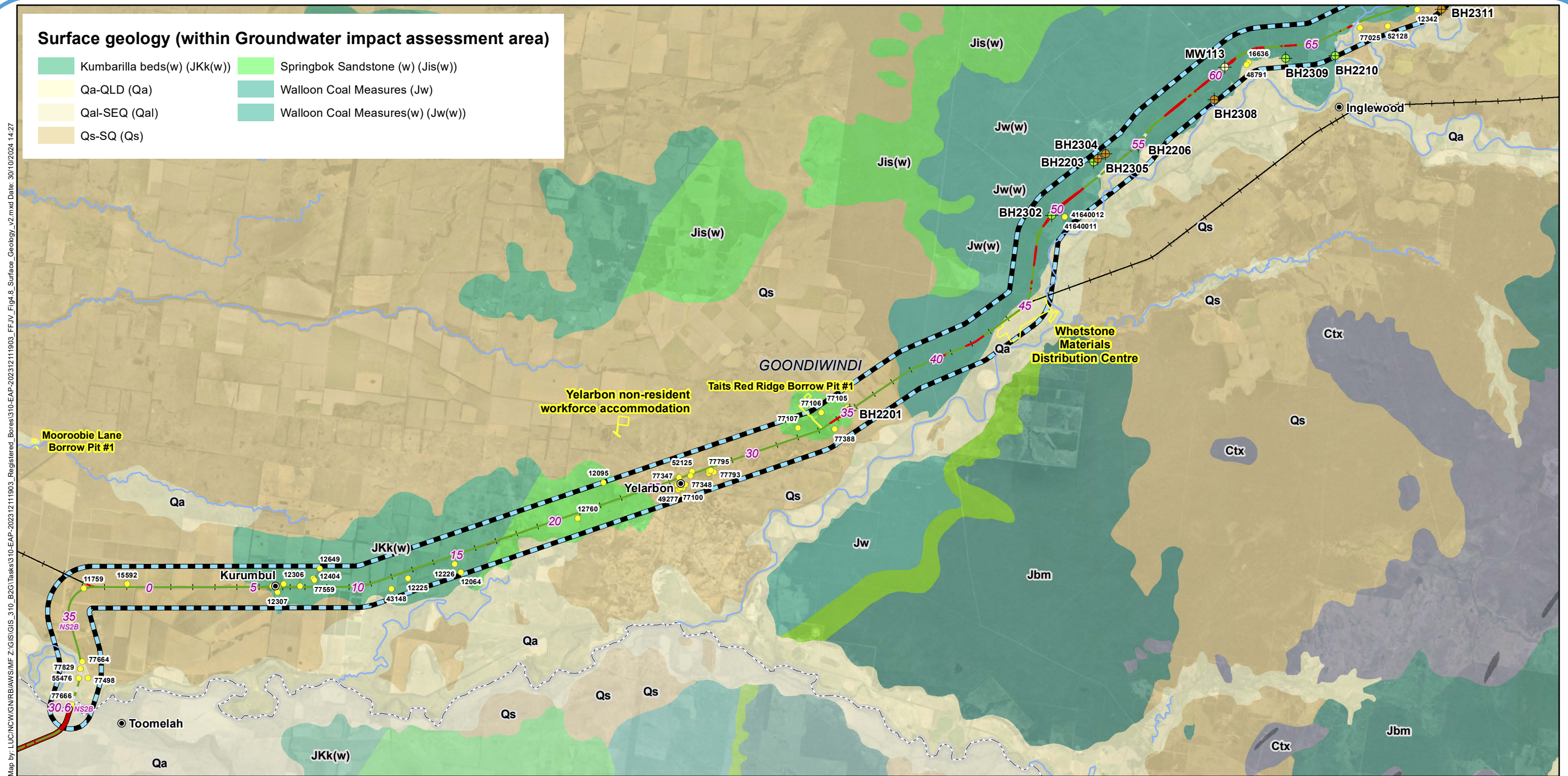
4.6.2.1 Alluvium/colluvium (Cainozoic)

Two primary alluvial units of relevance are present at surface along the groundwater impact assessment area distinguished by their respective catchments, namely the:

- Border Rivers Alluvium (BRA) – within the Border River catchment between approximately Ch 30.60 km (NS2B) to Ch 116.4 km
- Central Condamine Alluvium (and Upper Condamine Alluvium Tributaries)-within the Condamine-Balonne catchment between approximately Ch 116.4 km to Ch 208.2 km.

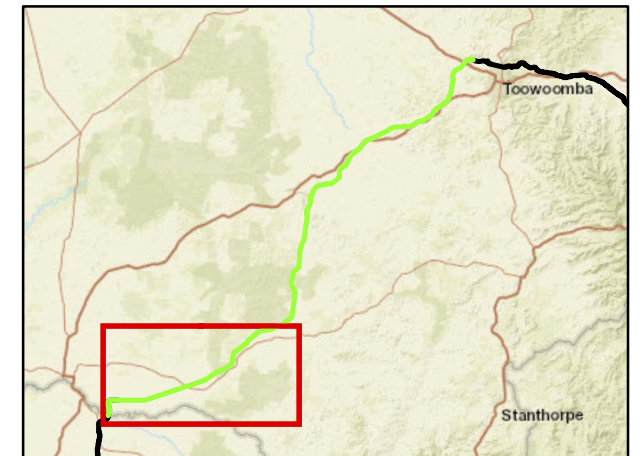
These Cainozoic sedimentary units comprise alluvial and colluvial sediments. Alluvial sediments are primarily transported and deposited by waterways and rivers, while colluvium/colluvial sediments consist of sands and soils derived from slope wash deposition. In areas with both colluvial sediments (in proximity to the Great Dividing Range) and alluvial deposits, these units are not distinguishable from each other, and hence discussed as one (alluvial/alluvium) unit. This colluvium is likely to comprise significant portions of the geological unit mapped as abandoned river terraces (Qs) in Figure 4.8.

Each of the alluvial units are discussed in the subsections below. Figure 4.8 depicts the mapped surface geology within and adjacent to the impact assessment area.

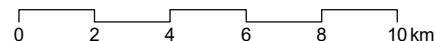


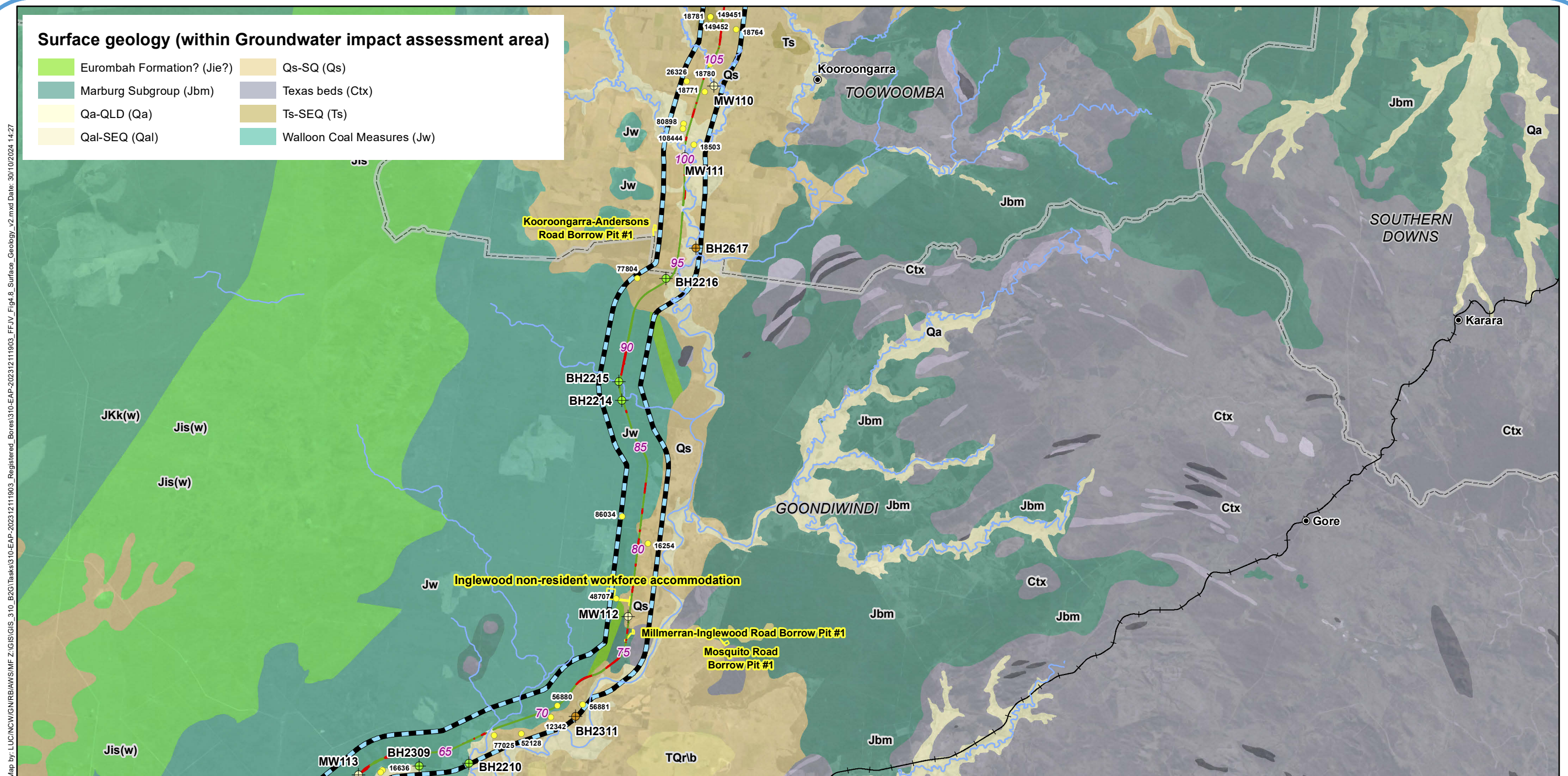
Legend

- | | | |
|-----------------------------------|--|------------------------------------|
| 5 Chainage (km) | North Star to NSW/QLD border alignment | Rail Earthworks Cut |
| Localities | Bridges | Rail Earthworks Fill |
| Existing site investigation bores | Existing rail (operational) | Groundwater impact assessment area |
| Former site investigation bores | Watercourses | Local Government Areas |
| New site investigation bores | NSW/QLD border | Impact assessment area |
| Registered bores | | Temporary footprint |



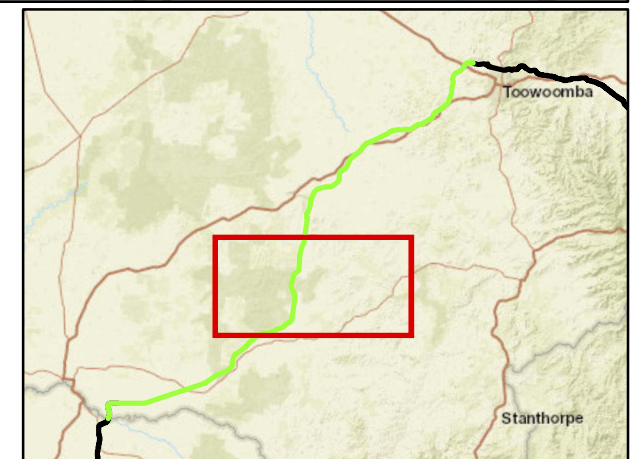
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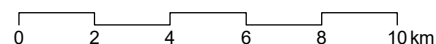


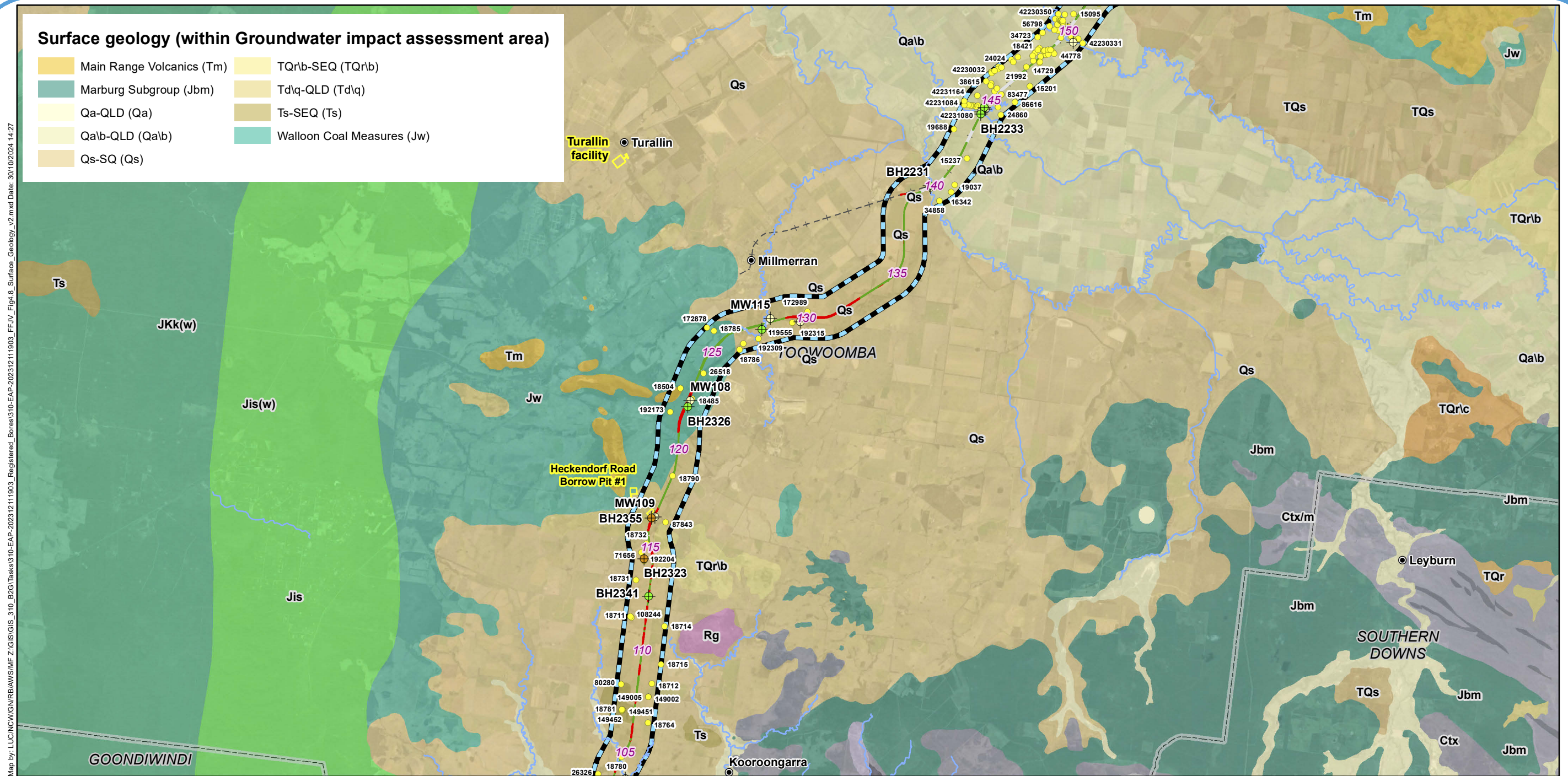
Legend

- | | |
|-----------------------------------|------------------------------------|
| 5 Chainage (km) | Rail Earthworks Cut |
| Localities | Rail Earthworks Fill |
| Existing site investigation bores | Groundwater impact assessment area |
| Former site investigation bores | Local Government Areas |
| New site investigation bores | Impact assessment area |
| Registered bores | Temporary footprint |
| Bridges | |
| Existing rail (operational) | |
| Watercourses | |



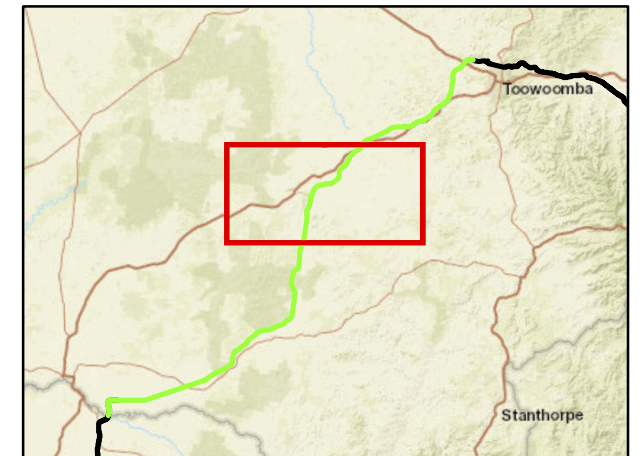
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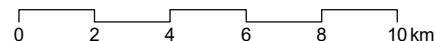


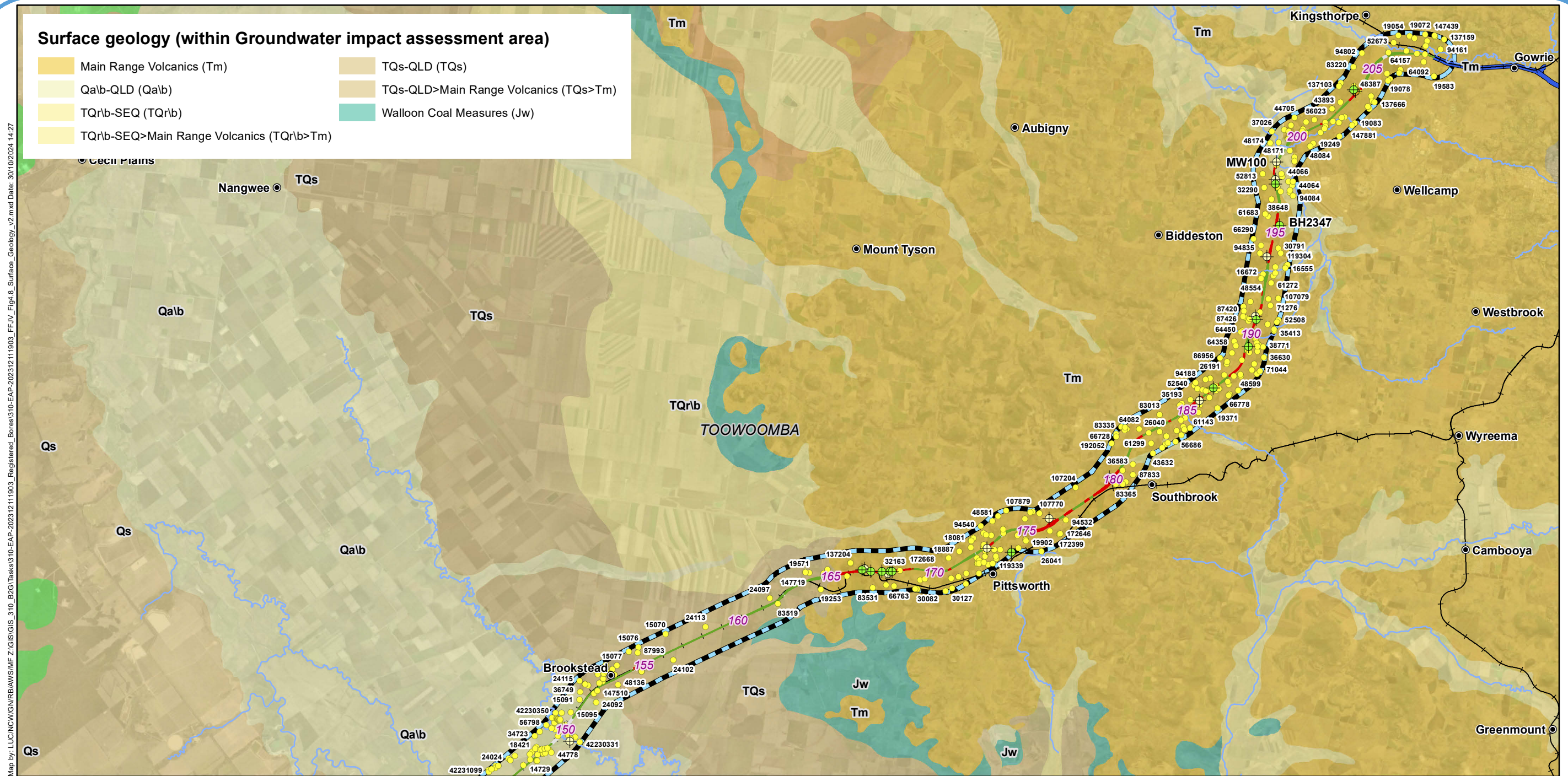
Legend

- | | |
|-----------------------------------|------------------------------------|
| 5 Chainage (km) | Rail Earthworks Cut |
| Localities | Rail Earthworks Fill |
| Existing site investigation bores | Groundwater impact assessment area |
| Former site investigation bores | Local Government Areas |
| New site investigation bores | Impact assessment area |
| Registered bores | Temporary footprint |
| Bridges | |
| Existing rail (operational) | |
| Existing rail (non-operational) | |
| Watercourses | |



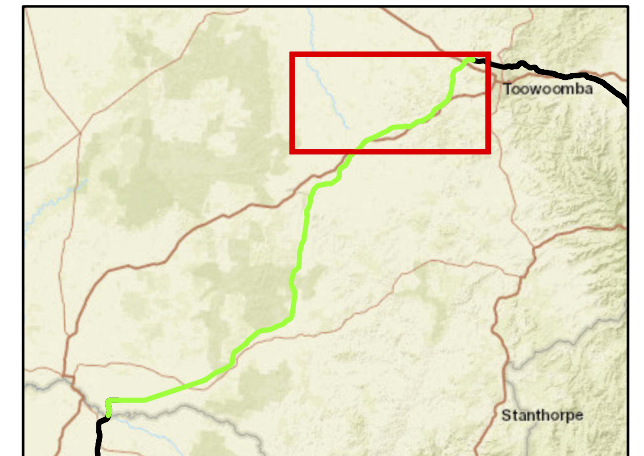
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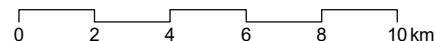


Legend

- 5 Chainage (km)
- Localities
- Existing site investigation bores
- Former site investigation bores
- New site investigation bores
- Registered bores
- Gowrie to Helidon alignment
- Bridges
- Existing rail (operational)
- Existing rail (non-operational)
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area
- Temporary footprint



A3 scale: 1:200,000



4.6.2.2 Border Rivers Alluvium

The BRA is associated with the Dumaresq and Macintyre rivers, Macintyre Brook and associated tributaries (i.e. Canning Creek). The Project intermittently crosses sections of this alluvium between Ch 30.6 km (NS2B) and Ch 117.0 km and is represented in Figure 4.8 as Qs and Holocene alluvium (Qa). This alluvial unit typically comprises clays, sands, and gravelly sands deposited on weathered Kumbarilla Beds (KB) and WCM of the Surat Basin.

Distribution of the BRA is generally restricted to tributary systems such as Canning Creek and Macintyre Brook with a more extensive presence on the flood plains of the Dumaresq and Macintyre rivers. The BRA thickness ranges from less than 5 m thick overlying the Kumbarilla Beds and WCM (boreholes 310-01-BH2304 at Ch 53.0 km and 310-01-BH2210 at Ch 65.0 km) to thick, generally fining upwards successions over 60 m in the paleochannels of the larger Macintyre and Dumaresq rivers (i.e. RN12095).

The alluvial sediments of the Dumaresq and Macintyre rivers, Macintyre Brook and associated tributaries (i.e. Canning Creek) is referred to collectively as the BRA to distinguish from the CA in the sections below.

4.6.2.3 Condamine Alluvium

The CA comprises a broad alluvial plain composed primarily of Quaternary unconsolidated clay, silt, sand, and gravel, depicted as 'Qa' in Figure 4.8 and a conceptualisation depicted on Figure 4.9. Alluvium within tributaries of the Condamine River, such as Westbrook Creek, are considered part of the CA stratigraphic unit. Based on a review of DRDMW registered bores and project investigation bores within the impact assessment area, the indicative total thickness of the CA is at least 60 m. Outside the impact assessment area, bores indicate the thickness may reach up to 130 m further north towards Dalby (DNRm, 2016b).

The stratigraphy of the CA consists of an upper clay sheetwash unit which thins towards the west and is underlain by a coarser sand and gravel unit. Within the impact assessment area, the thickness of the upper clay unit was observed to be 7.8 m (in borehole 310-01-BH2234 (Ch 144.5 km)) and 6.8 m thick (borehole 310-01-BH2235 (Ch 150.0 km)), respectively. Below the coarser sand/gravel unit is a basal clay which separates the alluvial sediments from the underlying WCM.

Within the CA footprint, the Surat Basin sediments have been eroded down (not present) to the WCM where a basal clay separates the main CA sequence from highly weathered WCM, as depicted in Figure 4.9 (DNRm, 2016). This basal clay is commonly referred to as a 'transition zone' and is understood to be discontinuous across the CA footprint while the MRV underlies the alluvium in the eastern portion of the impact assessment area.

Due to the complex nature of the alluvial sediments within the impact assessment area, a summary of the various components of the alluvium, stratification details and borehole data utilised to characterise these strata are presented in Figure 4.9.

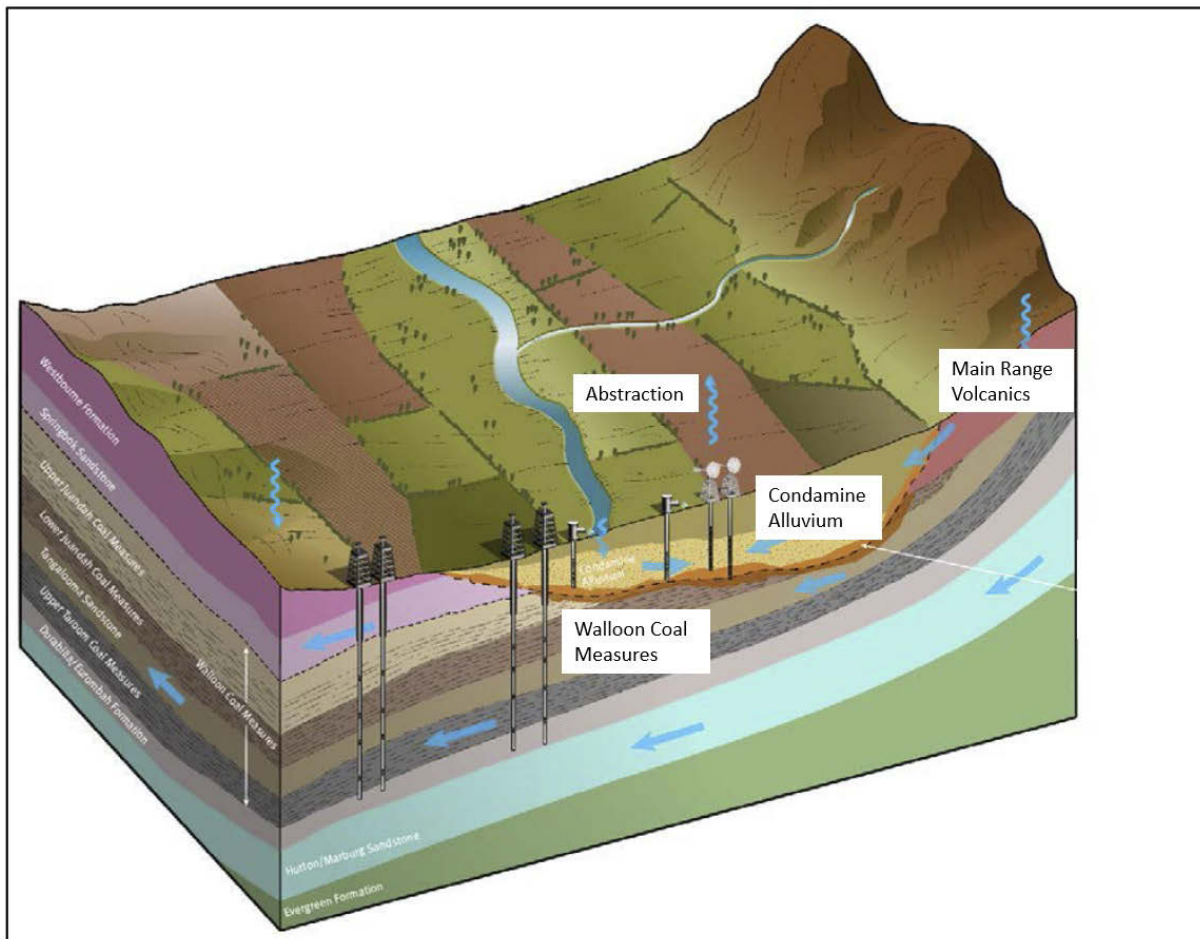


Figure 4.9 Geological conceptualisation of the Condamine Alluvium

Source: DNRM (2016)

Table 4.4 Stratigraphic summary of alluvium within the impact assessment area

Chainage range	Unit	Thickness (m)	Description	Reference boreholes
Ch30.6 km (NS2B) to Ch 38.0 km (BRA)	Topsoil	0 to 1.5 m	Sandy clay and clay	RN77068
	Clay (with minor Silt)	5.0 to 9.0 m	Yellow to brown clay	RN71611
	Clayey Sand/Sand/Gravel	5.0 to 60 m	Sand/sandy gravel/clay	RN12095 RN77347
	Basal Contact	Kumbarilla Beds: Mudstone and siltstone – extremely weathered siltstone and mudstone.		BH2213 BH2217 BH2218
Ch 92.0 to Ch 120.0 km (BRA including Macintyre Brook and Canning Creek)	Topsoil	0.1 to 0.3 m	Sand/silt	BH2309
	Clay/Sands/minor gravels	3 to 28 m	Clay/clayey sand/minor sandy gravel	BH2210 BH2311
	Basal Contact	Kumbarilla Beds and WCM: Extremely weathered sandstone and mudstone.		BH2216 BH2201 RN48791 RN77025
Ch 139.8 to Ch 152.0 km (CA and tributaries)	Topsoil	0.3 m	Clay, dark grey, high plasticity.	BH2231
	Clay and Clayey Sand	6 to 8 m	Clay and sandy clay, grey – dark brown, med-high plasticity, stiff to very stiff.	BH2234
	Sand and Gravel	5 to 10 m	Well graded sand and gravel	BH2235
	Clay/Sands	10 to 30 m	Brown clay and sandy clay	RN147510
	Basal Contact	WCM		

4.6.2.4 Main Range Volcanics (Tertiary)

The Main Range Volcanics (MRV) are located to the east and south-east of the CA and forms the main geological unit which outcrops along the Project alignment between Ch 165.5 km, near Pittsworth, to Ch 208.48 km near Kingsthorpe. The MRV is depicted as 'Tm' in Figure 4.8.

The MRV formation consists mainly of Oligocene-Miocene age alkaline olivine basalts which erupted from fissures that have since become extensively eroded (DNRM 2016). Some portions of the formation are covered by alluvium from tributaries of the Condamine River system (i.e. Westbrook Creek near Ch 198.5 km). The thickness of the MRV is up to 150 m; however, thinner portions of the formation underly some areas of the CA.

4.6.2.5 Kumbarilla Beds (Jurassic to Cretaceous)

The Kumbarilla Beds (KB) represent a succession of fluvial, lacustrine, and marginal marine facies deposited during the middle Jurassic to middle Cretaceous period (Ransley et al. 2015). This unit includes, from youngest to oldest:

- *Bungil Formation (Mid-Cretaceous)*: This formation consists of siltstones, mudstones, and carbonaceous sandstones associated with a lacustrine to marginal marine depositional environment (Ransley et al. 2015)
- *Mooga Formation (Late Cretaceous)*: The Mooga Formation is considered fluvial facies characterised by clayey sandstones interbedded with siltstones and mudstones with a typical thickness of less than 100 m
- *Orallo Formation (Late Cretaceous)*: Flood plain facies comprised predominantly of interbedded siltstone and mudstone
- *Gubberamunda Sandstone (Late Cretaceous – early Jurassic)*: consists of quartzose to sub labile sandstone, lesser conglomerate, siltstone, mudstone and claystone deposited in a relatively high energy fluvial environment
- *Springbok Sandstone (Mid-Late Jurassic)*: The Springbok Sandstone is comprised of quartzose sandstone and conglomerate with minor mudstone, siltstone, and shales. The unit is representative of a high energy braided fluvial depositional environment and regionally forms an important aquifer (Ransley et al. 2015).

During reference design stage investigations in 2018, the Kumbarilla Beds were interpreted to have been intersected in 310-01-BH2201 located at Ch 35.1 km. The top of the Kumbarilla Beds were encountered at between 5 to 10 m BGL and were characterised by extremely weathered siltstone and mudstone (Golder, 2019b). Due to the western dip of the Surat Basin strata, the Kumbarilla Beds do not outcrop east of approximately Ch 38.0 km.

4.6.2.6 Walloon Coal Measures (Jurassic)

The WCM are an important coal resource of the Surat Basin. The WCM comprise claystones, shales, sandstones and coal seams of fluvial and lacustrine origin with an average total thickness of 300 m (Exon, 1976; DNRM, 2016b). The WCM are contiguous between the Surat and Clarence-Moreton Basin forming a continuous unit over the Kumbarilla Ridge and represent a widespread episode of deposition of river, lake, swamp and marsh sediments. The formation has been either partly eroded, or exposed, over much of the eastern part of the Clarence-Moreton Basin (DNRM, 2016a).

The WCM intermittently outcrop and subcrop along the Project alignment between Ch 38.0 km and Ch 126.5 km, along the northern banks of Macintyre Brook and Canning Creek and towards Millmerran. The extent of the WCM are depicted as 'Jw' in Figure 4.8.

A review of data from the registered bores within the impact assessment area indicate the WCM are screened at depths shallower than 90 m BGL. Eleven bores established during the Project hydrogeological investigation between Ch 53.0 km and Ch 122.0 km intersected the WCM. In these locations extremely weathered sandstone and mudstone was encountered from 2 m BGL to 20 m BGL (Golder, 2019a).

4.6.2.7 Hutton Sandstone (Jurassic)

The Great Artesian Basin underlies the impact assessment area, and some Great Artesian Basin units have potential to be sensitive to impacts from Project activities, including the WCM and the Kumbarilla Beds. The Hutton Sandstone is a lateral equivalent of the upper Marburg Subgroup in the Clarence – Moreton Basin and encountered at depths ranging from 50 to 100 m BGL (Jell, 2013). The Marburg Subgroup is a regionally significant aquifer is mapped as an outcrop just east of the groundwater impact assessment area near Goondiwindi. This unit is fluvial in origin and composed of quartzose sandstone with interbeds of siltstone, shale, and minor mudstone with a typical thickness of 150 to 200 m (DNRM, 2016b). The Hutton Sandstone underlies the WCM and is intersected by ten registered bores within the impact assessment area between Ch 60 km and Ch 115 km (i.e. RN108444 and RN71656) and near Gowrie at Ch 208.2 km (i.e. RN94161 and RN147439) approximately 120 to 180 m BGL.

Otherwise, the Marburg Subgroup is below the depth of interest for the Project (90 m; maximum design depth is 21 m BGL) and is not considered to be susceptible to impacts by the Project. Therefore, Marburg Subgroup is not considered further in this assessment.

4.7 Hydrogeology

This section provides a description of the existing hydrogeological regime and is based on a review of available hydrogeological reports, reference design stage investigations between May 2018 and March 2022, and State Government data sets described in Section 3.2.1.

There are four main hydrostratigraphic units present within the impact assessment areas, which may be vulnerable to impacts resulting from construction and operation activities of the Project, these include:

- Cainozoic to recent age alluvial/colluvial sediments (Quaternary/Tertiary): of shallow alluvial systems along river valleys (Border Rivers and Condamine River alluvial units)
- Tertiary age MRV, fractured basalt aquifers in the eastern portion of the Project (east of the Kumbarilla Ridge)
- Jurassic to Cretaceous aged Kumbarilla Beds
- Jurassic-age WCM.

4.7.1 Existing hydrogeological regime

4.7.1.1 Alluvium/Colluvium (Quaternary/Tertiary)

The impact assessment area is underlain by two alluvium units distinguished by their respective catchments, namely the:

- Border Rivers Alluvium (Queensland) – within the Border Rivers catchment between approximately Ch 30.60 km (NS2B) to Ch 116.5 km
- Condamine Alluvium (Central Condamine and tributary alluvium) – within the Condamine-Balonne catchment between approximately Ch 116.5 km to Ch 208.2 km.

In areas with colluvial sediments (in proximity to the Great Dividing Range) and alluvial deposits, these units are not distinguishable from each other and hence discussed as one (alluvial/alluvium) unit. The characteristics are discussed below. Groundwater quality of the alluvial aquifers is summarised in Section 4.7.3 and groundwater users are discussed in Section 4.7.5. Further, EIS Appendix J: Soil Assessment Report provides a more detailed breakdown of the surficial alluvial sediments.

Occurrence

In the Border Rivers catchment, groundwater is associated with alluvial sediments found along the Dumaresq and Macintyre rivers, Macintyre Brook, and Canning Creek. Much of the region is characterised by an upper and lower alluvial system containing groundwater. East of the Macintyre Brook and Dumaresq River, alluvial sediments are largely confined to narrow valleys of Macintyre Brook and Canning Creek (Golder, 2019c). Collectively, these alluvial sediments are referred to the BRA.

The Quaternary CA is associated with the floodplain of the Condamine River and associated tributaries. It is incised primarily into the WCM of the Surat Basin and forms the primary bedrock to the alluvium (DNRM, 2016b). The MRV underlies the alluvium in the eastern portion of the impact assessment area.

An upper low permeability unit of sheetwash clays up to 10 m thick overlies a lower granular unit, mainly comprised of sand and gravel separated by clay lenses. The granular alluvium is the most transmissive part of the alluvium and is, therefore, the main source of groundwater (DNRM, 2016). Due to the heterogeneity of the alluvial sediments, localised perched aquifers have been observed in the CA along the eastern rim of the river valley (Dafny, Silburn, 2013). Perched aquifers result from a lens of more permeable sediments between two less permeable matrices where the hydraulic gradients of the over-and under-lying units recharge the more permeable lens. These perched aquifers are considered to be limited in both space and time; that is, the storage and yield are not considered sustainable for long durations.

Groundwater has been used extensively from the CA for irrigation, industrial, and stock and domestic purposes since the 1960s (DNRM, 2016a). The most productive groundwater resource is present in the central portion of the mapped alluvium.

Recharge and discharge mechanisms

Recharge to alluvial aquifers is anticipated to primarily occur from both rainfall and through seepage from ephemeral watercourses. Underlying units below permeable alluvium may also act as a source of recharge due to upward discharge of groundwater (Golder, 2019b) when hydraulic gradients allow (e.g. during the dry season when underlying aquifers may act as recharge).

Recharge to the CA is complex and there are differing views on the relative significance of different recharge pathways. The most common and prevalent view is that the alluvium is mainly recharged from river and stream flow leakage (39 to 115 mm/year, DNRM, 2016a). Diffuse rainfall recharge is expected to be limited by the clay content of near-surface soils and fine-grained sheetwash deposits. Black soils characterised by a large shrink-swell potential and very high plasticity are mapped within the CA. The physical properties of the black soils are likely to retard direct infiltration of rainfall to the alluvium aquifer.

On average, recharge to the CA is exceeded by outflows, the largest outflow being extraction from groundwater bores. As a result, groundwater levels in the CA have declined in many areas, by up to 25 m, over the past 60 years (DNRM, 2016a).

The dominant recharge mechanism to the BRA includes rainfall and flooding, side slope run off and streamflow leakage (NSW Department of Planning, Industry and Environment, 2019).

The primary discharge mechanisms from these units are extraction, as baseflow to the adjacent surface water features, and local leakage into the underlying units. Evapotranspiration, from vegetation growing along the bed and banks of water features, and seepage to the underlying units from the alluvial/colluvial sediments are also considered to be primary discharge mechanisms from these unit.

Hydraulic parameters and yields

Interrogation of the DRDMW Groundwater Database reported 12 groundwater yield results from alluvial aquifer bores within the impact assessment area. The yields reported for the registered alluvial bores ranged up to 7.1 litres per second (L/s) with an average yield of 4.81.6 L/s. The large variation is attributed to the complex depositional nature of the alluvial sediments and presence of interbedded layers fine grained sediments (clay) and coarse grained (sand and gravel) material, as discussed in the previous sections.

Results from aquifer pump tests performed within the impact assessment area, from registered bores RN86616 and RN83477, are included in the DRDMW database; transmissivity was estimated to be 451 and 500 m²/day, respectively. Indicative horizontal hydraulic conductivity values, based on the typical alluvium thickness of 50 m and these transmissivity values, are 9 m/day and 10 m/day, respectively.

Hydraulic testing (slug and variable head falling head test) was conducted at Project bores between Ch 30.7 km (NS2B) to Ch 139 km (depths 2 to 22 m BGL) targeting the alluvial aquifers during the reference design stage. The resulting hydraulic conductivity records ranged from 0.016 m/day and 0.35 m/day indicating high heterogeneity (Golder, 2019c).

4.7.1.2 Main Range Volcanics

The MRV are comprised of primary permeability in the form of vesicular zones with secondary porosity in the form of cooling joints and fractures (DNRM, 2016b). The vesicular, jointing, and zones of deeper weathering of these basalts can result in aquifer behaviour that ranges between unconfined, semi-confined or confined (DNRM, 2016b). As a result, groundwater occurrence and hydraulic properties of the MRV are inherently variable due to the nature, location, and frequency of the fractures and joints and secondary permeability.

Occurrence

The impact assessment area traverses the MRV between approximately Ch 165.4 km and Ch 208.48 km; located east and south-east of the CA, the main (southern) body of basalt trends almost parallel with the CA to the south-east, near Killarney. The MRV are commonly greater than 150 m thick except where the CA overlies the MRV where they were incised by surface water features and reduced in thickness as a result (DNRM, 2016b).

The MRV forms a significant productive aquifer used for irrigation, stock, and town water supplies. A total of 188 bores from the DRDMW Groundwater Database and located within the impact assessment area are reported to be screened within the MRV. From these 188 bores, 174 are reported as wholly screened within the MRV; the data from these 174 bores was considered in the subsections below.

Recharge and discharge mechanisms

Based on available data, recharge to the MRV is via direct rainfall infiltration, local vertical leakage from the underlying/overlying units and adjacent flow through from the CA where they are co-located, particularly after large rainfall events (DNRM, 2016b).

Regionally, recharge to the MRV ranges widely from 1.3 to 105 mm/year (University of Queensland, 2014). Within the impact assessment area, estimated recharge is 25.8 mm/year (Golder, 2019c).

The primary discharge mechanisms are considered to include bore extraction, local vertical leakage to underlying/overlying and adjacent units and to surface as hydraulic gradient permits and via permanent and non-permanent springs.

Hydraulic parameters and yields

The DRDMW Groundwater Database reported groundwater yield results from 57 MRV bores within the impact assessment area. The yields reported for the registered MRV bores ranged from 0.1 L/s to 16.0 L/s, with an average yield of 2.6 L/s.

Hydraulic testing (slug falling and rising head test) was conducted at one project bore (310-01-BH2347) targeting the MRV during the reference design hydrogeological investigation. Hydraulic conductivity was reported from this slug test as 0.35 m/day based on the results from both the rising and falling head tests.

Literature values for transmissivity in the MRV typically range from 200 square metres per day (m^2/day) to 300 m^2/day (DNRM, 2016b). These transmissivity values correspond to horizontal hydraulic conductivity values of 2 to 3 m/day for a typical MRV thickness of 100 m. The literature and Project hydrogeological investigation data confirm the hydraulic conductivity of the MRV is highly variable, reflecting the fractured and anisotropic nature of the aquifer.

4.7.1.3 Kumbarilla Beds

Occurrence

The lithology of the Kumbarilla Beds comprises sandstone, siltstone, mudstone, and some conglomerate (Table 4.3). The formations within the Kumbarilla Beds lie unconformably (erosional contact) over the WCM and are often indistinguishable from each other in this area. The unconformity is likely the result of erosion as scouring has been observed at the contact between the WCM and lower Springbok Sandstone unit of the Kumbarilla Beds (DNRM, 2016a).

The lower sandstones of the Kumbarilla Beds were deposited by streams flowing generally towards the centre of the basin, frequently in small channels eroded into the uppermost siltstones of the WCM, and occasionally into the coal seams (DNRM, 2016a).

The Project alignment traverses intermittent outcrop and sub-crop of the Kumbarilla Beds between approximately Ch 5.0 km and Ch 25.0 km. Several registered groundwater bores in fractured rock located between Ch 30.60 km (NS2B) to Ch 38.0 km are recognised to be screened across the Kumbarilla Beds.

Recharge and discharge mechanisms

The outcrops of the Kumbarilla Beds are likely recharged by direct infiltration of rainfall, and by seepage from ephemeral streams during periods of flow following rainfall. Locally, upward leakage from sub-cropping rock below permeable alluvium may also act as a source of recharge (DNRM, 2016b).

Discharge mechanisms from the Kumbarilla Beds likely occur via seepage/through flow into the underlying and/or adjacent aquifers, evapotranspiration (in sub-crop/outcrop areas), and groundwater extraction.

Hydraulic parameters and yields

Interrogation of the DRDMW Groundwater Database reported groundwater 3 yield results from Kumbarilla Beds bores within the impact assessment area. The yields reported for the registered Kumbarilla Beds bores ranged from 0.2 L/s to 5.5 L/s.

The DRDMW Groundwater Database has record of one pump test of a registered bore within the impact assessment area and located in the Kumbarilla Beds. Transmissivity was estimated from this single pump test at 404 m^2/day (RN43148).

One variable head slug test near Ch 35.0 km (310-01-BH2201) was conducted within the Springbok Sandstone sub-unit of the Kumbarilla Beds during the Project hydrogeological investigations. Hydraulic conductivity was reported from this slug test as 0.3 m/day based on the results of this falling head test. This is consistent with the regional (literature) hydraulic conductivity data, which indicates indicate the various units of the Kumbarilla Beds range from 0.0003 m/day to 0.7 m/day (Golder, 2019b).

4.7.1.4 Walloon Coal Measures

Occurrence

The WCM are an important coal resource of the Surat Basin. The WCM comprise claystone, shale, sandstone, and coal seams of fluvial and lacustrine origin with an average total thickness of 300 m (Exon 1976; DNRM, 2016b). The WCM are contiguous between the Surat and Clarence – Moreton basins forming a continuous unit over the Kumbarilla Ridge and represent a widespread episode of deposition of river, lake, swamp and marsh sediments. The formation has been either partly eroded, or exposed, over much of the eastern part of the Clarence-Moreton Basin (DNRM, 2016a).

The contact between the CA and the underlying WCM is characterised by a clay zone of undifferentiated origin which is often dominated by multi-coloured clay (DNRM, 2016b). On a regional basis, the underlying WCM are considered to be an aquitard, although groundwater is extracted extensively for stock and domestic supplies where the WCM occur at shallow depth (DNRM, 2016a).

The Project alignment traverses the WCM intermittently, in the form of outcrop and sub-crop along the rail alignment, between approximately Ch 38.0 km and Ch 126.0 km, as depicted as 'Jw' on Figure 4.8.

Recharge and discharge mechanisms

Recharge of the WCM is considered to primarily be through seepage from the overlying and underlying units and via direct rainfall infiltration in areas of sub-crop (DNRM, 2016b).

Estimates of the long-term recharge have been derived using a modified Chloride Mass Balance method. Estimated long-term mean recharge rate in the WCM is 3.6 mm/year, with a maximum of 5 mm/year (DNRM, 2016a).

The primary discharge mechanisms from the WCM are considered to include bore extraction, where the WCM locally acts as an aquifer, and vertical seepage into the under and overlying units.

Hydraulic parameters and yields

The DRDMW Groundwater Database reported 8 groundwater yield results from WCM bores within the impact assessment area. The yields reported for the registered WCM bores ranged from 0.02 L/s to 11.4 L/s, with an average yield of 2.7 L/s.

Nine bores were installed and screened in the WCM during the Project hydrogeological investigation. Aquifer tests, in the form of variable head tests, were completed in for each of these bores. Hydraulic conductivity values from these tests ranged from 0.00016 m/day to 0.05 m/day. In the literature typical values for the hydraulic conductivity in the WCM range from 0.00016 m/day to 0.045 m/day (DNRM, 2016b), consistent with the results obtained from testing during the Project hydrogeological investigations.

4.7.2 Groundwater levels

An assessment of the DRDMW Groundwater Database was undertaken for registered bores within the impact assessment area. Bores noted as being screened targeting hydrostratigraphic units, which can potentially be impacted by the Project were considered, being the BRA, CA, Main Range Volcanics, Kumbarilla Beds, and WCM.

Registered bores with available SWL and yield data were primarily considered, together with registered bores with long-term SWL data up to 2023 (typically DNRM monitoring bores). Groundwater level data collected between October 2018 and April 2022 at Project investigation bores as part of the baseline groundwater monitoring program (Sections 3.4.1.3 and 8.3.1.1) was also included in the assessment.

4.7.2.1 Cainozoic Alluvium

Border Rivers Alluvium

Records from the DRDMW Groundwater Database indicate that five registered bores within the groundwater impact assessment area are screened in the BRA aquifer but none with representative long-term groundwater level records (i.e. DRDMW or DNRM monitoring bores).

The search was expanded to a 5 km buffer of the alignment, which identified four BRA registered bores with long-term static water level records (4160040, 41640003B, 41640039 and 41640038). These bores are located between Whetstone and Kurumbul in the far south-west corner of the alignment.

Water levels range between 235.1 and 254.7 m AHD (Table 4.5). Standard deviation of water levels from the median range between 0.15 and 0.60 m, indicating seasonal variability.

Table 4.5 Summary of Border Rivers Alluvium registered bore water level data recorded in 2021-2022

Bore number	Data logger water levels (mAHD)					
	Minimum	Maximum	Average	Median	Standard Deviation	Data points
Border River Alluvium						
41640003B	235.11	235.51	235.34	235.37	0.15	4
41640039	238.50	239.26	238.92	238.96	0.28	4
41640040	239.30	240.23	239.74	239.66	0.37	3
41640038	253.27	254.73	254.28	254.56	0.60	4
Minimum	<u>235.11</u>	235.51	235.34	235.37	0.15	3
Maximum	253.27	<u>254.73</u>	254.28	254.56	0.60	4
Average	241.55	242.43	<u>242.07</u>	242.14	0.35	NA
Median	238.90	239.75	239.33	<u>239.31</u>	0.32	NA

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

Long-term water level data recorded at four BRA registered monitoring bores between June 1985 and January 2023 are plotted in Figure 4.10. Long term trend analysis shows water levels at RN41640003B have steadily declined from 239 m AHD in 1987 to 235 m AHD in 2020, a reduction of 4 m, the levels slightly increased by no more than 0.7 m from 2020 to 2023. Similar decreasing trends are apparent in RN41640038, RN41640040 and RN41640039 between 2011 and 2020, followed by an increasing trend from 2020 to early 2023 that ultimately returned to declining trends. This recent increasing trend is likely resultant from the 2021-2022 La Nina event, which has increased recharge to the shallow unconfined and semi-confined alluvium.

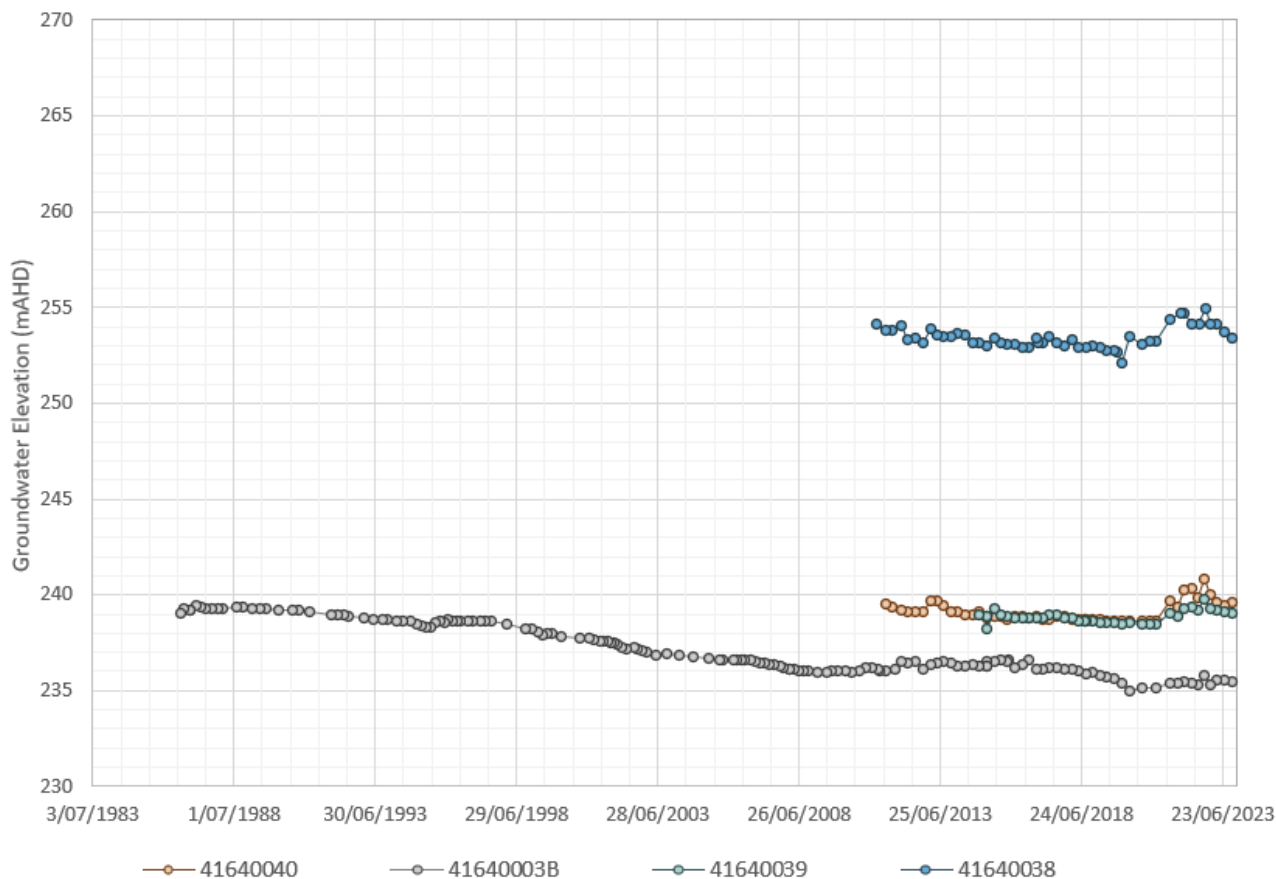


Figure 4.10 Long term groundwater level monitoring data within the Border Rivers Alluvium (registered monitoring bores)

Three Project investigation bores targeting the BRA were installed near Kurumbal; 270-01-BH2213, 270-01-BH2217, and 270-01-BH2218. Construction within the Macintyre River alluvium in July 2018, these bores have exhibited average SWL measurements (m BGL) of 9.14, 13.27 and 12.04, respectively.

Table 4.6 Summary of Border Rivers Alluvium Project bore water level data recorded in 2021

Bore number	Data logger water levels (mAHD)				
	Minimum	Maximum	Average	Median	Standard Deviation
Border Rivers Alluvium					
BH2213	214.11	217.32	214.74	214.56	0.52
BH2217	215.42	214.56	214.99	215.16	0.25
BH2218	213.11	213.71	213.66	213.67	0.03
Minimum	<u>213.11</u>	213.71	213.66	213.67	0.03
Maximum	215.42	<u>217.32</u>	214.99	215.16	0.52
Average	214.21	215.20	<u>214.47</u>	214.46	0.27
Median	214.11	214.56	214.74	<u>214.56</u>	0.25

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

Water levels are compared with rainfall data to show hydraulic connection (if any) with surface water. Water levels in 270-01-BH2213 show response to several rainfall events, with the most significant response observed during the period of intense rainfalls between August 2021 and February 2022. Bore 270-01-BH2217 shows an increase in water level as result of rainfall. The water level experienced a rise from March to May 2021, followed by a period of stability until July 2021, after which it has continued to increase. Conversely, water levels at 270-01-BH2218 are stable throughout the duration of the monitoring period with a standard deviation of only 0.03 m. This suggests the BRA is connected with surface water with high connectivity reported at 270-01-BH2213.

Groundwater flow within the BRA is inferred towards the south-west. Groundwater elevation contours crossing the Dumaresq River and Macintyre River indicate that these rivers are losing systems, meaning they act to recharge groundwater within the alluvium.

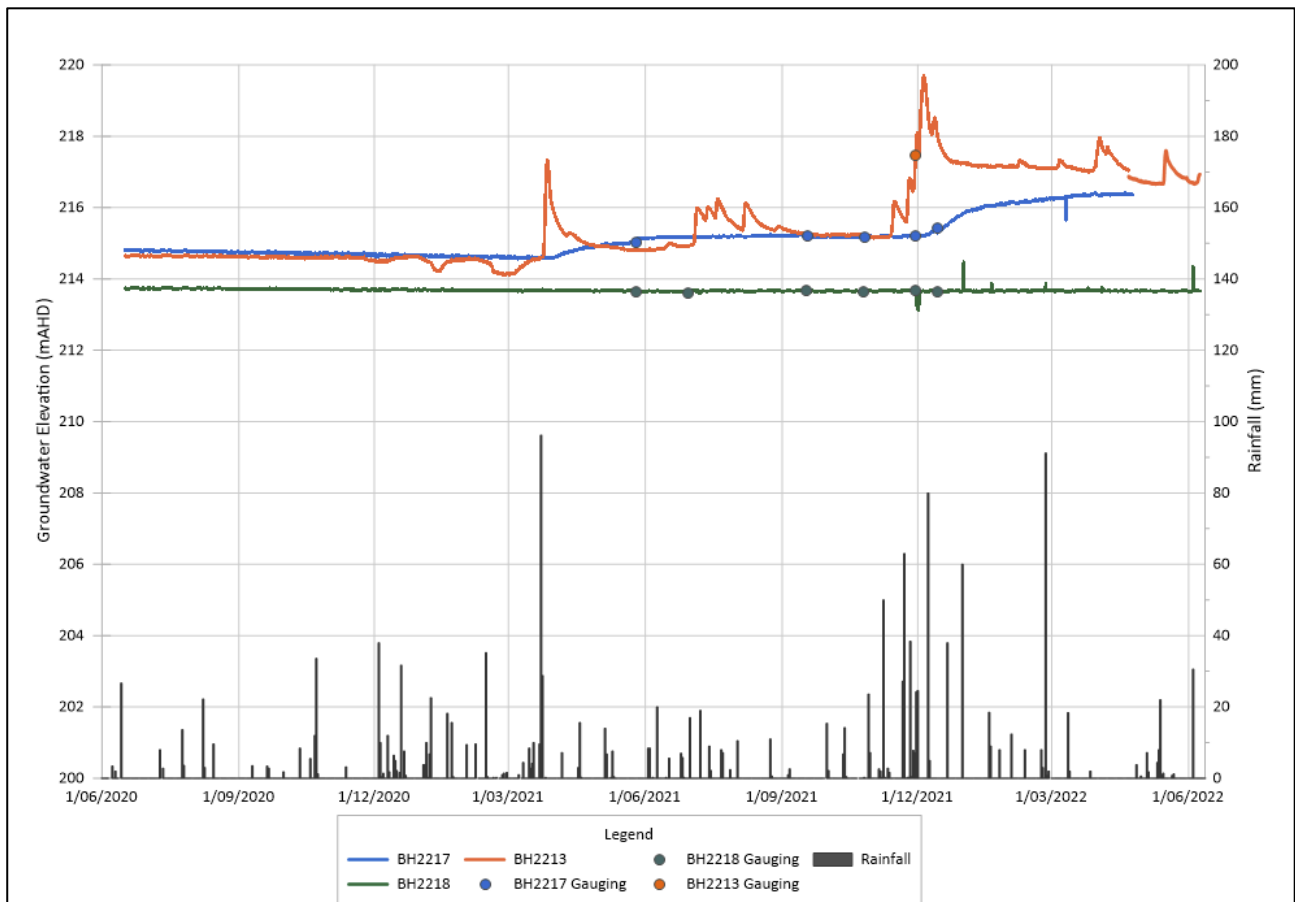


Figure 4.11 Groundwater levels within the Border Rivers Alluvium (Project bores) Condamine Alluvium

Condamine Alluvium

A search of the DRDMW Groundwater Database was undertaken for bores within the impact assessment area screened within the CA. Examination of the database identified three CA registered bores with long-term static water level data, including two nested bore sets.

RN42231378 (screen intervals of 56 to 67 m BGL and 107 to 119 m BGL) and RN 42231379 (screen intervals of 64 to 70 m BGL and 79 to 85 m BGL), installed to monitor both shallow and mid-deep sections of the alluvium.

Average water level data was between 354.9 m AHD (RN42231379B – shallow) and 355.4 m AHD (RN42231379A), (Table 4.7). Differences in the shallow and deeper alluvium water levels can be noted (0.5 m). This indicates:

- A complex multi-storey aquifer system
- Limited hydraulic connection between the upper and lower alluvium

- Unconfined to semi-confined groundwater within the upper alluvium
- Confined groundwater within the lower alluvium
- Upward vertical groundwater gradient.

Table 4.7 Summary of Condamine Alluvium registered bore water level data

Bore number	Groundwater elevation (mAHD)					
	Minimum	Maximum	Average	Median	Standard Deviation	Data points
Condamine River Alluvium						
42231416	360.49	360.60	360.55	NA	NA	2
42231379A	355.35	355.44	355.40	NA	NA	2
42231379B	354.91	354.92	354.92	NA	NA	2
42231378A	355.91	355.99	355.95	NA	NA	2
42231378B	355.61	355.64	355.63	NA	NA	2
Minimum	354.91	354.92	354.92	NA	NA	-
Maximum	360.49	360.60	360.55	NA	NA	-
Average	356.45	356.52	356.49	NA	NA	-
Median	355.61	355.64	355.63	NA	NA	-

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

Long term trend analysis shows declining groundwater level at RN4221378 and RN4221379 from commencement of monitoring to November 2009, with following stabilisation and increase in water levels to current. An overall decline of ~2 m since the beginning of the monitoring period is noted at RN4221378 and RN4221379. These decreasing trends may generally be associated with prolonged drought conditions and abstraction from bores over the past 60 years (DNRM, 2016a). Bore RN4221416 exhibits fluctuating level from commencement of monitoring to approximately 2009, with an increase in water levels to current.

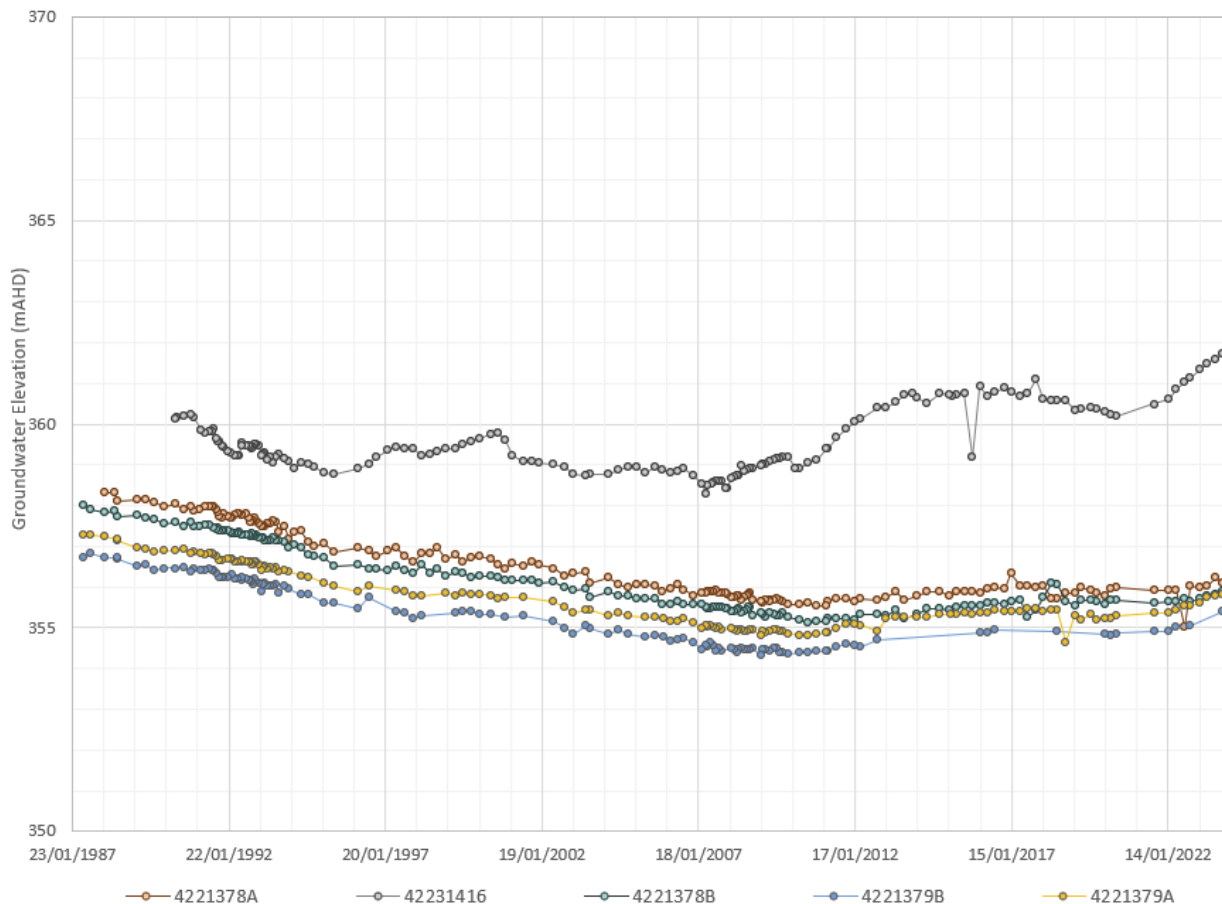


Figure 4.12 Long term groundwater level monitoring data within the Condamine River Alluvium (registered monitoring bores)

Four Project investigation bores targeting the CA have been installed between 8.7 km and 8.9 km north-east of Millmerran. Groundwater levels recorded at these Project bores targeting the CA are summarised in Table 4.8 and shown on Figure 4.13. One bore, being 310-01-BH2231, was found to be damaged by roots in 2021 and has now been decommissioned as part of the 2023 drilling campaign.

Groundwater levels in the three remaining Project bores range between approximately 357.9 and 378.6 m AHD, with a median of 363 m AHD. Both Project and monitoring bores show reduction in water levels towards the north to north-west with a local depression centred in Norwin (18 km east of Cecil Plains) inferred to be resultant from groundwater extraction (pumping) (DNRM, 2016a).

Table 4.8 Summary of Condamine River Alluvium project bore water level data

Bore number	Data logger water levels (mAHD)				
	Minimum	Maximum	Average	Median	Standard Deviation
Condamine River Alluvium					
BH2233	363.52	375.25	364.45	364.24	1.40
BH2234	361.90	363.08	362.51	362.55	0.37
BH2235	357.96	378.56	358.16	358.04	1.29
Minimum	<u>357.96</u>	363.08	358.16	358.04	0.37
Maximum	363.52	<u>378.56</u>	364.45	364.24	1.40
Average	361.13	372.30	<u>361.71</u>	361.61	1.02
Median	361.90	375.25	362.51	<u>362.55</u>	1.29

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

Project bore groundwater levels are compared with rainfall data to show hydraulic connection (if any) with surface water. The levels in 310-01-BH2234 and 310-01-BH2233 show a marked response to several rainfall events particularly from April 2021 with standard deviations of 0.98 and 2.97 m, respectively. The response to rainfall at Bore 310-01-BH2235 is slightly delayed and subdued, with a noticeable response observed starting from September 2021. The standard deviation here is 0.78 m. This suggests the CA has high connectivity with surface water. It is noted that Project bores are located adjacent water courses and field notes show these bores may have been inundated by flood water in December.

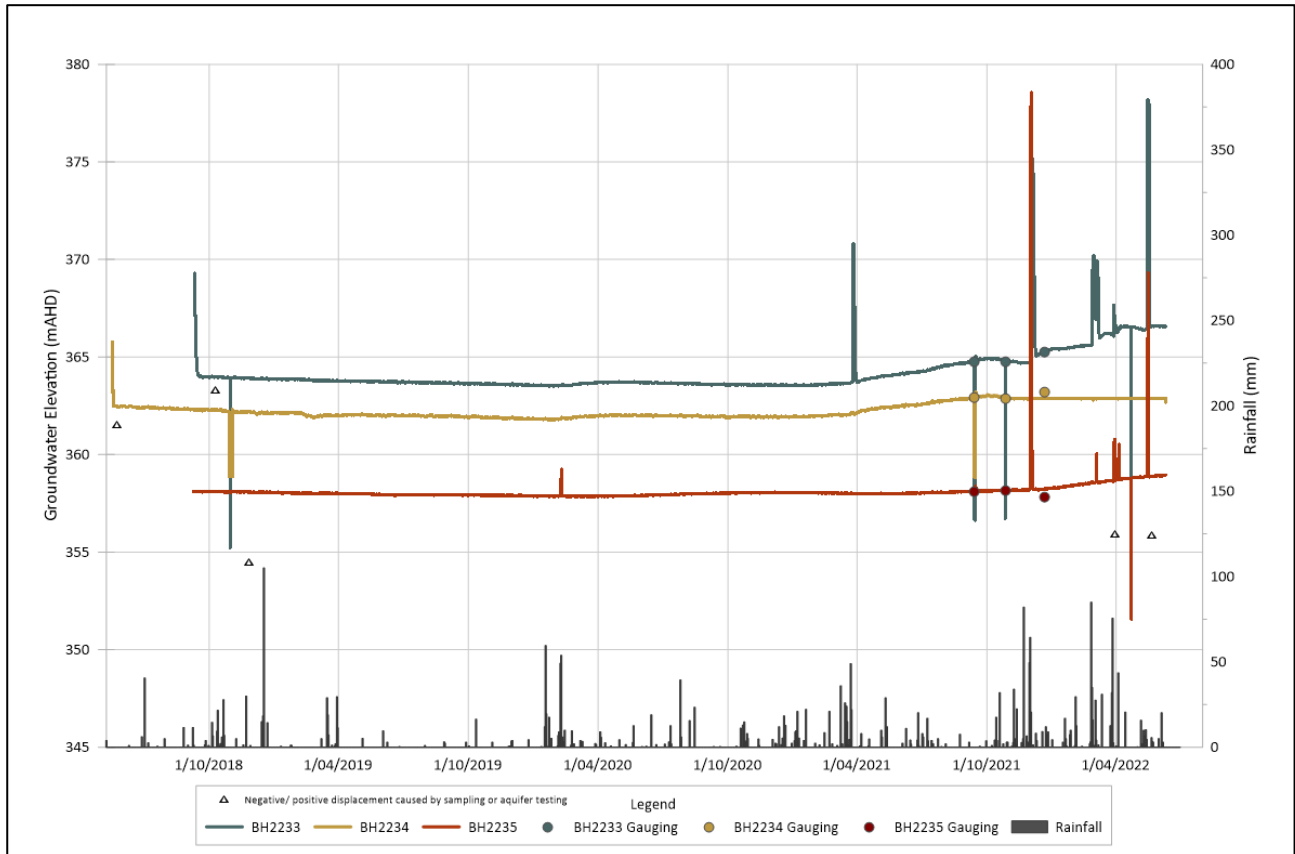


Figure 4.13 Groundwater levels within the Condamine River Alluvium (Project bores)

4.7.2.2 Main Range Volcanics

No registered bores screened within the MRV with long-term available water level data were identified within the impact assessment area. The search was expanded to 5 km of the alignment, which identified six MRV registered bores with static water levels recorded up through to 2023, including three nested bore sets.

These bores are located between Gowrie Mountain and Southbrook in the upper north-eastern section of the alignment. Three sets of nested bores (RN2230955, RN42230967 and RN42230963) targeting shallow MRV (screen intervals of between 10 and 26 m BGL), middle MRV (screen intervals of between 27 and 67 m BGL) and deep MRV (screen intervals of between 86 and 107 m BGL) were noted.

MRV long-term static groundwater elevation levels range between approximately 411.7 and 499.8 m AHD, (Table 4.9). The presented data covers the period from 1976 to 2023 and show a general declining trend up to 2007, followed by an increase up to 2011, a decrease to 2021 followed by an upward trend through 2022 and the subsequent decreasing trend post-2022 climatic events. These patterns reflect the MRV's response to climatic (heavy rainfall and flooding) events.

Table 4.9 Summary of MRV registered bore water level data recorded in 2021-2022

Bore number	Groundwater elevation (mAHD)					
	Minimum	Maximum	Average	Median	Standard Deviation	Data points
Main Range Volcanics						
42231670	411.74	412.28	411.89	411.80	0.18	7
42230955A	488.03	489.56	488.57	488.17	0.62	6
42230955B	494.83	499.75	496.10	495.08	1.77	6
42230967A	455.23	461.72	458.58	458.47	2.00	6
42230967B	455.63	462.58	459.65	459.80	2.25	6
42230967C	455.68	462.59	459.67	459.81	2.23	6
42230963A	451.81	458.89	455.22	455.50	2.63	6
42230963B	459.76	474.36	467.16	467.20	4.96	6
42230963C	485.97	488.42	487.17	487.17	0.74	6
42230957	449.71	450.48	449.91	449.78	0.27	6
42231668	492.03	498.19	494.17	493.69	2.13	6
Minimum	<u>411.74</u>	412.28	411.89	411.80	0.18	6
Maximum	494.83	<u>499.75</u>	496.10	495.08	4.96	7
Average	463.67	468.98	<u>466.19</u>	466.04	1.80	NA
Median	455.68	462.59	459.67	<u>459.81</u>	2.00	NA

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

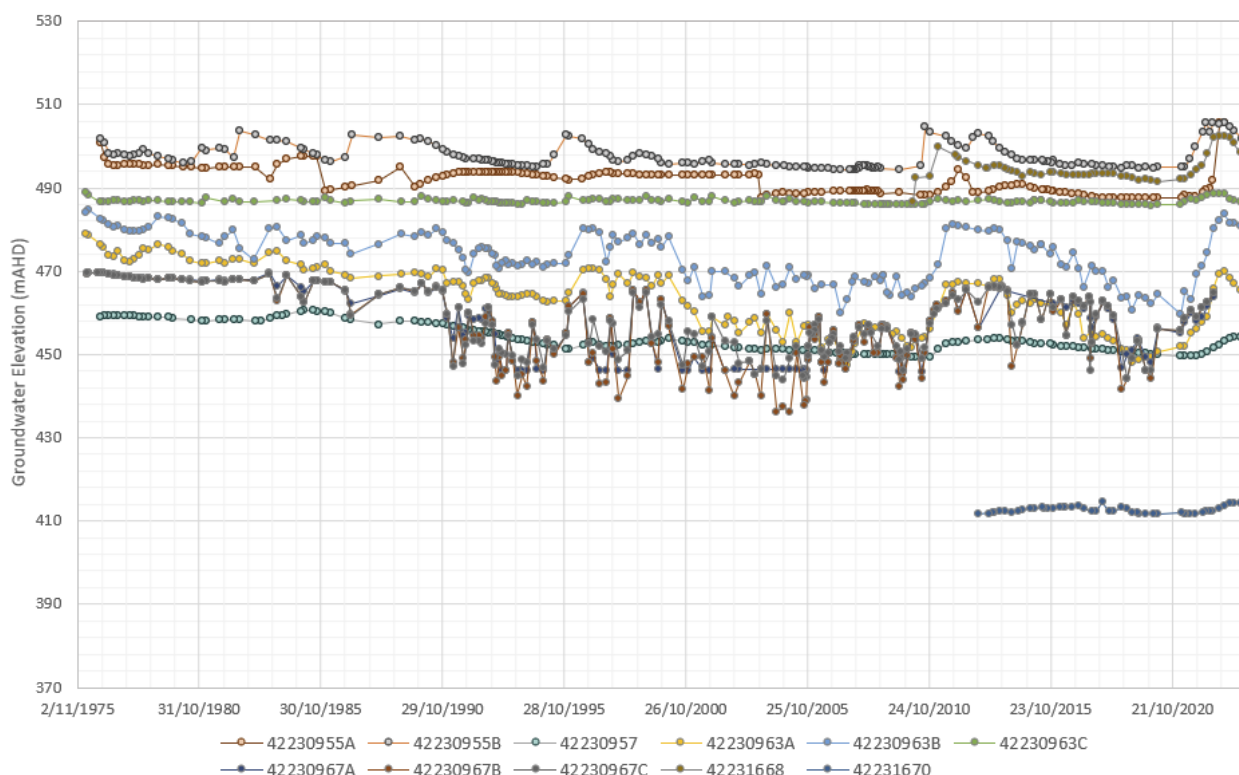


Figure 4.14 Long term groundwater level monitoring data within the MRV (registered monitoring bores)

Five Project investigation bores targeting the MRV were installed between Gowrie Mountain and Southbrook. Groundwater levels recorded at these Project bores targeting the MRV are summarised in Table 4.10. Bores 310-01-BH2343, 310-01-BH1347, 310-01-BH2248 and 310-01-BH2344 are screened within the shallow MRV and Bore 310-01-BH2345 is screened within the middle MRV.

Static water levels in Project bores were recorded using data loggers set at hourly logging intervals and range between approximately 427 and 521 m AHD, with a median of 513 m AHD. These water levels are higher on average than shallow and middle MRV registered monitoring bore water levels.

Table 4.10 Summary of MRV project bore water level data recorded in 2022

Bore number	Data logger water levels (mAHD)				
	Minimum	Maximum	Average	Median	Standard Deviation
Main Range Volcanics					
BH2343	519.09	520.85	520.22	520.36	0.34
BH2345	512.50	513.13	512.72	512.67	0.15
BH2347	453.25	454.47	453.59	453.44	0.33
BH2248	426.72	425.42	425.90	425.86	0.36
BH2344	499.97	517.41	513.12	513.45	1.55
Minimum	<u>426.72</u>	425.42	425.90	425.86	0.15
Maximum	519.09	<u>520.85</u>	520.22	520.36	1.55
Average	482.31	486.26	<u>485.11</u>	485.16	0.55
Median	499.97	513.13	512.72	<u>512.67</u>	0.34

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

Groundwater flow in the shallow MRV is inferred to the north-west, which is consistent with the declining ground surface elevation. Groundwater flow in the middle MRV is inferred to the south-east, which may be a result of localised extraction and reversed natural flow gradients. There is evidence of localised groundwater fluctuation within the middle MRV as shown in the long-term groundwater level data.

Hydrographs produced using water level data collected at Project bores during 2022 are shown in Figure 4.15. The levels generally indicate minor variation in response to rainfall with median standard deviation of 0.34 m. Bore 310-01-BH2344 shows the greatest variability of approximately 17 m across the year and may be attributed to the significant rainfall and flooding occurring during December 2021 and February 2022. Project bores screened across the shallow and middle MRV appear to have little overall hydraulic connection with surface water and response to rainfall.

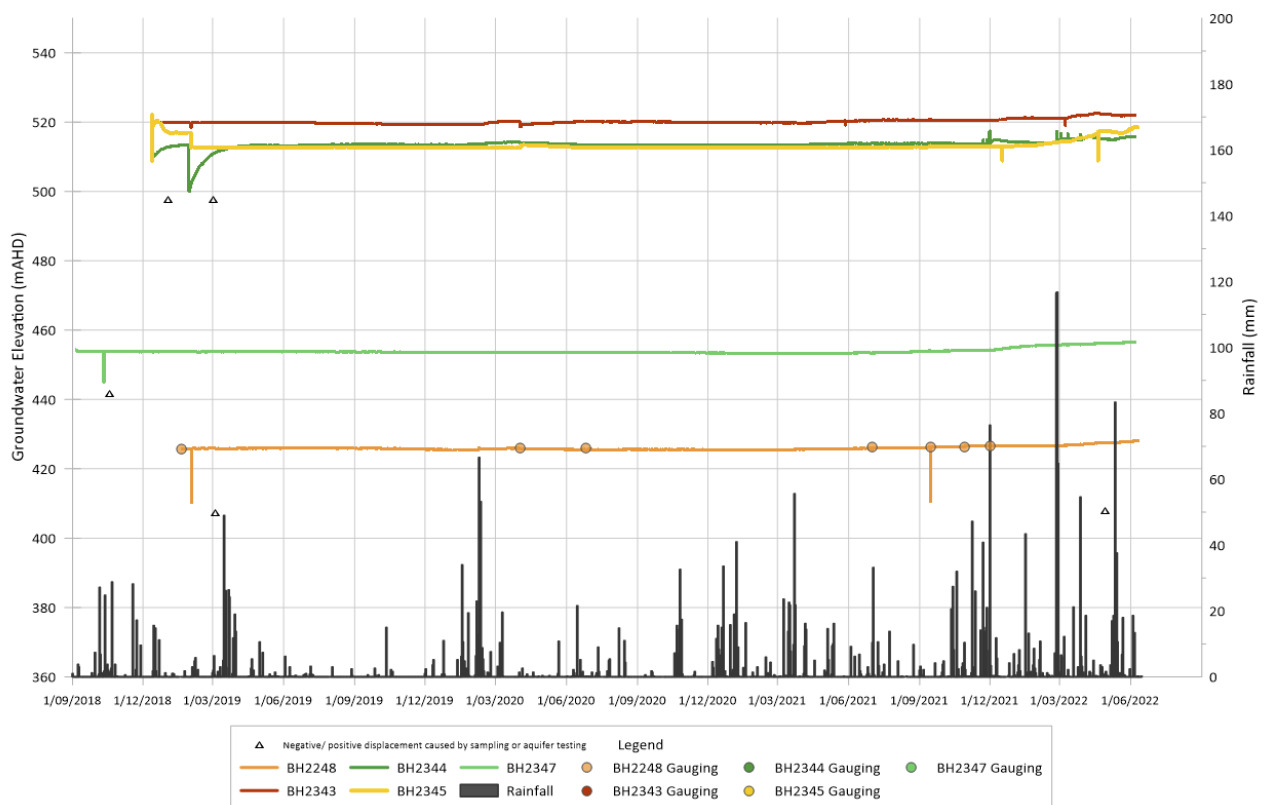


Figure 4.15 Groundwater elevation within the MRV (Project bores)

4.7.2.3 Kumbarilla Beds

According to the DRDMW Groundwater Database, there are 12 registered bores within the groundwater impact assessment area that are screened in the Kumbarilla Beds. A total of eight water levels have been recorded from these registered boreholes, between 1951 and 1993, and reveal a range of 2.4 m AGL (artesian) to 133 m BGL.

No registered bores screened within the Kumbarilla Beds with available long-term water level data, were identified within the impact assessment area. The search was expanded to a 5 km buffer of the alignment, which identified one registered bore screened within the Kumbarilla Beds with long-term to recent static water level records recorded up through 2023.

It is noted that review of casing and stratigraphy details for RN41640003 indicated potential for the bore to be screened across both the BRA and Kumbarilla Beds. Representative groundwater levels for RN41640003 are displayed on Figure 4.16 for the period of 1985 to 2023.

A long gradual declining trend is apparent to 2009. After 2009, there was a slight increase in groundwater levels, which then remained relatively stable until 2017. From 2018, the data for bore RN41640003 demonstrates a relatively small degree of seasonal variance in water levels which may reflect confinement of the aquifer.

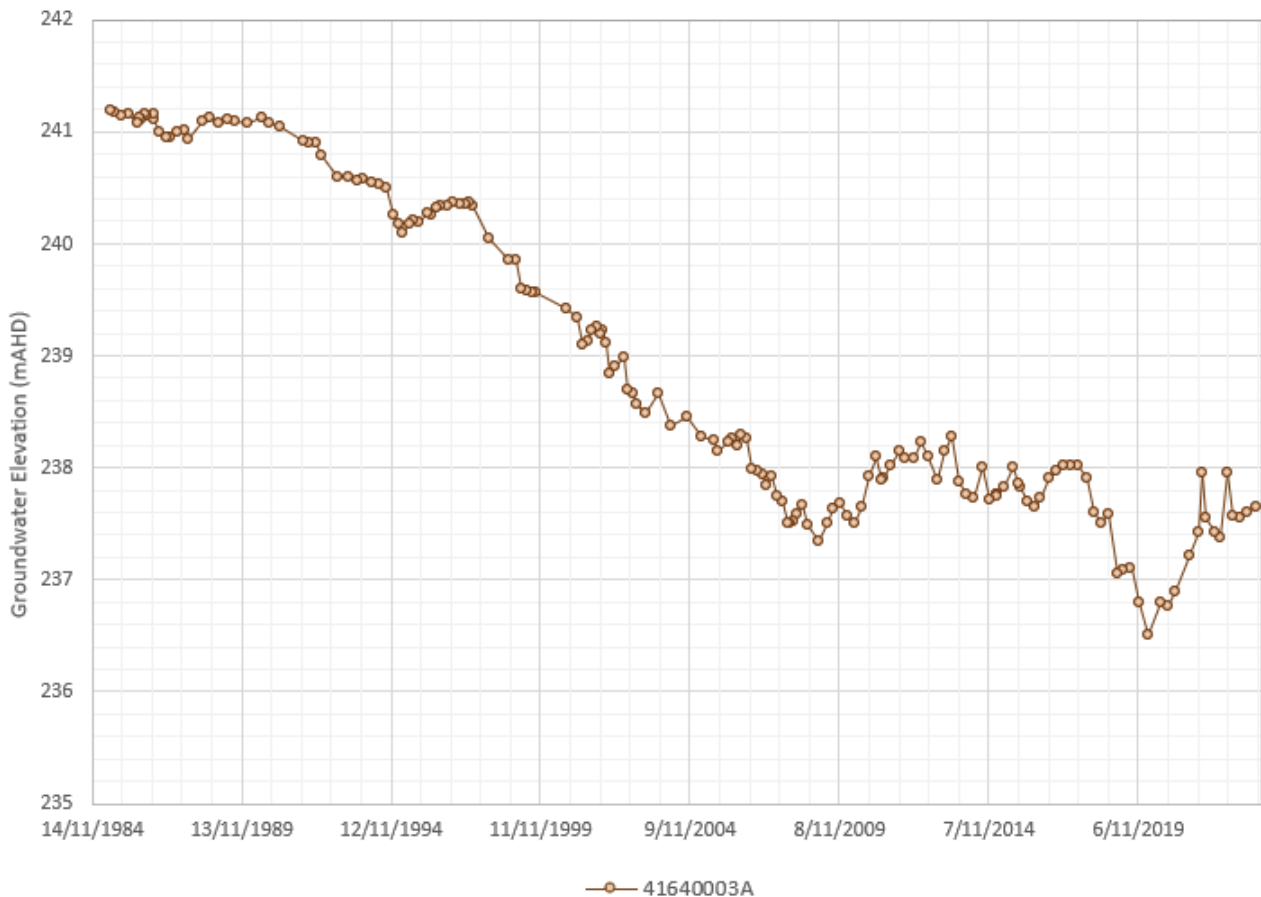


Figure 4.16 Groundwater elevation within the Kumbarilla Beds

Groundwater flow in the Kumbarilla Beds near the Project is inferred towards the west, which follows the general topographic trends in the region (University of Queensland, 2014).

4.7.2.4 Walloon Coal Measures

Of the 23 bores reported as constructed in the WCM, 13 report SWLs that range from 1.5 to 102 m BGL, with an average of about 26.3 m BGL.

Only one registered bore screened within the WCM with available long-term water level data was identified within the impact assessment area (RN42231135). The search was expanded to a 5 km buffer of the alignment, which identified two WCM registered bores with recent static water level records for a total of three long-term data sets.

These bores are located in the upper north-eastern section of the alignment. Water levels range between 380.5 m AHD (RN42231135) and 400.4 m AHD (RN42231670) (Table 4.11).

Table 4.11 Summary of WCM registered bore water level data recorded in 2021-2022

Bore number	Groundwater elevation (mAHD)					
	Minimum	Maximum	Average	Median	Standard Deviation	Data points
Walloon Coal Measures						
42231340	380.54	381.43	380.65	380.59	0.10	121
42231358	400.43	400.43	NA	NA	NA	1
42231135	388.81	388.81	NA	NA	NA	1
Minimum	<u>380.54</u>	381.43	NA	NA	NA	1
Maximum	400.43	<u>400.43</u>	NA	NA	NA	121
Average	389.93	390.22	NA	NA	NA	NA
Median	9.99	9.58	NA	NA	NA	NA

Table notes:

Italics and underline denote minimum, maximum average and median values of each category

Long-term water level data recorded at three WCM registered monitoring bores between May 1977 and March 2023 is plotted in Figure 4.17. Long-term monitoring at RN42231135 shows a notable decrease in water levels, declining from 422 m AHD in 1976 to 372 m AHD in 2016. The water levels show an increasing trend starting from 2016, gradually reaching 429 m AHD in 2021, before decreasing to 427 m AHD. Bore RN42231358 also exhibits a slight decreasing trend. Conversely, bore RN42231340 shows a slight increasing trend; however, there is a notable decline in 2022 from 381 to 378 m AHD. These water levels reflect the complex and variable hydrogeological setting of the WCM, coupled with the prolonged drought conditions, bore extraction, and regional depressurisation of this unit to enable resource extraction in the form of coal seam gas.

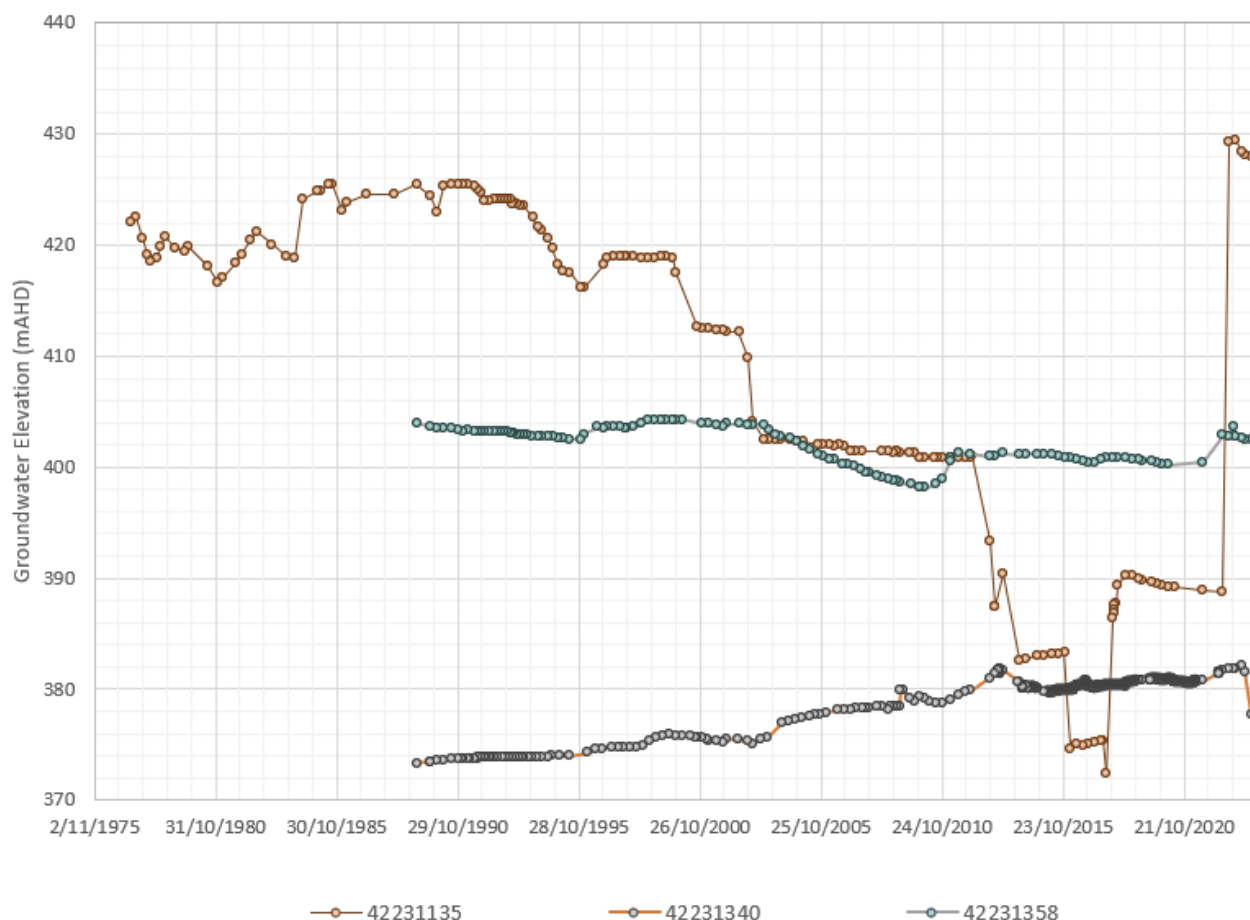


Figure 4.17 Long term groundwater level monitoring data within the WCM

Seven project investigation bores targeting the WCM were installed in 2018 between Bringalily and Inglewood. Groundwater levels recorded at these Project bores targeting the WCM are summarised in Table 4.12 and shown on Figure 4.18.

Static water levels in Project bores were recorded during 2022 using data loggers set at hourly logging intervals and range between approximately 209 and 313 m AHD (Table 4.12).

Table 4.12 Summary of WCM project bore water level data recorded in 2021

Bore number	Data logger water levels (mAHD)					Manual water levels (mAHD)				
	Minimum	Maximum	Average	Median	Standard Deviation	Minimum	Maximum	Average	Median	Standard Deviation
Walloon Coal Measures										
BH2216	305.66	312.64	307.67	307.59	1.62	305.68	311.76	307.62	306.90	2.32
BH2210	273.64	274.28	273.92	273.92	0.11	273.23	273.49	273.32	273.25	0.14
BH2206	263.06	264.22	263.38	263.39	0.17	263.15	264.19	263.43	263.39	0.34
BH2309	261.23	270.91	262.42	262.22	1.21	261.74	266.53	263.46	262.10	2.67
BH2203	257.86	260.91	258.86	258.85	0.80	257.85	259.28	258.64	258.71	0.50
BH2215	212.51	219.46	213.19	213.17	0.80	213.09	217.31	214.54	213.22	2.40
BH2214	209.06	210.78	209.55	209.54	0.16	209.46	210.48	209.87	209.67	0.54
Minimum	<u>209.06</u>	210.78	209.55	209.54	0.11	<u>209.46</u>	210.48	209.87	209.67	0.14
Maximum	305.66	<u>312.64</u>	307.67	307.59	1.62	305.68	<u>311.76</u>	307.62	306.90	2.67
Average	254.72	259.03	<u>255.57</u>	255.53	0.70	254.88	<u>257.58</u>	<u>255.84</u>	255.32	1.27
Median	261.23	264.22	262.42	<u>262.22</u>	0.80	261.74	264.19	263.43	<u>262.10</u>	0.54

Table note:

Italics and underline denote minimum, maximum average and median values of each category

Groundwater flow in the WCM near the Condamine to Gowrie area (i.e. Ch 115.0 km to Ch 208.2 km) is generally towards the north-west; however, between Millmerran and Yelarbon, the flow direction is inferred towards the west to south-west (DNRM, 2016a). Available groundwater level data suggests that there is potential for groundwater flow from the basalts to the WCM (University of Queensland, 2014). This flow is likely exacerbated by depressurisation of the coal seams, that can induce flow from the adjacent units.

Hydrographs produced using water level data collected at Project bores during 2022 are shown in Figure 4.18. Long-term comparison between water levels and rainfall suggests a subdued reaction of groundwater to rainfall. The water levels remain relatively stable, with occasional fluctuations from rainfall and possibly extraction of water from the monitored aquifer. The subdued water level reaction suggests an indirect connection between the aquifer and recharge. The confined or semi-confined WCM sandstones, siltstones, shales, carbonaceous mudstones, and coals have variable vertical hydraulic conductivities. Where vertical hydraulic conductivity is low, it has a potential to restrict direct rainfall recharge.

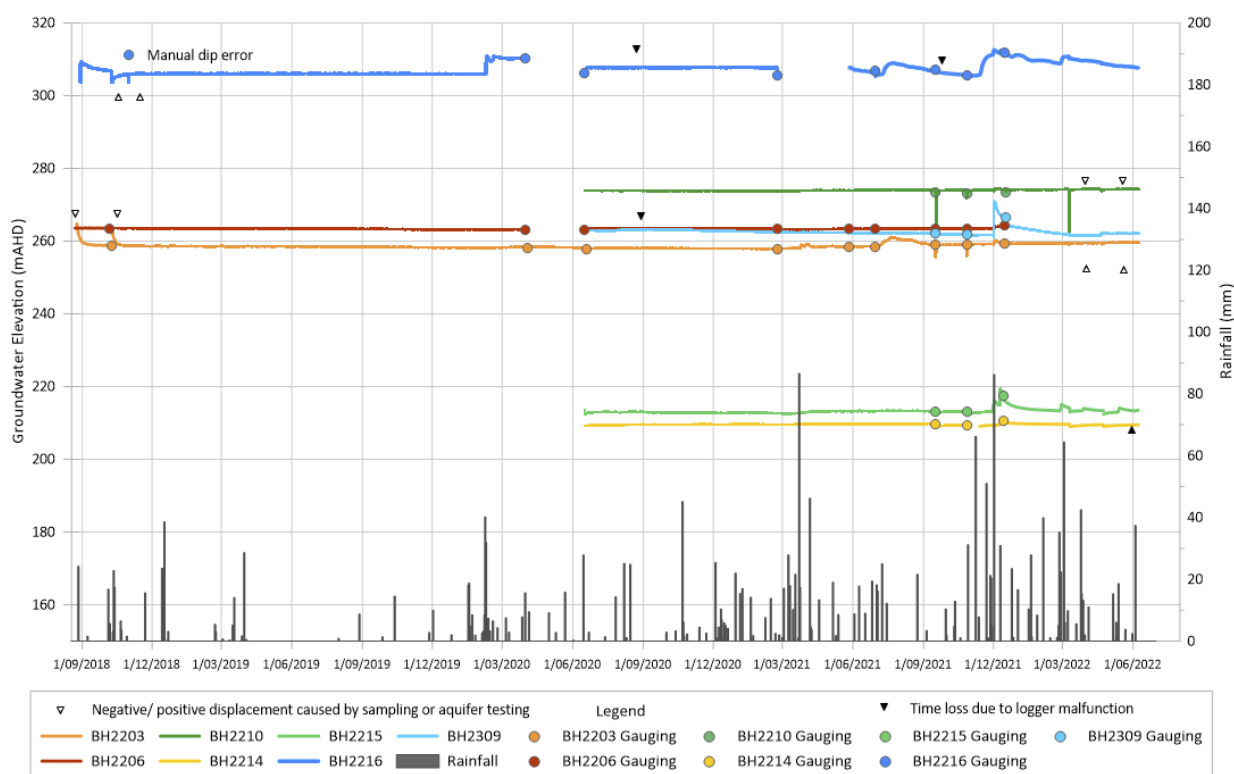


Figure 4.18 Groundwater elevation within the WCM (Project bores)

4.7.2.5 Vertical hydraulic gradients

Recent groundwater measurements from nested bores near the Project within the alluvium, and sedimentary units of the Surat Basin and Clarence-Moreton Basin, were evaluated to interpret vertical groundwater gradients.

Representative nested bores and groundwater level data are summarised in Table 4.13 and presented on the figures in the relevant subsection above. Due to a lack of nested bore locations close to the Project, bores up to 4.5 km from the impact assessment area were reviewed to characterise vertical gradients.

Table 4.13 Vertical groundwater elevation from nested bore data from the Border Rivers region

Bore	Monitoring point	Screened interval (m BGL)	Aquifer	Water level (m AHD)	Location relative to the Project	Comment
41640003	Pipe B	42 to 47.5	BRA	235.51	4.5 km to south of Ch 24 km	Upward hydraulic gradient. Kumbarilla Beds static level 1.6m above alluvium water level. Levels gauged on 9/02/2022.
	Pipe A	92 to 101.5	Kumbarilla Beds	237.55		
42231378	Pipe B	56 to 67	Upper CA	355.61	250 m south of Ch 153 km	Slight upward hydraulic gradient. Lower alluvium static level 0.3 m above upper alluvium. Levels gauged on 20/01/2022.
	Pipe A	107 to 119	Lower CA	355.91		
42230962	Pipe B	4.0 to 13	Upper MRV	491.80	2 km east of Ch 188 km	No hydraulic gradient between upper and lower. Levels gauged on 22/04/2020.
	Pipe A	34 to 36	Lower MRV	483.93		
42231209	Pipe A	21 to 150	WCM	351.32	Ch 25.56 km NNW	No nested bores located to compare these two aquifers. Both

Bore	Monitoring point	Screened interval (m BGL)	Aquifer	Water level (m AHD)	Location relative to the Project	Comment
42230060	Pipe A	14 to 28.4	CA	353.67	Ch 20.33 km NNW	water levels measured on 20/01/2022. Downward gradient. WCM water level 2.35 m below that of CA.

The static water level data indicates the following with respect to groundwater hydraulic gradients:

- The upward gradient from the Kumbarilla beds into the overlying BRA, indicating the Kumbarilla Beds aquifer is confined and there is limited hydraulic connection between the two
- The slight upward gradient between the upper and lower CA indicates hydraulic connectivity exists through the aquifer profile
- Negligible vertical gradient between the upper and lower MRV shows well established hydraulic connectivity through the aquifer. This is a well-connected fractured hard rock aquifer which acts as a single unit
- The downward gradient that exists between the CA and the deeper WCM shows limited hydraulic connectivity probably due to semi-confined conditions. Groundwater has potential to flow from the alluvium to the WCM.

The dataset included in the hydraulic connectivity assessment is limited relative to the geographical size of the assessment area. As such, there is potential variation of connectivity between the alluvial sediments and underlying bedrock in localised areas; however, these are likely to impact negligibly on the overall inferred hydraulic connectivity of the alluvial units and underlying bedrock presented above.

4.7.3 Groundwater chemistry

A search of the DRDMW Groundwater Database was undertaken for bores within the impact assessment area, for the aquifers of interest, with reported chemistry data. The search yielded a total of 47 bores with chemistry data and source aquifer records.

These data were sorted according to source aquifer (aquifer attribution on the bore cards) and used to derive minimum, maximum, and median values for select hydrochemical parameters to gain an understanding of the current (baseline) conditions of the identified hydrostratigraphic units with potential to be impacted by the Project. Only bores screened within BRA, CA, MRV or WCM were considered further.

A summary of major ion concentrations for the BRA, CA, MRV and WCM registered and Project bores is shown in Table 4.14.

Table 4.14 Hydrochemical composition of water in three main aquifers (mg/L)

		Major Cations				Major Anions			
		Sodium	Potassium	Calcium	Magnesium				
		Median	Median	Median	Median	Dominant Cation	Bicarbonate	Chloride	Sulphate
							Median	Median	Median
Borders Rivers Alluvium	Project Bores	131	3	26	11	Sodium	208	117	32
	Registered Bores	305	1.5	5	0.1	Sodium	705	70	5
Condamine Alluvium	Project Bores	79.5	2	32.5	19.5	Sodium	191.5	64	3
	Registered Bores	79	1.3	56	29	Sodium	420	68	2
Main Range Volcanics	Project Bores	81	2	64	68.5	Sodium	310.5	219.5	5
	Registered Bores	87	2	58	70	Sodium	414.9	215	9.4
Walloon Coal Measures	Project Bores	645.5	6	56.5	32	Sodium	318.5	975.5	140
	Registered Bores	180	1	33	29	Sodium	330	430	21

4.7.3.1 Hydrochemical classification

Piper diagrams plot relative abundances of major cations and anions on adjacent tri-linear fields, with these points then being extrapolated to a central diamond field. The cation and anion plotting points are derived by computing the percentage equivalents per million for the main diagnostic cations of Ca^{2+} , Mg^{2+} , and Na^+/K^+ , and anions Cl^- , SO_4^{2-} , and $\text{CO}_3^{2-}/\text{HCO}_3^-$.

Waters from different environments typically plot in diagnostic areas or 'hydrochemical facies'. The upper half of the diamond normally contains water of static environments, while the middle area normally indicates an area of dissolution and mixing. The lower triangle of this diamond shape indicates an area of dynamic and co-ordinated environments. Sodium chloride type (old water) normally plot in the right corner of the diamond shape while recently recharged water plots on the left corner of the diamond plot (magnesium bicarbonate type). The top corner normally indicates water with sulphate impact (gypsum).

Water chemistry, including Piper diagrams and determination of corresponding hydrochemical characteristics, is presented in the following subsections for each of the relevant aquifer units.

Alluvium (Condamine River)

Water chemistry data obtained from registered and Project bores targeting the CA have been plotted onto a Piper diagram to determine the hydrochemical character of the aquifer (Figure 4.19).

The data points plot in a well-defined area of mixed type or sodium bicarbonate type waters, indicative of mixed environment that is typical of an alluvial aquifer. Salinity is variable in this aquifer, with EC ranging between $192 \mu\text{S}/\text{cm}$ and $1,362 \mu\text{S}/\text{cm}$ (TDS 129 to 913 mg/L), which is considered to be fresh ($<1,000 \text{ mg}/\text{L}$). This suggests that the aquifer is regularly recharged and that there is no extended residence time to facilitate water–substrate interaction (i.e. this is a typical dynamic primary aquifer system).

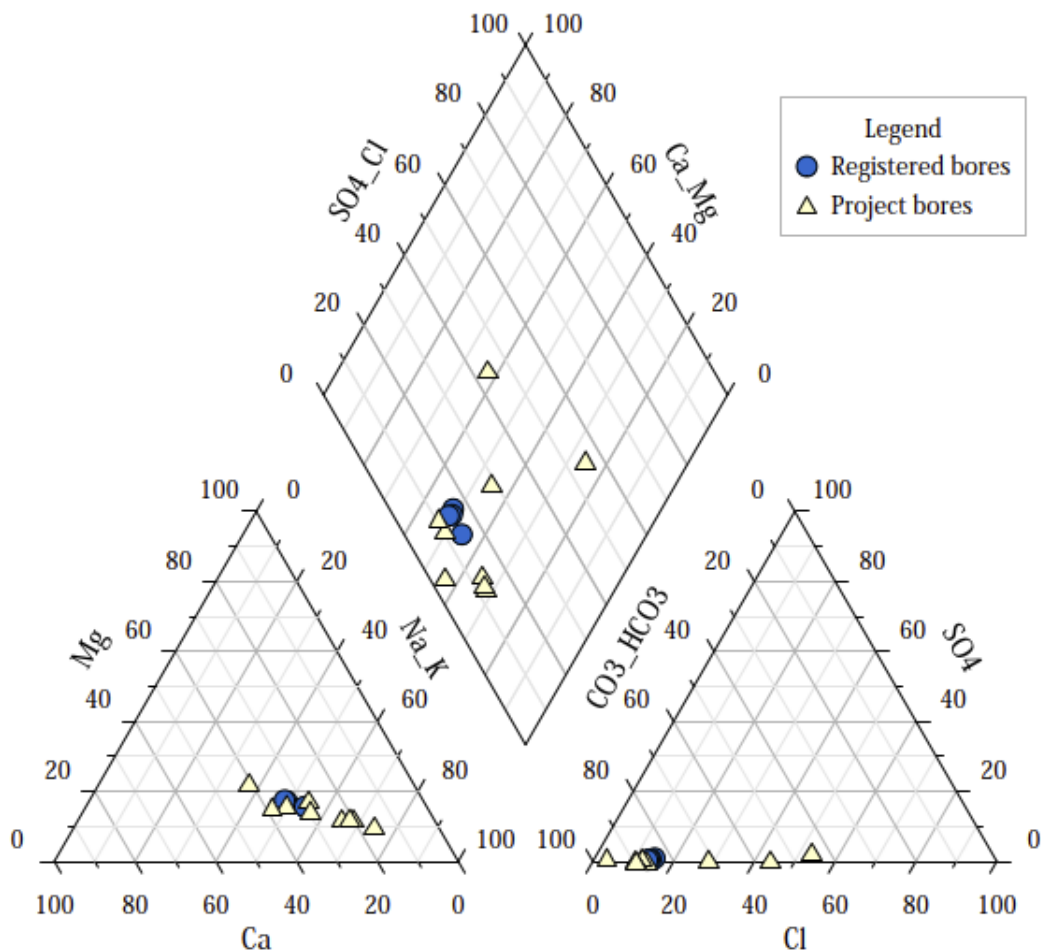


Figure 4.19 Piper diagram of results for groundwater samples collected from the Condamine Alluvium

Alluvium (Border Rivers)

Water chemistry data obtained from registered and Project bores targeting the BRA have been plotted onto a Piper diagram to determine the hydrochemical character of the aquifer (Figure 4.20).

The data indicates Project bores are typically mixed type, while the registered bore is sodium bicarbonate type. Both indicate a mixed environment, typical of an alluvial aquifer which acquire their character from the hosting alluvial sediments and are subject to variable conditions.

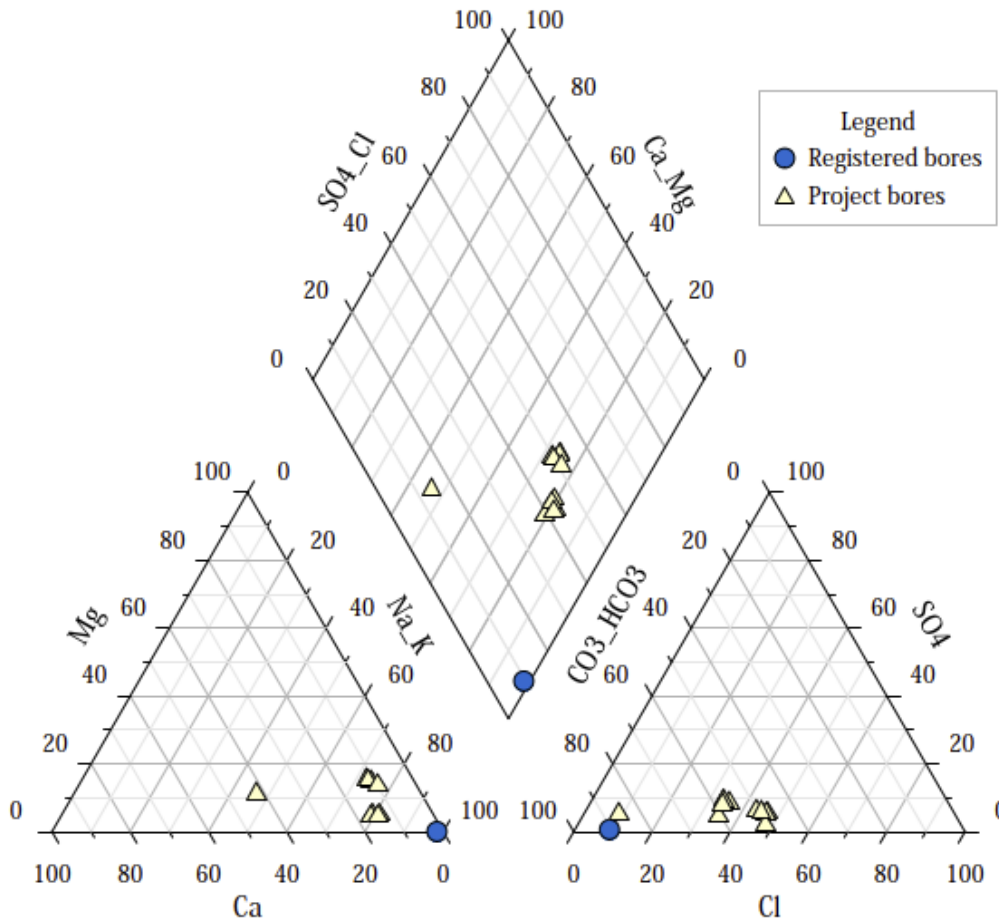


Figure 4.20 Piper diagram of results for groundwater samples collected from the Border Rivers Alluvium

Salinity is variable in this aquifer with EC ranging between 145 $\mu\text{S/cm}$ and 1,527 $\mu\text{S/cm}$ (TDS 93 ppm to 979 mg/L), considered fresh. This suggests that certain parts of the aquifer can yield saline water and that such areas are probably further from recharge zones, which typically reflects longer residence time in the aquifer.

Main Range Volcanics

The MRV consist of basalt that underlies the CA tributaries in the eastern portion of the impact assessment area and overlies the WCM.

Water chemistry data obtained from registered and Project bores targeting the MRV have been plotted onto a Piper diagram to determine the hydrochemical character of the aquifer (Figure 4.21) The dominant cations in the majority of samples is shown to be sodium and potassium and the dominant anion is shown to be bicarbonate. The plotted registered and Project bore data show that groundwater within this aquifer does not have a specific hydrochemical signature, with individual samples plotting across the diagram (rather than plotting in a cluster). The scattered nature of the samples indicates that there are multiple processes occurring in this aquifer. These processes are likely to involve recent recharge, mixing environments and cation exchange of magnesium and calcium for sodium.

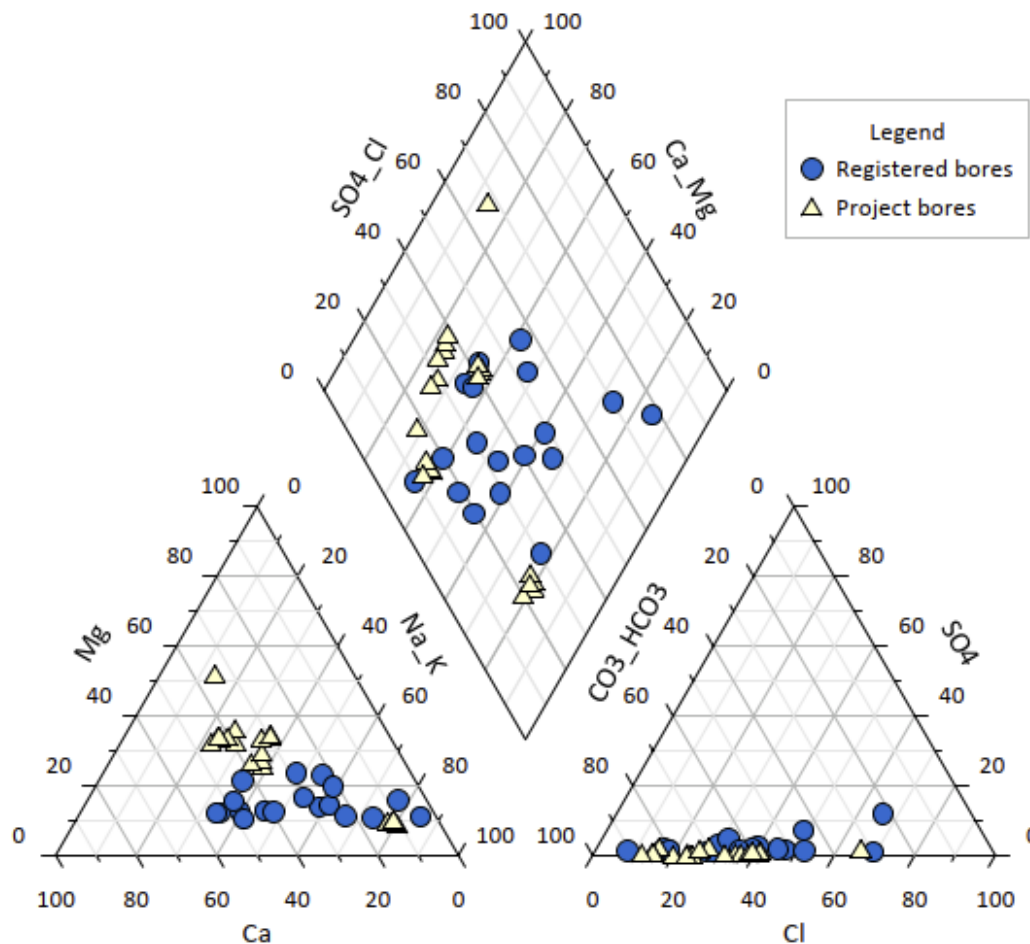


Figure 4.21 Piper diagram of results for groundwater samples collected from the Main Range Volcanics

EC values ranging from 183 $\mu\text{S}/\text{cm}$ to 1,891 $\mu\text{S}/\text{cm}$ (TDS 285 ppm to 2,950 mg/L) were recorded from the MRV bores, considered fresh to brackish quality.

Walloon Coal Measures

The quality of the groundwater within the WCM is recognised to be highly variable due to the variable lithology, structure of the unit and the hydraulic connectivity (leakage) between lithological layers.

Water chemistry data from registered and Project bores targeting the WCM are plotted on Figure 4.22. The data presents scattered distribution across the plot which is consistent with the known highly variable nature of the unit. However, the majority of data points plot as sodium chloride type, which is indicative of a longer residence time within the aquifer (old waters).

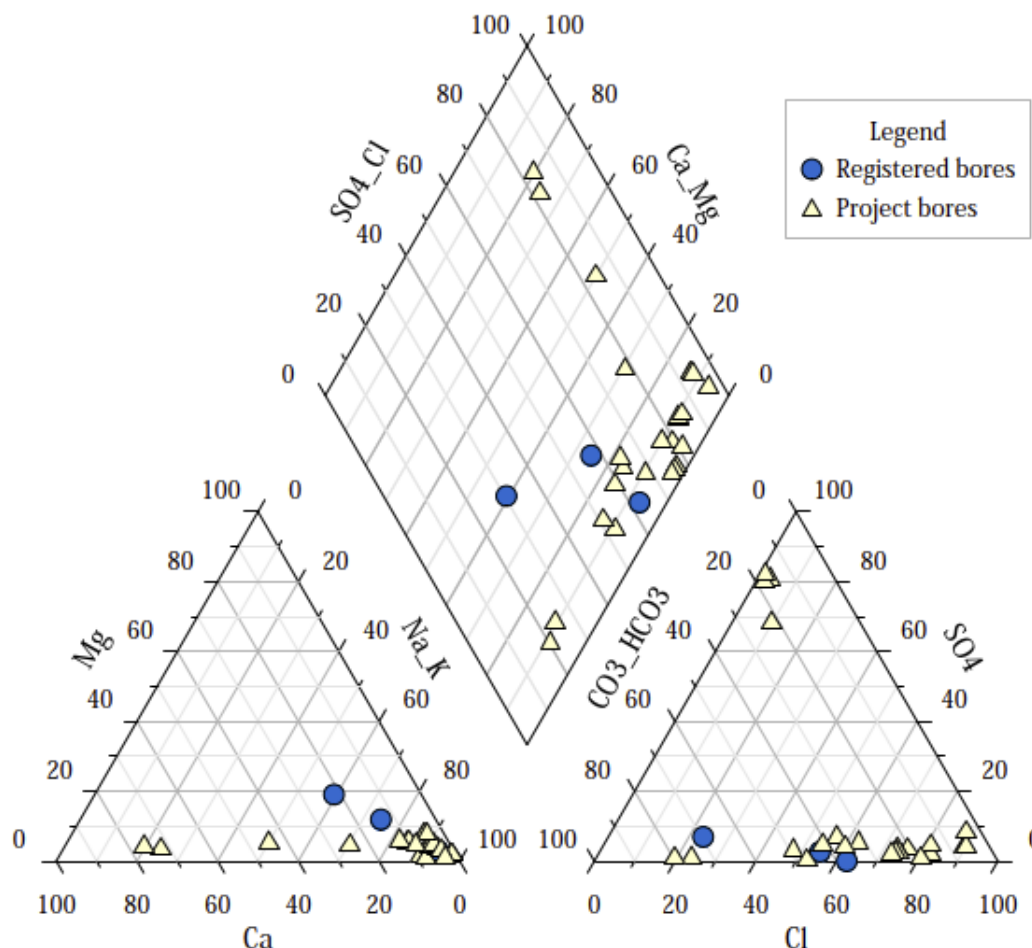


Figure 4.22 Piper diagram of results for groundwater samples collected from the Walloon Coal Measures

Water chemistry data from quality samples obtained from the WCM show EC values ranging from 178 $\mu\text{S}/\text{cm}$ to 7,051 $\mu\text{S}/\text{cm}$ (TDS 278 ppm to 11,000 mg/L), considered fresh to saline. The high variability in the dissolved salt load is also evident in the scattered distribution of data across the piper plot.

Project groundwater quality summary

The available project groundwater chemistry data is summarised in Table 4.15 against guideline values, to compare the quality of the hydrostratigraphic units described above and identify suitability for potential groundwater usage in the impact assessment area.

As a general overview, TDS, chloride, sodium, iron and manganese are the main parameters that limit potential suitability for use in the impact assessment area. Metals, primarily Iron and Manganese, are shown to exceed long-term irrigation guidelines (ANZG, 2018) across all aquifers. While the maximum of ions calcium, sodium and chloride are shown to exceed drinking water criteria (NHMRC & NRMCC, 2018) across all aquifers.

Table 4.15 Comparison of groundwater quality to guideline values

Parameter	Guidelines			Alluvium (Condamine) (n=12)			Alluvium (Border Rivers) (n=20)			Main Range Volcanics (n=32)			Walloon Coal Measures (n=40)		
	ANZG Stock (2000)	NHMRC Drinking Water (2018)	ANZECC Irrigation Long Term (2000)	Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median
<i>Physiochemical</i>															
Electrical Conductivity (µs/cm)				194	2010	636	367	1420	771	634	5290	1165	410	17500	3665
Total Dissolved Solids (mg/L)	2000 - 4000*	1200**		129	1470	388.5	262	829	500	348	4080	708	278	11200	2070
pH (field)			6-8.5	7.21	8.36	8.08	7.10	8.32	7.78	7.26	8.56	8.01	6.39	8.49	7.33
Na Adsorption Ratio				1.00	6.33	2.61	1.47	6.78	5.46	0.82	5.64	1.39	1.04	58.20	16.00
Total Hardness (mg/L)	4000	6000		52	537	159.5	48	273	106	95	2600	448.5	24	1650	283.5
Total Alkalinity (mg/L)				85	311	195	100	319	208	225	740	310.5	28	910	318.5
<i>Dissolved Anions</i>															
Bicarbonate (mg/L)				85	311	191.5	100	319	208	217	740	310.5	28	910	318.5
Carbonate (mg/L)				<1	13	<1	<1	6	<1	<1	29	<1	<1	59	<1
Chloride (mg/L)		250		5	583	64	10	294	117	38	1420	220	9	5970	976
Fluoride (mg/L)	2		1	<0.1	0.4	0.2	<0.1	0.5	0.5	<0.1	0.4	0.2	<0.1	2.0	0.2
Sulphate as SO ₄ (mg/L)	1000	500		1	22	3	6	43	32	1	68	5	2	825	140
<i>Dissolved Cations</i>															
Sodium (mg/L)		180		17	236	79.5	38	205	131	37	136	81	52	3230	645.5
Potassium (mg/L)				1	6	2	2	8	3	<1	5	2	2	18	6
Iron (mg/L)		0.3	0.2	<0.05	1.41	0.56	<0.05	1.63	0.21	<0.05	0.54	0.16	<0.05	21.00	3.68
Calcium (mg/L)	1000			12	103	32.5	6	38	26	15	212	64	3	330	56.5
Magnesium (mg/L)				6	68	19.5	8	47	11	14	512	68.5	4	312	32
<i>Nutrients</i>															
Nitrate (mg/L)	400	50		<0.01	8.060	0.650	<0.01	1.610	0.440	<0.01	22.800	0.490	<0.01	4.190	0.070
Phosphorus (mg/L)				<0.01	0.520	0.110	<0.01	0.510	0.310	<0.01	0.120	0.025	<0.01	0.730	0.003
<i>Metals</i>															
Arsenic (mg/L)			0.1	<0.001	1740	690	<0.001	0.011	0.003	<0.001	0.006	<0.001	<0.001	0.01	0.003
Barium (mg/L)				0.068	0.394	0.1535	0.085	0.67	0.15	0.012	0.168	0.043	0.041	2.16	0.183
Beryllium (mg/L)			0.1	<0.001	0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (mg/L)			0.5	<0.05	0.60	<0.05	<0.05	0.10	0.08	<0.05	0.08	0.06	<0.05	0.45	0.10
Cadmium (mg/L)			0.01	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.0004	<0.0001	<0.0001	0.0003	<0.0001
Chromium (mg/L)			0.1	<0.001	0.069	0.0035	<0.001	0.63	0.008	<0.001	0.015	0.003	<0.001	0.055	0.004
Cobalt (mg/L)			0.05	<0.001	0.026	0.011	<0.001	0.09	0.0095	<0.001	0.013	0.002	<0.001	0.021	0.004
Copper (mg/L)			0.2	<0.001	0.036	0.008	0.001	0.252	0.009	<0.001	0.102	0.003	<0.001	0.028	0.004
Iron (mg/L)			0.2	0.33	40.5	2.17	<0.05	40	0.75	0.06	15.5	0.775	0.23	27.8	4.8
Lead (mg/L)			2	<0.001	0.013	0.003	<0.001	0.023	0.008	<0.001	0.005	0.002	<0.001	0.025	0.002
Manganese (mg/L)			0.2	0.03	1.17	0.3085	0.003	1.62	0.239	0.005	0.422	0.0805	0.002	4.42	0.363
Mercury (mg/L)			0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0017	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (mg/L)			0.2	0.002	0.081	0.012	<0.001	0.084	0.018	<0.001	0.057	0.006	<0.001	0.049	0.005
Selenium (mg/L)			0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (mg/L)			0.1	<0.01	0.09	0.055	<0.01	0.06	0.03	<0.01	0.02	<0.01	<0.01	0.04	<0.01
Zinc (mg/L)			2	<0.005	0.122	0.014	<0.005	0.294	0.024	<0.005	0.071	0.01	<0.005	0.125	0.011

* The following TDS concentrations are recommended for stock drinking water quality to ensure no adverse effects on the animals. For beef cattle (max 4,000 mg/L), dairy cattle (max 2,400 mg/L), sheep (max 4,000 mg/L), horses (max 4,000 mg/L), pigs (max 4,000 mg/L) and poultry (max 2,000 mg/L).

** TDS of greater than 1,200 mg/L is considered unpalatable. Between 0 - 600 mg/L is considered good, 600 - 900 mg/L is considered fair, 900 - 1,200 is considered poor.

4.7.3.2 Regional salinity

Salinity is a major land degradation issue that can impact on land productivity and, in-stream salt loads and concentrations. Two salinity risk assessments have previously been undertaken within the impact assessment area. The Murray Darling region salinity risk assessment intersects the impact assessment area between the Macintyre River and east of Millmerran State Forest (Biggs et al. 2010). The Condamine Catchment salinity risk assessment intersects the impact assessment area east of Millmerran State Forest to Gowrie (Searle et al. 2007).

The Murray Darling region salinity risk assessment identified 58 known salinity land expression areas affected by secondary salinity, including the Yelarbon Desert in the Border Rivers catchment. The Yelarbon area (approximately from Ch 24 km to Ch 27 km) is known for its extremely alkaline, sodic sodosol soils strongly attributed to upwelling of sodium bicarbonate rich groundwater (Biggs et al. 2010). This upwelling is primarily attributed to an offset fault from the Peel Fault that allows saline groundwater to infiltrate the soil zone (Knight et al., 1989).

Within the Border Rivers catchment, the salinity risk assessment identified the use of saline groundwater for land irrigation, leaking dams and dissolution of salts as the most common secondary salinity sources. Despite the need for greater research regarding secondary salinity formation and the impact of salinity on infrastructure assets, the risk assessment concluded salinity in the region will have a low risk to rail infrastructure (Biggs et al. 2010).

The Condamine Catchment salinity risk assessment identified more than 170 salinity land expression sites with most influenced by climatic conditions. The assessment identified return to typical long-term weather patterns will likely increase the size and number of dryland salinity expressions in the region and increase salt load exported from the catchment. The impact assessment area intersected sub-catchments considered to contain a very low to high overall salinity risk. The Millmerran area was considered to have a very low to low risk of secondary salinity, whilst the Pittsworth and Gowrie area considered to have moderate risk. An area of high salinity risk intersects the impact assessment area near Southbrook and presents a 'Current' threat, through salinity, to infrastructure assets in the area (Searle et al. 2007).

An assessment of the salinity hazard risk along the Project alignment has been undertaken and documented in EIS Chapter 9: Land Resources and EIS Appendix J: Soil Assessment Report.

4.7.4 Surface water - groundwater interactions

4.7.4.1 Condamine Alluvium

The Condamine Alluvial system has been traditionally conceptualised as a single connected groundwater system with little or no interaction with underlying bedrocks. Recharge to the CA is complex and there are differing views on the relative significance of different recharge pathways. The most common and prevalent view is that the alluvium is mainly recharged from river and stream flow leakage, as discussed in Section 4.7.1.1. This relationship is demonstrated by the hydrograph in Figure 4.23 produced from the groundwater bore database that spans a time period between June 1995 and January 2022.

Data for stream flow were taken from the Lemon Tree Weir on the Condamine River, station number 422349A, and groundwater level data were taken from registered bore RN42231089 which is approximately 8 km downstream adjacent to the Gore Highway. Rainfall data has been obtained from the Glen Royal BoM weather station (Station 041504).

There is an approximate 10 m difference in elevation between the groundwater level and Condamine River water level with the latter being most elevated. This difference in water level elevation suggests that the Condamine River is a losing river facilitating aquifer recharge. This means that surface water typically infiltrates vertically to recharge local groundwater within the alluvium.

Diffuse rainfall recharge is expected to be limited by the high clay content of near-surface soils and fine-grained sheetwash deposits. Discharge is mostly through extraction and baseflow to receiving surface water features (DNRM, 2016).

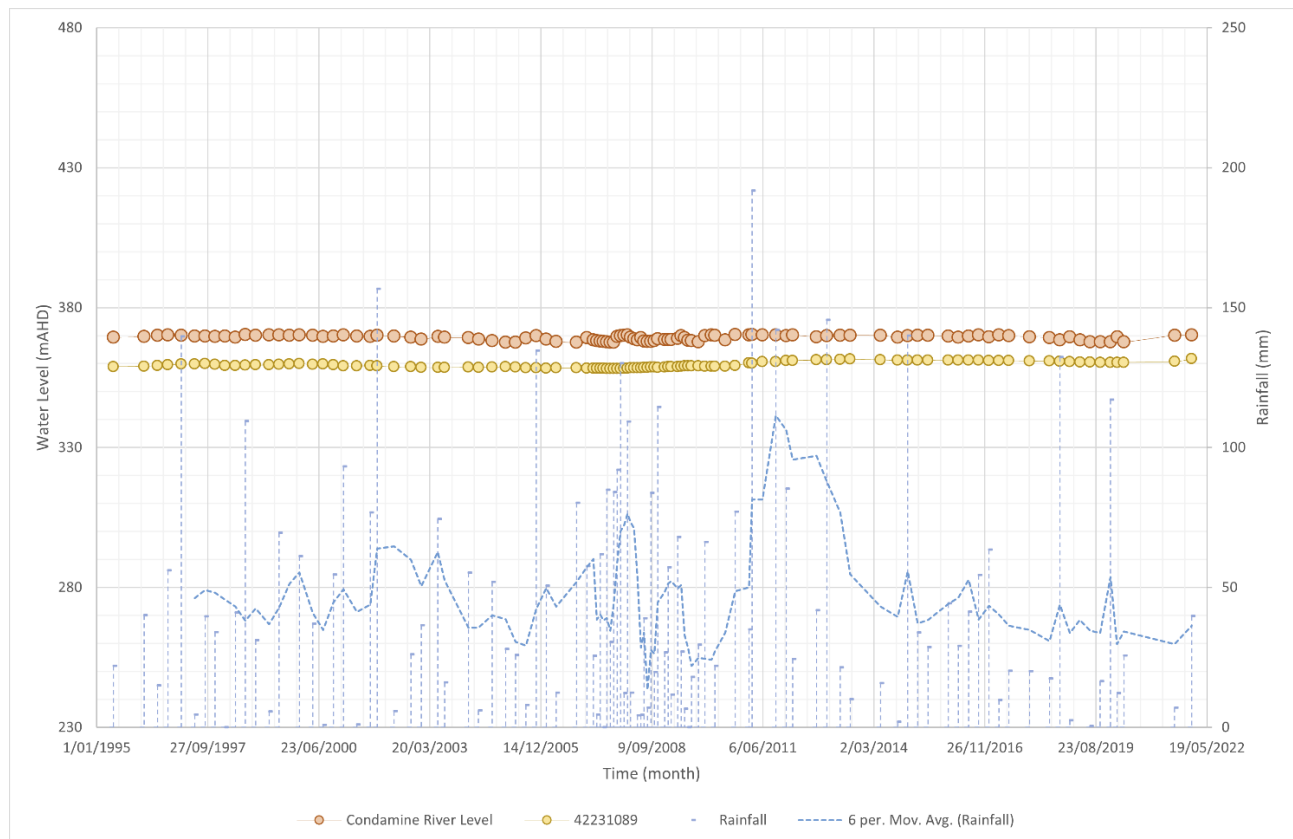


Figure 4.23 Representative hydrograph of the Condamine River (gauging station 422349A)

4.7.4.2 Border Rivers Alluvium

Regional assessments of surface water - groundwater interactions have identified the Macintyre River and other watercourses in the region to be losing systems (Parson et al. 2008). This means that surface water typically infiltrates vertically to recharge local groundwater within the alluvium (i.e. loses water to the groundwater).

A hydrograph for the Macintyre River produced from data that spanning a time period between April 2011 and January 2022 is presented on Figure 4.24. Data for stream flow were taken from the Ben Dor Weir on the McIntyre River (Station Number 416406A) and groundwater level data were taken from registered bore RN41640038 which is approximately 7 km upstream adjacent to the Cunningham Highway. Rainfall data has been obtained from the Bengalla TM BoM weather station (Station 41506).

There is an approximate 5 m difference in elevation between the groundwater level and McIntyre River water level with the groundwater being most elevated. This difference in water level elevation indicates in this instance that the McIntyre River is a gaining river contrary to the assessment discussed above.

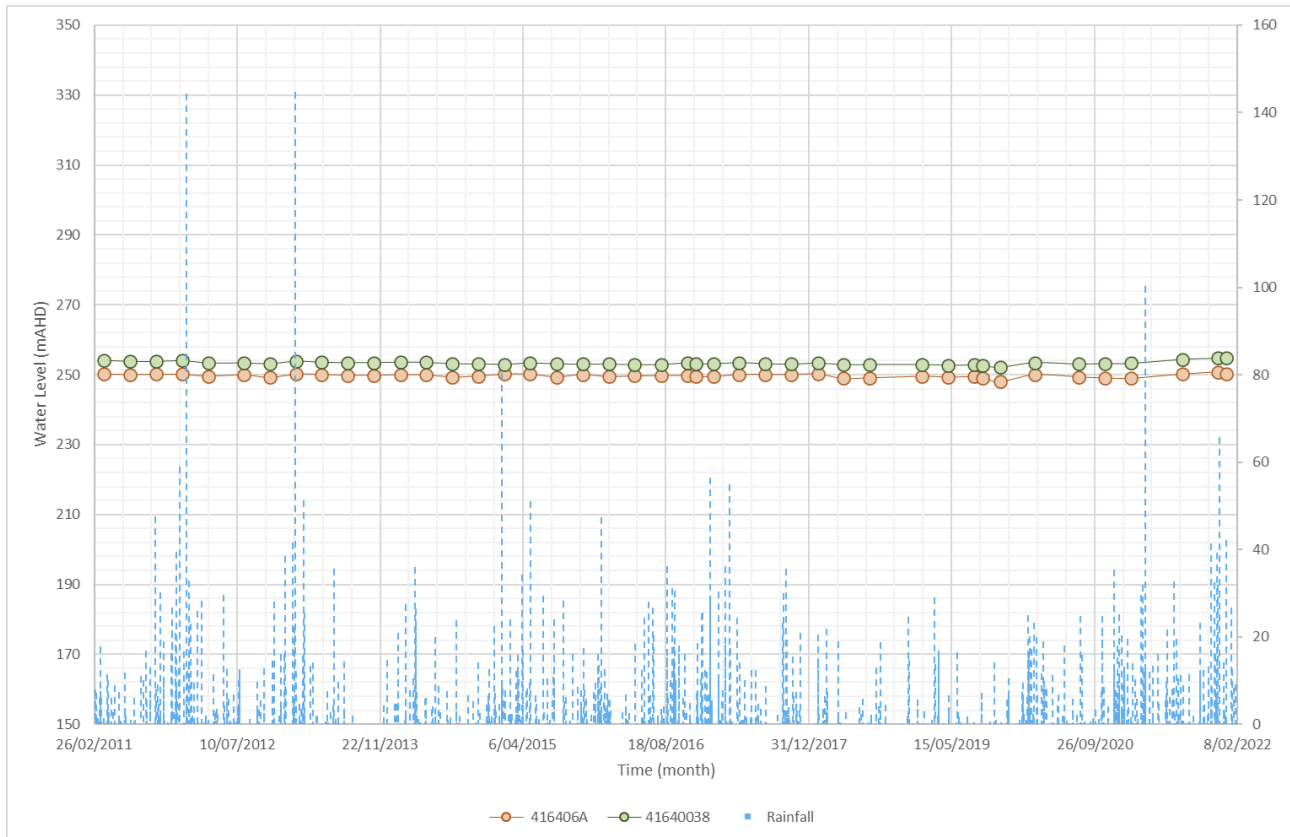


Figure 4.24 Representative hydrograph of the McIntyre River (gauging station 416406A)

4.7.4.3 Main Range Volcanics

There are no perennial streams/ivers crossing outcrops of MRV in proximity to the Project but there is potential recharge from local ephemeral streams/creeks. To identify surface-groundwater interaction, rainfall data has been compared to groundwater level response. A hydrograph was produced using time-series groundwater data from registered bore RN42230962 and rainfall data from the Glen Royal weather station for the period 1973 to 2021 (Figure 4.25).

The hydrograph shows that there is a rapid response in groundwater level to rainfall which illustrates a typical attribute of a highly fractured aquifer. Seasonal streams will readily recharge the aquifer because of the high degree of hydraulic connection.

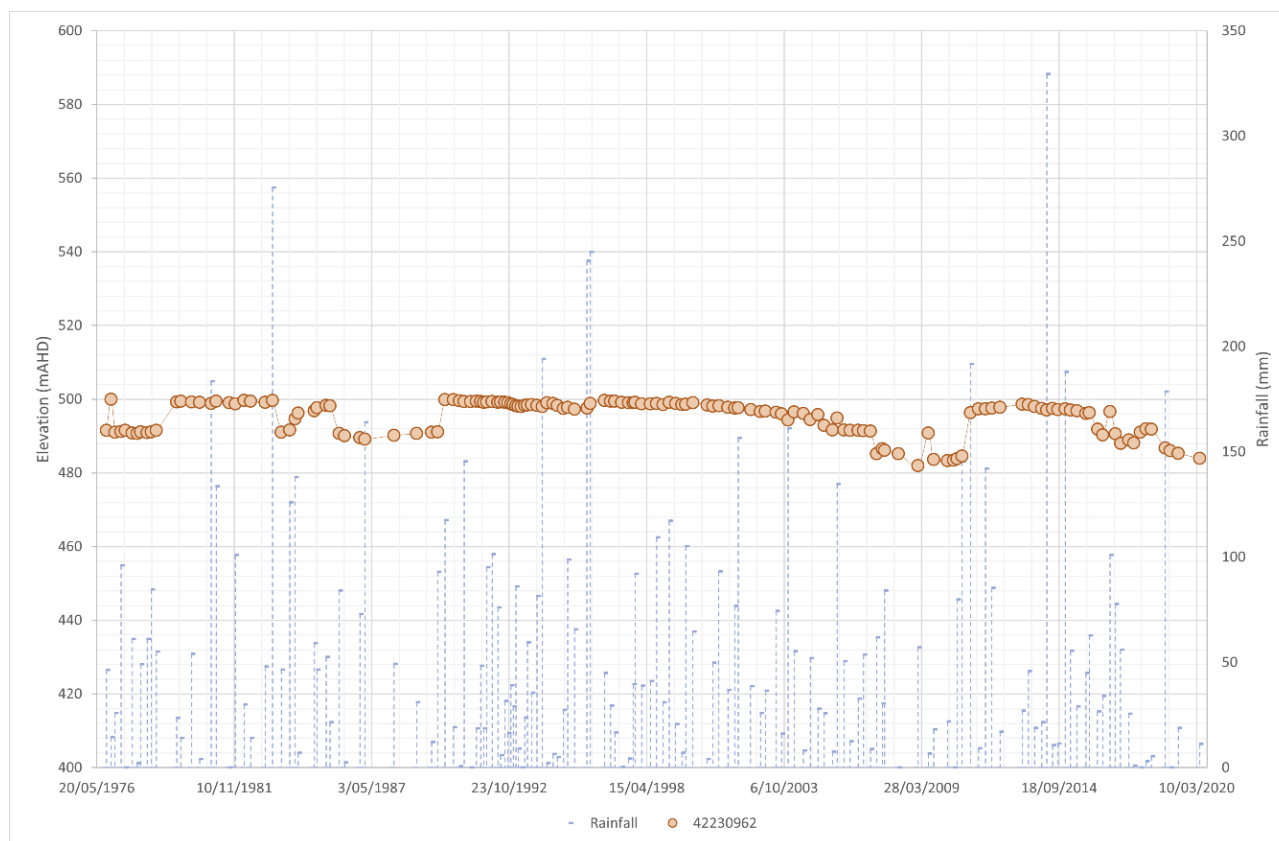


Figure 4.25 Representative hydrograph of RN42230962 static water level and rainfall in the Main Range Volcanics

4.7.5 Groundwater use

4.7.5.1 Registered groundwater bores

A search of registered groundwater bores within the impact assessment area was completed in December 2023 using the DRDMW Groundwater Database and Queensland Globe. The search identified a total of 526² registered bores within the impact assessment area, of which 197 were excluded from the existing environment assessment (quality, aquifer designation, etc.) as part of the literature review and desktop assessment due to an absence of data on aquifer lithology and bore construction details.

The database was utilised to develop an appreciation for existing groundwater usage within the impact assessment area. A summary of registered bore data relating to units within the depth of interest is provided in Table 4.16, while the registered bores are depicted on Figure 4.26.

Only bores screened within alluvial aquifers, WCM, MRV and Kumbarilla Beds were considered in the assessment. The majority of registered bores within the impact assessment area are screened within the MRV of the Clarence - Moreton Basin, while those within the Surat Basin are primarily screened in the Kumbarilla Beds, WCM and the CA. It is noted that a number of bores, predominantly DNRM monitoring bores, are nested and target multiple aquifers.

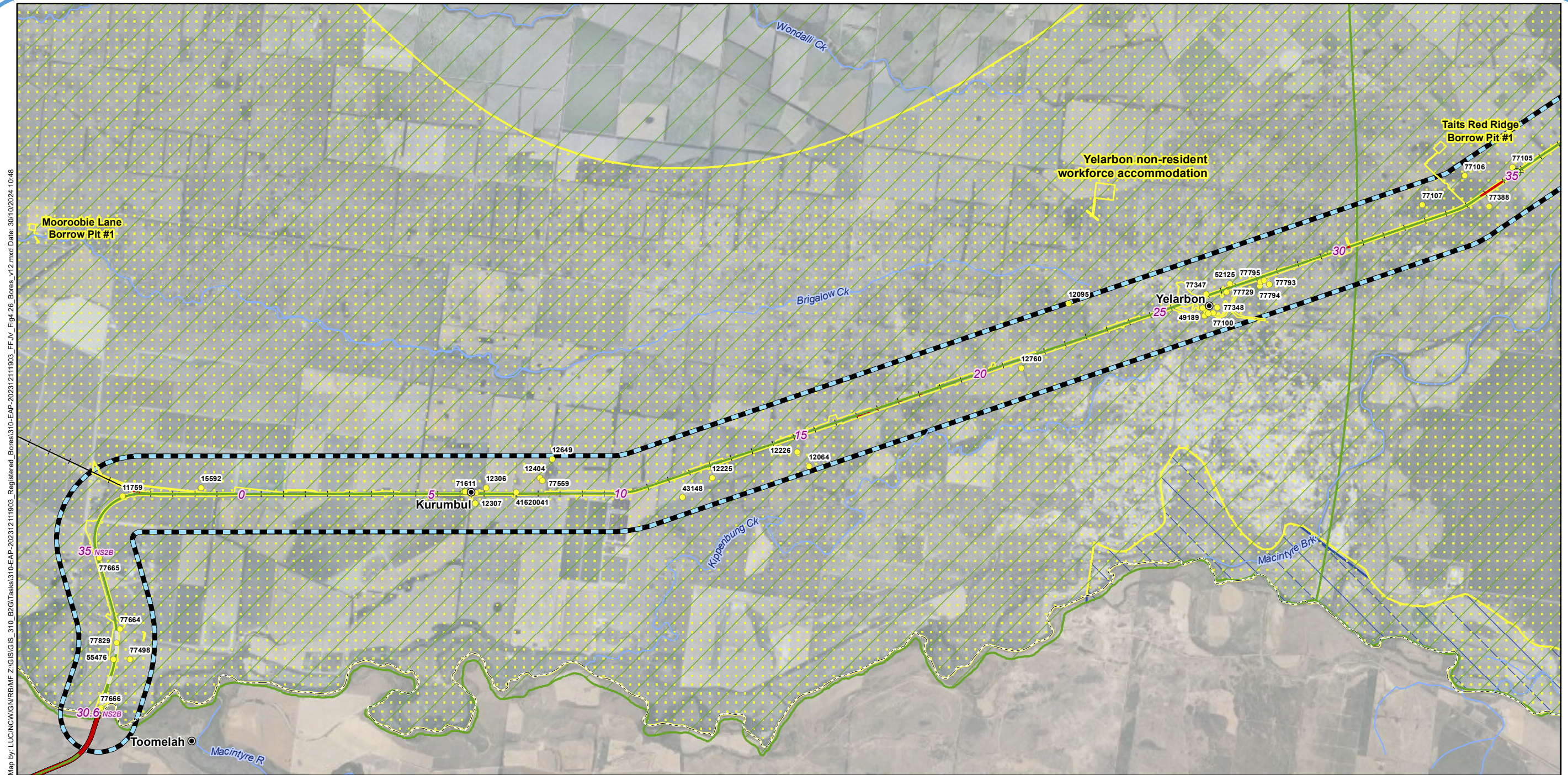
² DRDMW registered groundwater bores including 'existing' and 'Abandoned but useable'.

Table 4.16 **Summary of DRDMW registered bores within the impact assessment area**

Aquifer	Number of bores	Standing water level (m BGL)				Yield (L/s)			
		Min	Max	Mean	Count	Min	Max	Mean	Count
BRA	5	-7.5	-8.1	7.8	2	0.9	4.4	2.6	2
Condamine Alluvium	85	-6.1	-35	-20.5	15	0	16	7.1	16
MRV	174	-0.1	-80	-26.3	60	0.13	28.2	2.8	83
Kumbarilla Beds	12	0	-62	-15.38	20	0.15	5.5	1.4	12
WCM	23	-8	-102	-53.6	7	0.06	3.15	0.5	13

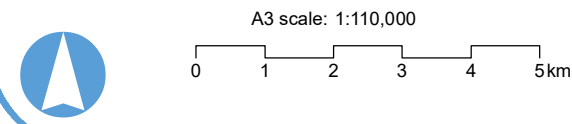
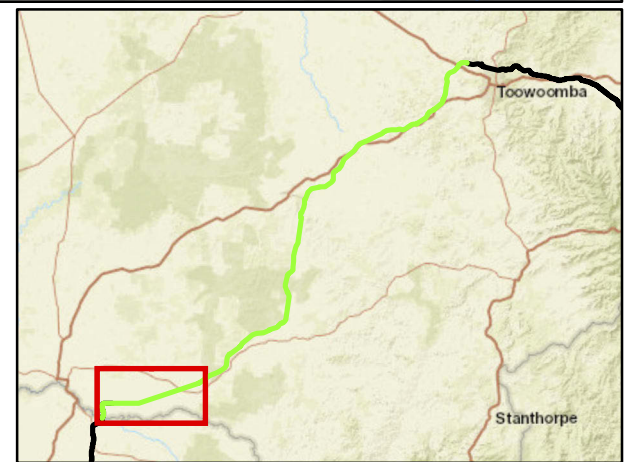
Table note:

* Parameters recorded on bore cards

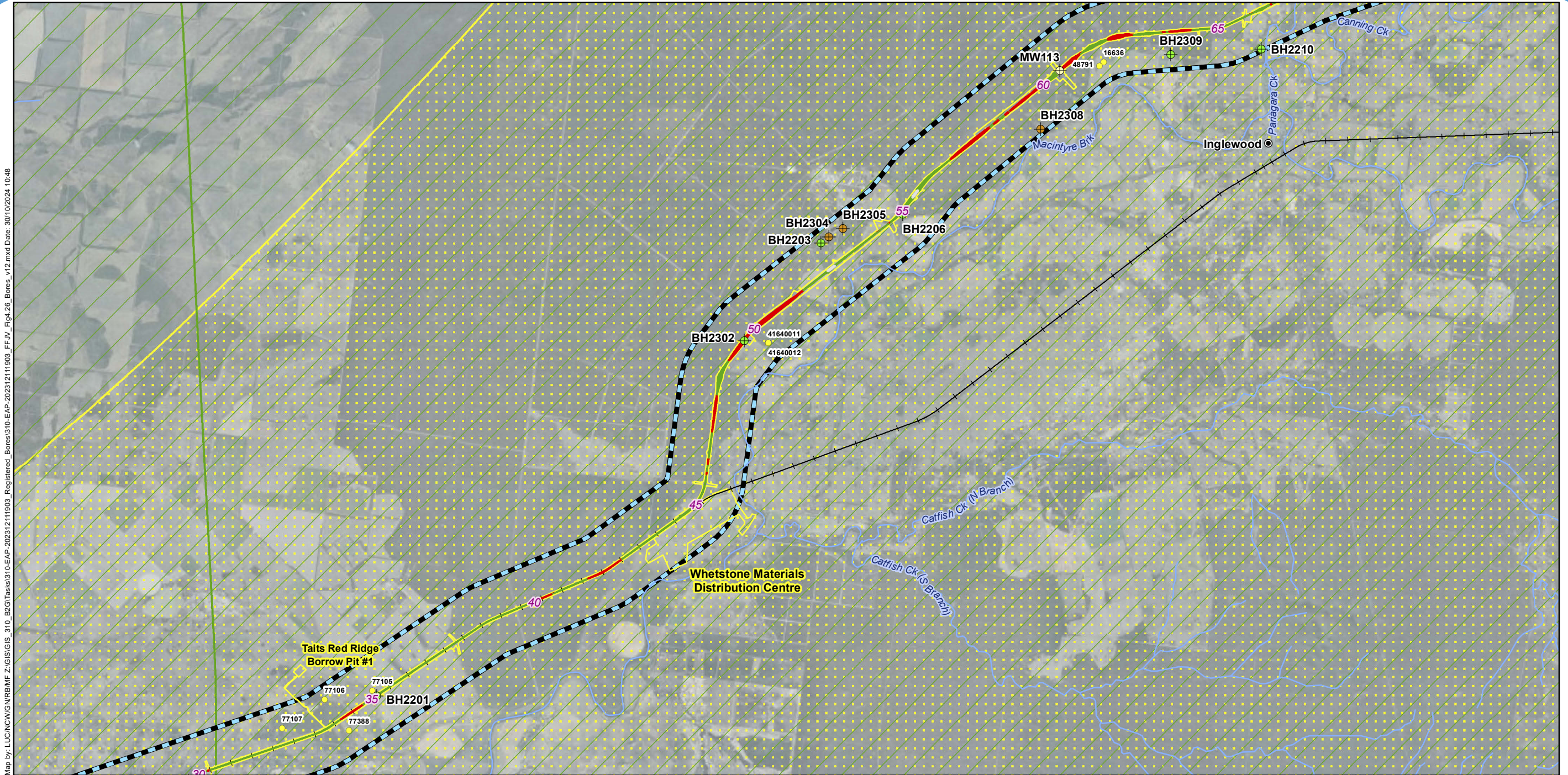


Legend

- | | | |
|---|--|--|
| <ul style="list-style-type: none">5 Chainage (km)LocalitiesExisting site investigation boresFormer site investigation boresNew site investigation boresRegistered boresNorth Star to NSW/QLD border alignmentBridgesExisting rail (operational) | <ul style="list-style-type: none">WatercoursesNSW/QLD borderRail Earthworks CutRail Earthworks FillGroundwater impact assessment areaImpact assessment areaTemporary footprint | Groundwater management areas <ul style="list-style-type: none">Water Act 2000Water Plan (Border Rivers and Moonie) 2019Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017Water Regulation 2016 |
|---|--|--|



Border to Gowrie
Figure 4.26a: Registered and design phase bores within the impact assessment area



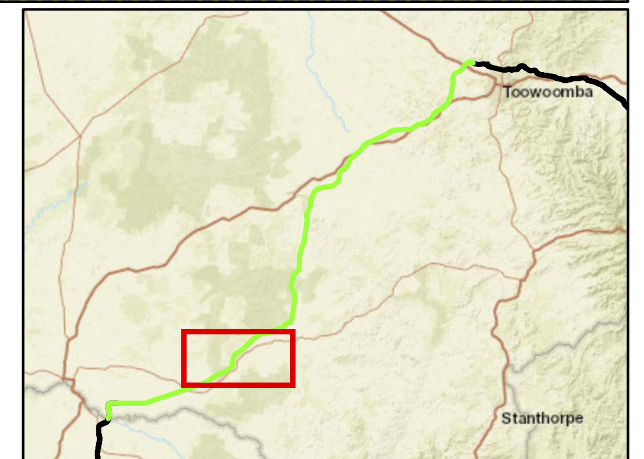
Legend

- 5 Chainage (km)
- Localities
- Existing site investigation bores
- Former site investigation bores
- New site investigation bores
- Registered bores
- Bridges
- Existing rail (operational)

- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Impact assessment area
- Temporary footprint

Groundwater management areas

- Water Act 2000
- Water Plan (Border Rivers and Moonie) 2019
- Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017



A3 scale: 1:110,000
0 1 2 3 4 5km

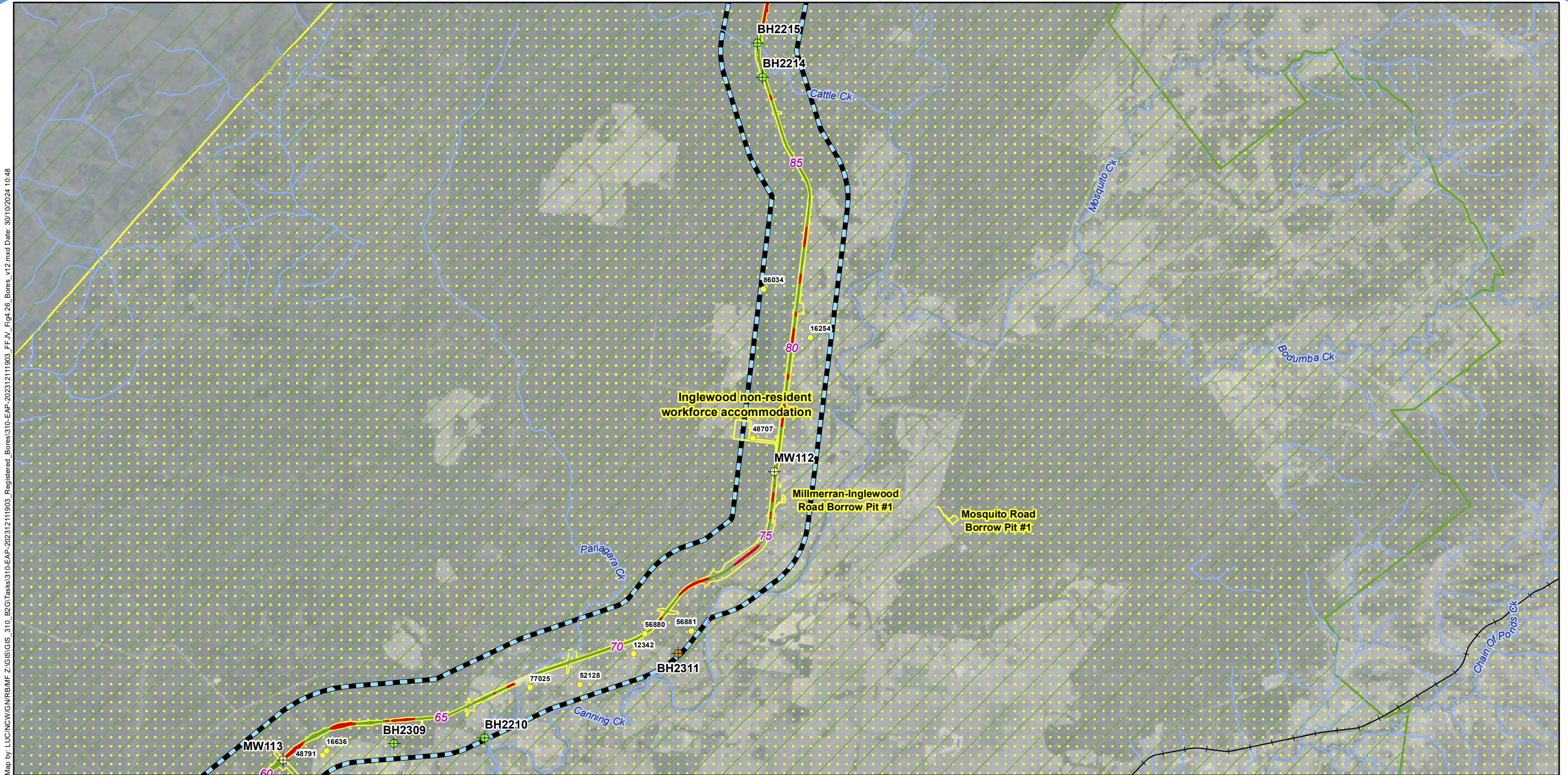


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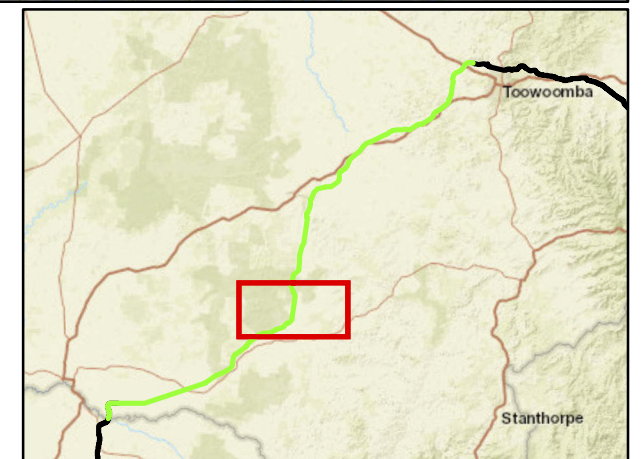
Border to Gowrie

Figure 4.26b: Registered and design phase bores within the impact assessment area

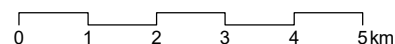


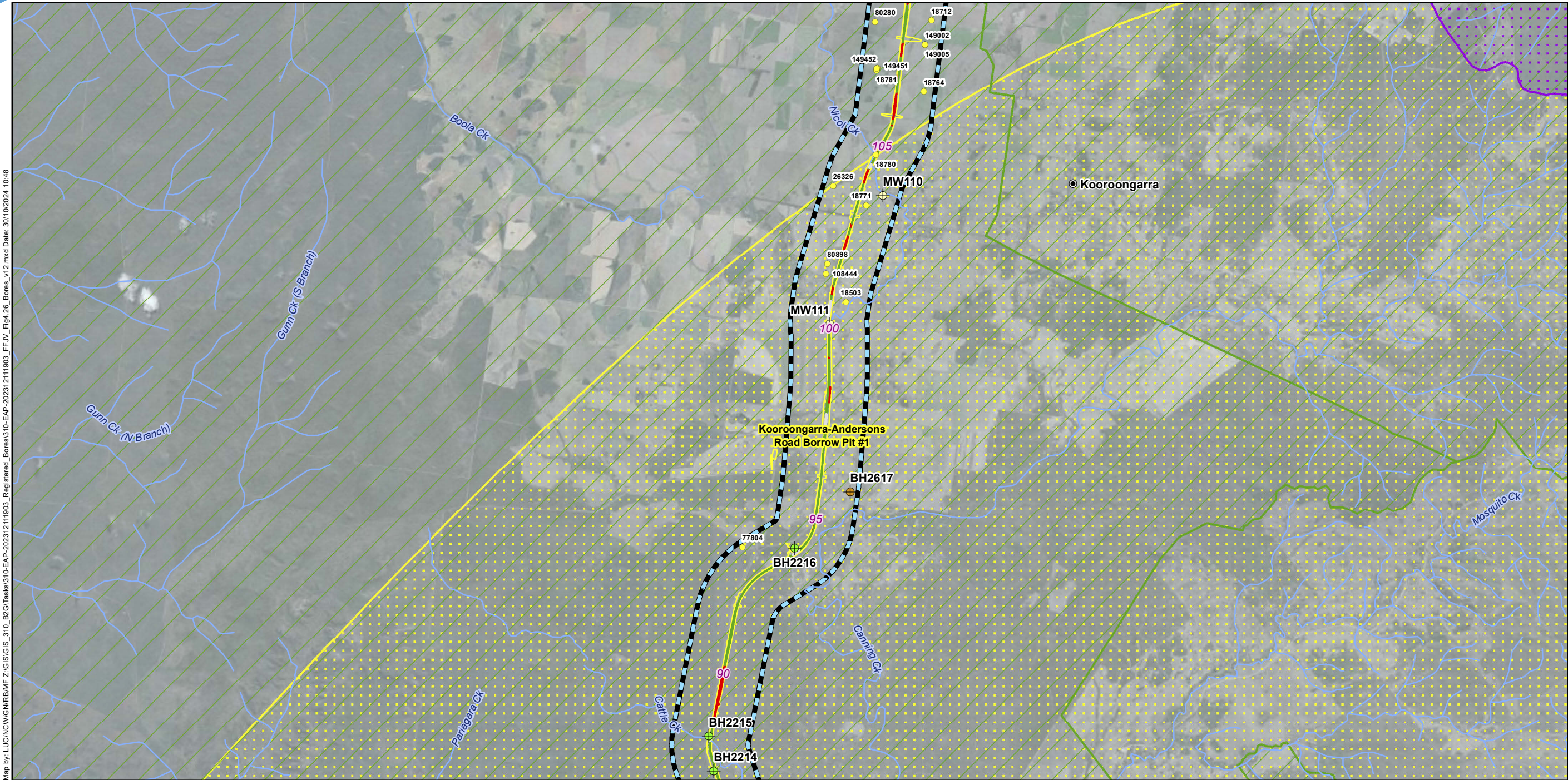
Legend

- 5 Chainage (km)
- Existing site investigation bores
- Former site investigation bores
- New site investigation bores
- Registered bores
- Bridges
- Existing rail (operational)
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Impact assessment area
- Temporary footprint
- Groundwater management areas
- Water Act 2000
- Water Plan (Border Rivers and Moonie) 2019
- Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017



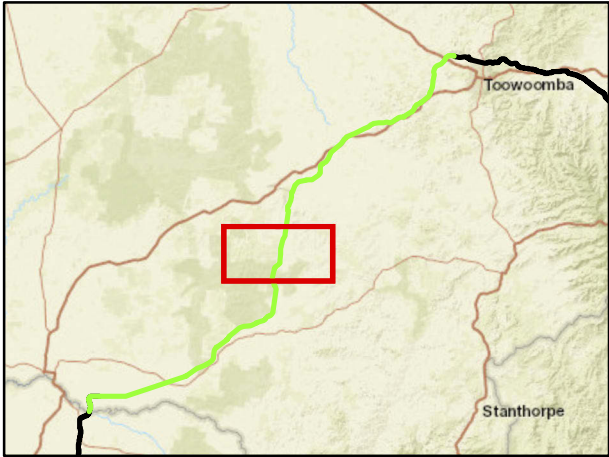
A3 scale: 1:110,000





Legend

- | | | |
|--|--|---|
| <ul style="list-style-type: none">5 Chainage (km)LocalitiesExisting site investigation boresFormer site investigation boresNew site investigation boresRegistered boresBridges | <ul style="list-style-type: none">WatercoursesRail Earthworks CutRail Earthworks FillGroundwater impact assessment areaImpact assessment areaTemporary footprint | <p>Groundwater management areas</p> <ul style="list-style-type: none">Water Act 2000Water Plan (Border Rivers and Moonie) 2019Water Plan (Condamine and Balonne) 2019Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 |
|--|--|---|



A3 scale: 1:110,000

0 1 2 3 4 5km

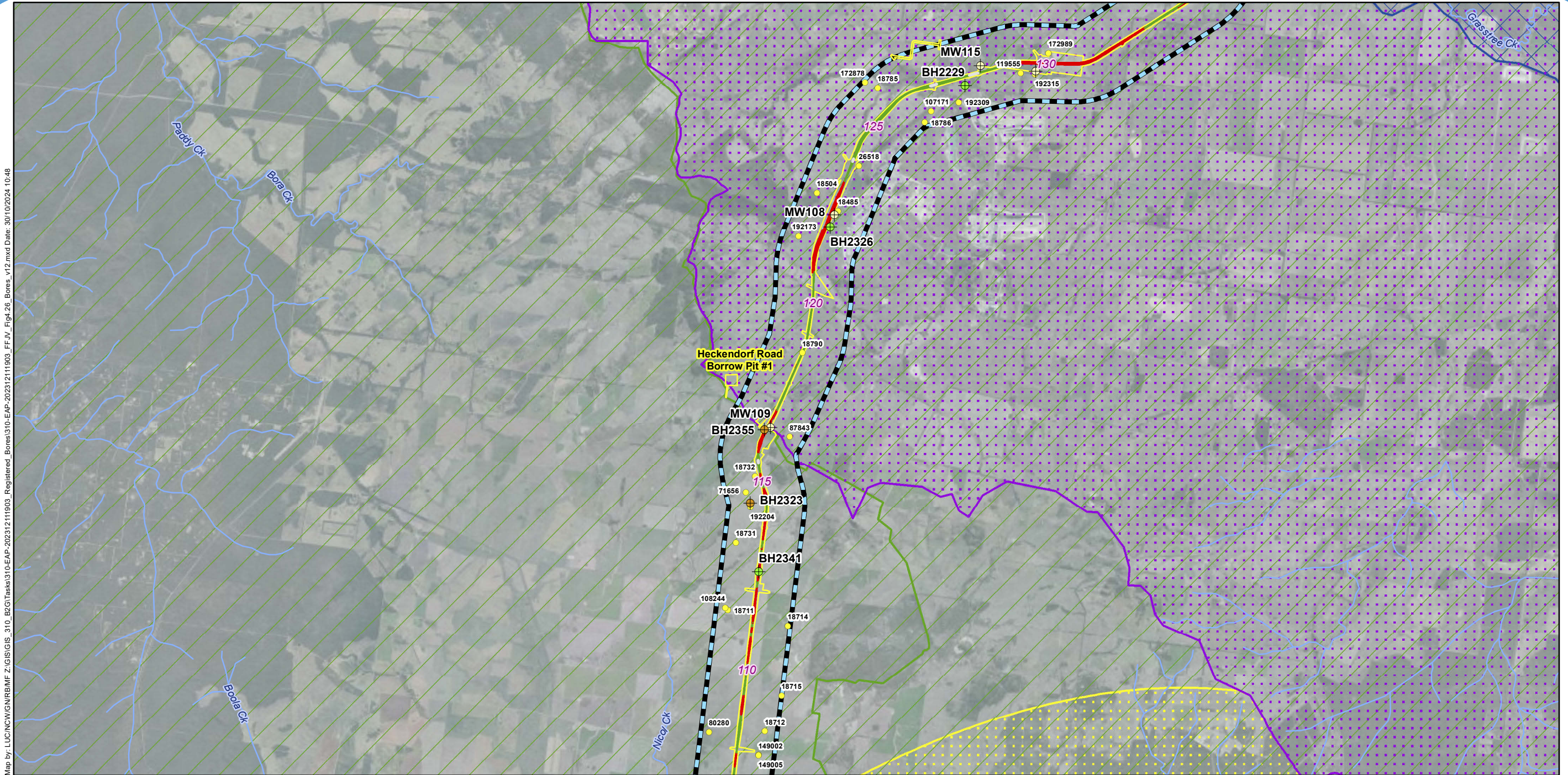


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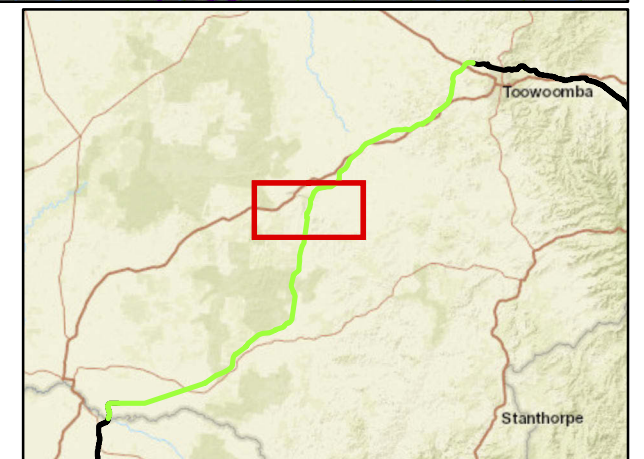
Border to Gowrie

Figure 4.26d: Registered and design phase bores within the impact assessment area

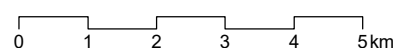


Legend

- 5 Chainage (km)
- Existing site investigation bores
- Former site investigation bores
- New site investigation bores
- Registered bores
- Bridges
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Temporary footprint
- Groundwater management areas**
 - Water Act 2000
 - Water Plan (Border Rivers and Moonie) 2019
 - Water Plan (Condamine and Balonne) 2019
 - Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017
 - Water Regulation 2016



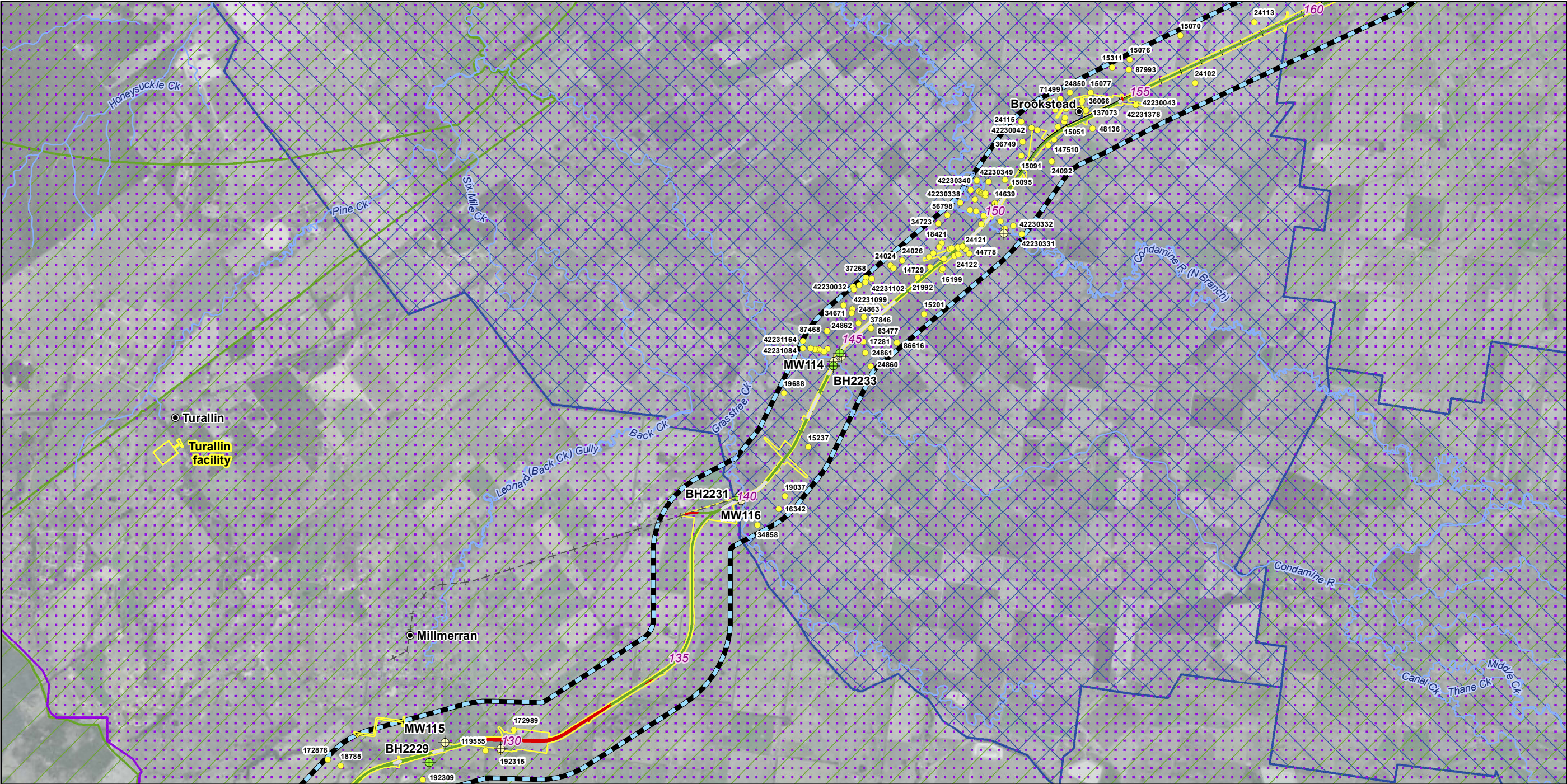
A3 scale: 1:110,000



Issue date: 30/10/2024 Version: 12
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure 4.26e: Registered and design phase bores within the impact assessment area

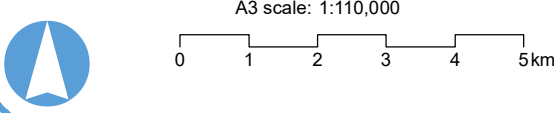
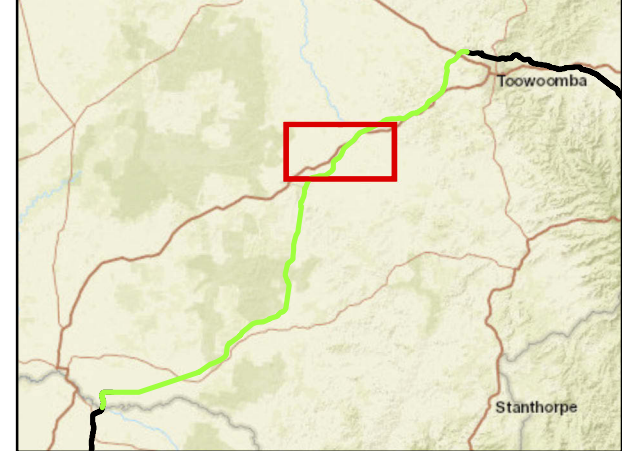


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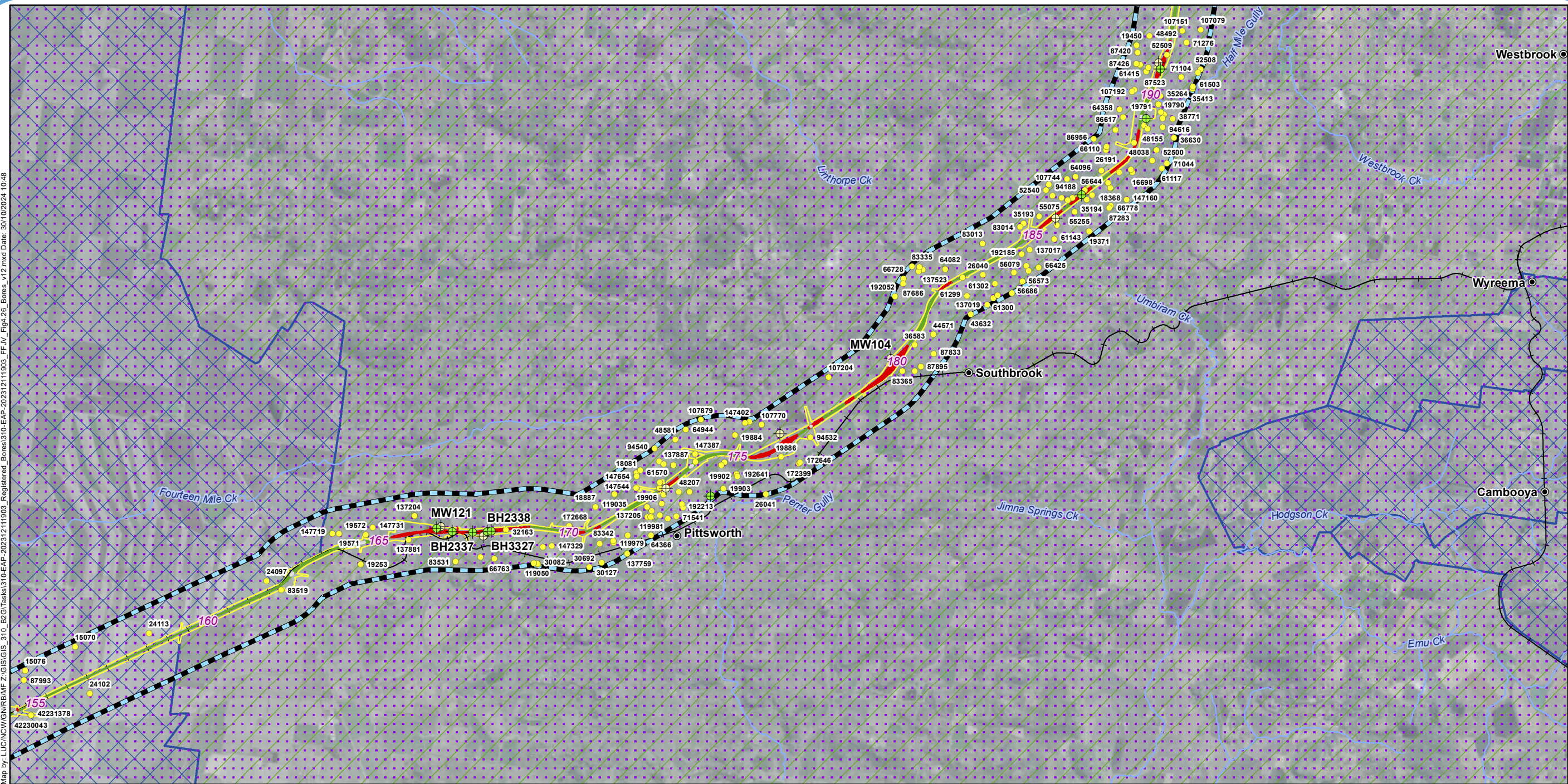
- 5 Chainage (km)
- Localities
- Existing site investigation bores
- Former site investigation bores
- New site investigation bores
- Registered bores
- Bridges
- Existing rail (operational)
- Existing rail (non-operational)

- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Impact assessment area
- Temporary footprint

- Groundwater management areas**
- Water Act 2000
 - Water Plan (Condamine and Balonne) 2019
 - Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017
 - Water Regulation 2016



Border to Gowrie
Figure 4.26f: Registered and design phase bores within the impact assessment area



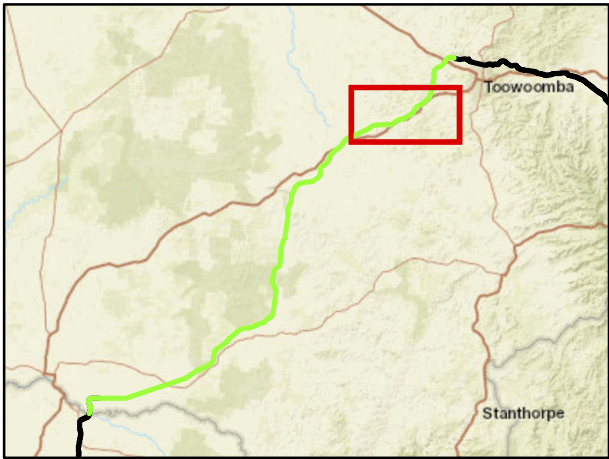
Legend

- 5 Chainage (km)
- Localities
- Existing site investigation bores
- Former site investigation bores
- New site investigation bores
- Registered bores
- Bridges
- Existing rail (operational)

- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Impact assessment area
- Temporary footprint

Groundwater management areas

- Water Act 2000
- Water Plan (Condamine and Balonne) 2019
- Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017
- Water Regulation 2016



A3 scale: 1:110,000

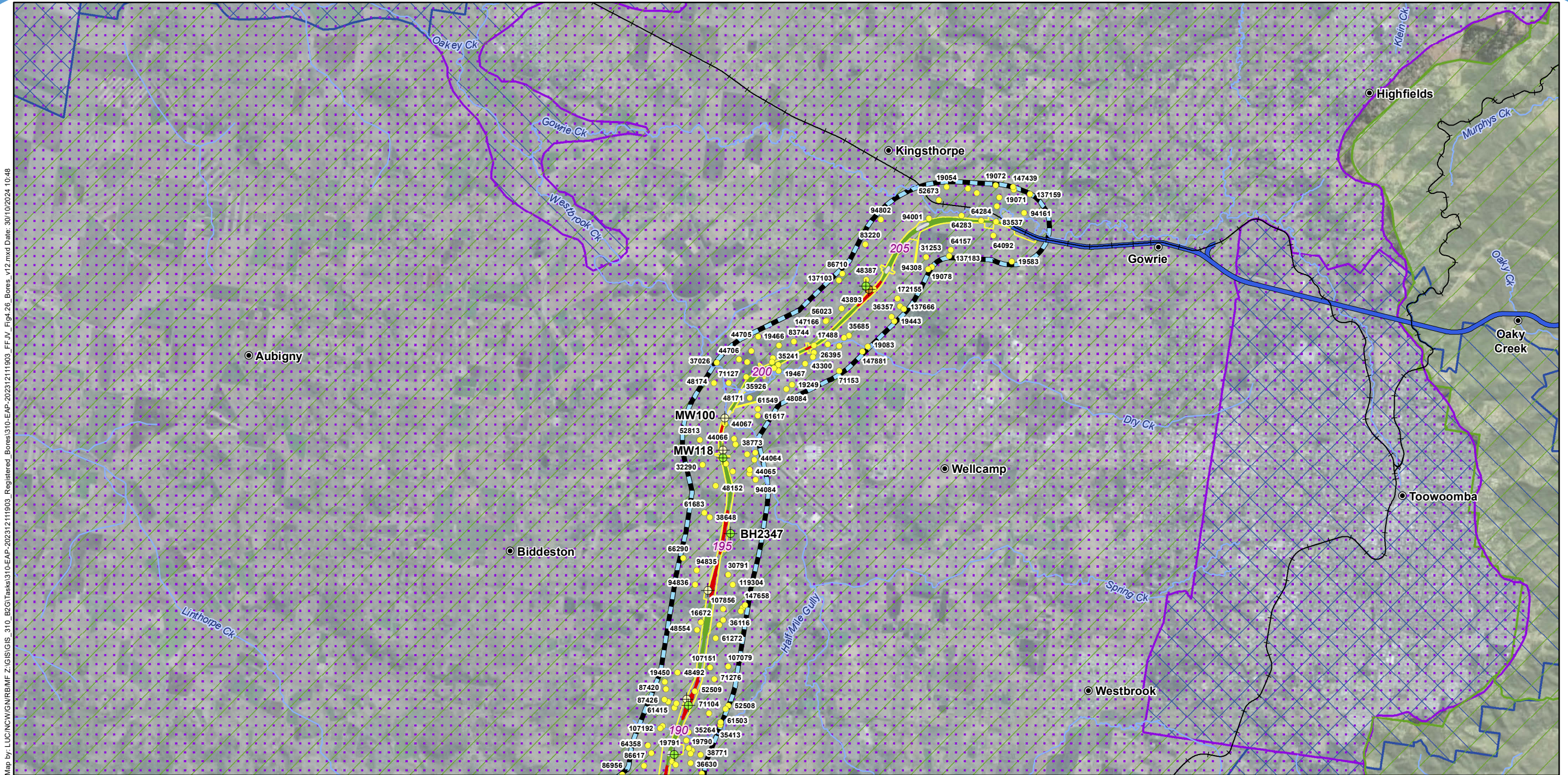


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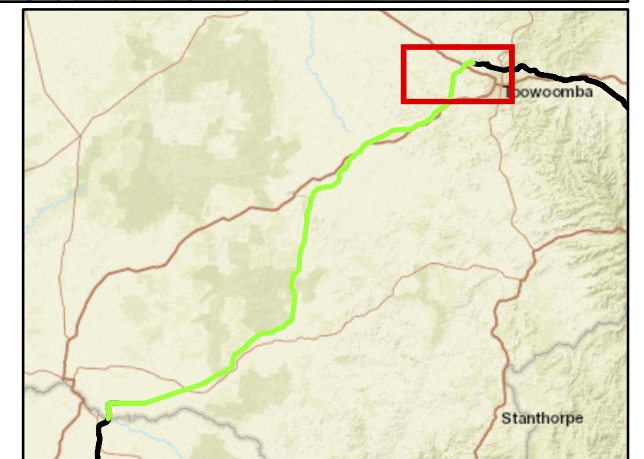
Border to Gowrie

Figure 4.26g: Registered and design phase bores within the impact assessment area

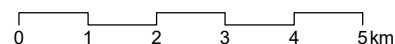


Legend

- | | | |
|-----------------------------------|------------------------------------|--|
| 5 Chainage (km) | Watercourses | Groundwater management areas |
| Localities | Rail Earthworks Cut | Water Act 2000 |
| Existing site investigation bores | Rail Earthworks Fill | Water Plan (Moreton) 2007 |
| Former site investigation bores | Groundwater impact assessment area | Water Plan (Condamine and Balonne) 2019 |
| New site investigation bores | Impact assessment area | Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 |
| Registered bores | Temporary footprint | Water Regulation 2016 |
| Gowrie to Helidon alignment | | |
| Bridges | | |
| Existing rail (operational) | | |



A3 scale: 1:110,000



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Border to Gowrie

Figure 4.26h: Registered and design phase bores within the impact assessment area

4.7.5.2 ARTC Groundwater Bore Survey

ARTC undertook a bore survey of potential groundwater users (landowners) impacted by the Project to confirm the location of registered bores and to establish the presence of any unregistered bores. The bore survey targeted landowners within the Project footprint and within 80 m of deep cuttings (>10 m BGL).

The groundwater bore survey was undertaken between December 2021 to April 2022 by means of telephone, email and hard copy mail out. A total of 179 landholders were identified and invited to complete the survey. Of which, 74 surveys were completed.

The survey identified three unregistered groundwater bores within the bore census footprint. The reported usage for all three bores was stock watering and domestic purposes. The locations of the unregistered bores were assessed against the predicted groundwater impacts to identify if any potential landholder bores are to be impacted from the Project. No unregistered bores outside the bore census footprint with potential to be impacted by groundwater impacts from the Project (i.e. deep cuts with potential for ongoing seepage) were identified. Registered groundwater bores identified within the Project footprint are discussed in Section 4.7.5.1 and are presented in Appendix A.

4.7.5.3 Groundwater entitlements

A review of the Queensland water entitlements database (DRDMW, 2023) was undertaken for details regarding the licence type and source aquifer for water entitlements associated with lot/plans which fall within the impact assessment area, noting that the actual use of the water may not be within the groundwater impact assessment area. An annual water volume is typically assigned to each licence (Table 4.17) and is summarised for the units of the three water sharing plans relevant to the Project.

Analysis of water entitlements within the groundwater impact assessment area indicates that the authorised purpose 'irrigation' is the predominant groundwater entitlement licence purpose within the groundwater impact assessment area (entitlements associated with Lot/Plan that intersect the groundwater impact assessment area, noting that the actual use of the water may not be within the impact assessment area). This is followed by 'any', 'stock', 'town water' and 'industrial'. In the BRA, the majority of the assigned entitlements are for supplementing surface water supplies during drought periods, which often results in only a small proportion of the groundwater allocation being used (DNRM, 2016b). The sedimentary rock aquifers within the impact assessment area, being formations such as the Kumbarilla Beds and WCM note stock and domestic purposes as the primary groundwater entitlement authorised use. This is likely reflective of the less suitable groundwater chemistry for irrigation (i.e. high sodium adsorption ratios) from formations such as the Kumbarilla Beds and WCM (Table 4.17). Any, town water supply and industrial entitlements comprise most of the remaining entitlements for groundwater takes from sedimentary rock aquifers in the area.

Table 4.17 Summary of groundwater entitlements and availability for the impact assessment area

Queensland Water Plan	Water source	Licenced purpose	Number of entitlements	Water made available (ML/year)	Per cent of assigned water volume
Water Plan (Border Rivers and Moonie) 2019	Border Rivers Alluvium ¹ (Macintyre & Dumaresq Rivers)	Irrigation	52	3181	69.7
		Industrial and commercial	6	907	19.9
		Irrigation and stock	4	451	9.8
		Any	6	17	0.03
		Aquaculture	1	2	0.0004
Total assigned water volume within impact assessment area				4,558	99.4
Water Plan (Condamine and Balonne) 2019	Upper Condamine ²	Irrigation and stock	167	9792	10.2
		Stock intensive	7	78	0.08
		Any	303	42712	44.4
		Commercial and industrial	5	40	0.0004
		Town water and urban supply	6	3411	3.5

Queensland Water Plan	Water source	Licenced purpose	Number of entitlements	Water made available (ML/year)	Per cent of assigned water volume
		Aquaculture	1	38	0.0004
		Productive base	4	40128	41.7
		Total assigned water volume			96,196
	Main Range Volcanics	Irrigation and stock	942	42920	73.8
		Commercial and industrial	75	2783	4.8
		Stock intensive	57	943	1.6
		Any	79	4998	8.6
		Town water and urban supply	9	5423	9.3
		Aquaculture	5	114	7.0
		Agriculture and rural	9	198	0.3
		Amenities	9	160	0.3
		Dairying and irrigation	7	228	0.4
		Educational facility and irrigation	27	364	0.6
		Total assigned water volume			58,131
Total assigned water volume within impact assessment area				153,317	100
Water Plan (GABORA) 2017	Balonne- Condamine and Border Rivers Basins ³	Stock and domestic	2041	not defined ⁴	not defined ⁴
		Irrigation and stock	260	8694	33
		Stock intensive	119	5124	19.6
		Town water and urban supply	52	9710	18
		Commercial and industrial	41	2198	8.4
		Any	112	8498	32.5
		Aquaculture	5	96	0.003
		Dairying	2	9	0.0003
		Agriculture	5	60.5	0.002
		Amenities	4	685	2.6
		Educational facility	13	48	0.001
		Total assigned water volume within impact assessment area			

Table notes:

1 Macintyre and Dumaresq River Alluvium

2 Condamine River Alluvium, Emu Creek Alluvium, Glengallan Creek Alluvium, Hodgson Creek Alluvium and Oakey Creek Alluvium

3 Wallumbilla formation, Bungil formation, Mooga formation, Orallo formation, Kumbarilla beds, Springbok Sandstone Gubermunda Sandstone, Surat Hutton and Walloon Coal Measures

4 Entitlement not assigned to majority of licences.

Review of each Water Plan and the Queensland Water Entitlement Viewer³, accessed on 20 December 2023, was undertaken to determine total available water (unallocated) for each Water Plan.

- The Border Rivers and Moonie Water Plan shows that 7,906 ML of unsupplemented groundwater is made available per annum and that no supplemented water is shown to exist. Unallocated groundwater is reported to be 11,887 ML per annum
- The Condamine and Balonne Water Plan shows that:
 - 19,361 ML of unsupplemented groundwater is made available per annum

³ Queensland Water Entitlement Viewer, accessed at

<https://qgsp.maps.arcgis.com/apps/MapSeries/index.html?appid=610e67fd52e24dbf9168ed812137ff5c>.

- No unallocated groundwater is available.
- The Water Plan (GABORA) shows that:
 - No unallocated groundwater (general reserve) is shown to exist for the Toowoomba South Basalts (MRV)
 - 250 ML of unallocated groundwater (state reserve) exists for the Springbok Walloon groundwater unit (which includes the WCM).

4.7.6 Groundwater dependent ecosystems

Groundwater plays an important role in sustaining aquatic and terrestrial ecosystems, such as springs, wetlands, rivers and vegetation. Understanding these GDEs is essential for groundwater management and planning.

The BoM has developed a Groundwater Dependent Ecosystems Atlas (GDE Atlas) (BoM, 2022) as a national dataset of Australian GDEs and potential GDEs. The GDE Atlas contains national and regional information about three types of ecosystems:

- **Aquatic** ecosystems that rely on the surface expression of groundwater—this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs. Marine and estuarine ecosystems can also be groundwater dependent, but these are not mapped in the Atlas.
- **Terrestrial** ecosystems that rely on the subsurface presence of groundwater—this includes all vegetation ecosystems
- **Subterranean** ecosystems – this includes cave, karst, and aquifer ecosystems. No subterranean GDEs have been mapped within 5 km of the groundwater impact assessment area.

It is important to note that the GDE Atlas mapping is from two broad sources:

- National assessment – national scale assessment based on a set of rules that describe potential for groundwater/ecosystem interaction and available GIS data
- Regional studies – more detailed assessment by States and/or regional agencies using approaches included field work, analysis of satellite imagery and application of rules/conceptual models.

The identification of potential GDEs in the Atlas therefore does not confirm that a particular ecosystem is groundwater dependent.

The groundwater impact assessment area for GDEs was expanded to 5 km from the Project as a conservative approach. An overview of potential aquatic GDEs is provided on Figure 4.27 and potential terrestrial GDEs are presented on Figure 4.28.

4.7.6.1 Aquatic groundwater dependent ecosystems

The GDE Atlas (BoM, 2022) reports no high potential aquatic GDEs located within 5 km of the Project footprint. Areas where potential aquatic GDEs are identified within 5 km of the Project are as follows:

- Between NS2B Ch 30.6 km and Ch 20 km the Project passes a number of low potential aquatic GDE associated the Macintyre River and tributaries
- Between Ch 40.0 km and Ch 95.0 km the Project crosses numerous unnamed tributaries associated with Macintyre Brook and Canning Creek. These drainage features have been assigned a moderate aquatic GDE potential.
- Unnamed creeks and tributaries between Ch 115.0 km to Ch 125.0 km (south-west of Millmerran) are inferred to be associated with Bora Creek, located east of the groundwater study area, and have been assigned a moderate potential for aquatic GDEs
- The Condamine River, which the Project alignment crosses near Ch 139.5 km, is considered to have a low potential for aquatic GDEs. The Condamine River North branch is not considered to support aquatic GDEs.

- Low-to-moderate potential for aquatic GDEs are mapped between Ch 165 km to Ch 185 km
- Low-to-moderate potential for aquatic GDEs are mapped between Ch 197 km and Ch 200 km, inferred to be associated with Gowrie Creek.

The location of potential aquatic GDEs in relation to the Project footprint and groundwater assessment area are shown on Figure 4.27.

4.7.6.2 Terrestrial groundwater dependent ecosystems

Areas where terrestrial GDEs are identified by BOM's GDE Atlas (2022) within 5 km of the Project footprint are as follows:

- One high potential terrestrial GDE is crossed by the Project alignment between Ch 24.4 km and Ch 26.8 km, near Yelarbon. This GDE is associated with the alkaline landscape of the Yelarbon Desert sandy plains (Department of Science, Information Technology and Innovation, 2017). This GDE is recognised under Water Plan (GABORA) 2017 as a GDE Area. The Yelarbon Desert GDE has not yet been attributed a source aquifer
- Broad areas of moderate potential for terrestrial GDEs occur between Ch 33.0 km and Ch 95.0 km. These areas are characterised to have intermittent connection to brackish aquifers associated with shallow alluvium (Department of Science, Information Technology and Innovation, 2017)
- Irregular areas of moderate potential for terrestrial GDEs are crossed by and surround the Project footprint between Ch 165.0 km to Ch 196.0 km. These GDEs are associated with the fractured-rock aquifers of the MRV which may provide an intermittent connection to these ecosystems.

The location of terrestrial GDEs in relation to the Project footprint are shown on Figure 4.28.

4.7.6.3 Subterranean groundwater dependent ecosystems

No potential subterranean GDEs have been identified within the BoM GDE Atlas (2022) within 5 km of the impact assessment area.

4.7.6.4 Springs

A spring is a hydrogeological feature which occurs due to natural groundwater discharge and may be classed as having a permanent or non-permanent (ephemeral) saturation regime. GDEs may in turn be associated with the expression of surface water in a spring. Springs can have a substantial environmental, cultural and economic values.

A total of nine springs are identified within a 20 km distance from the Project alignment from the publicly available Queensland Herbarium active spring dataset. The groundwater impact assessment area for springs was expanded significantly, as a conservative measure, as it is recognized that hydraulic connectivity between a source aquifer and spring may be expansive. All of these springs are sourced from the MRV. Eight of these springs are classified as non-permanently saturated, as detailed in Table 4.18.

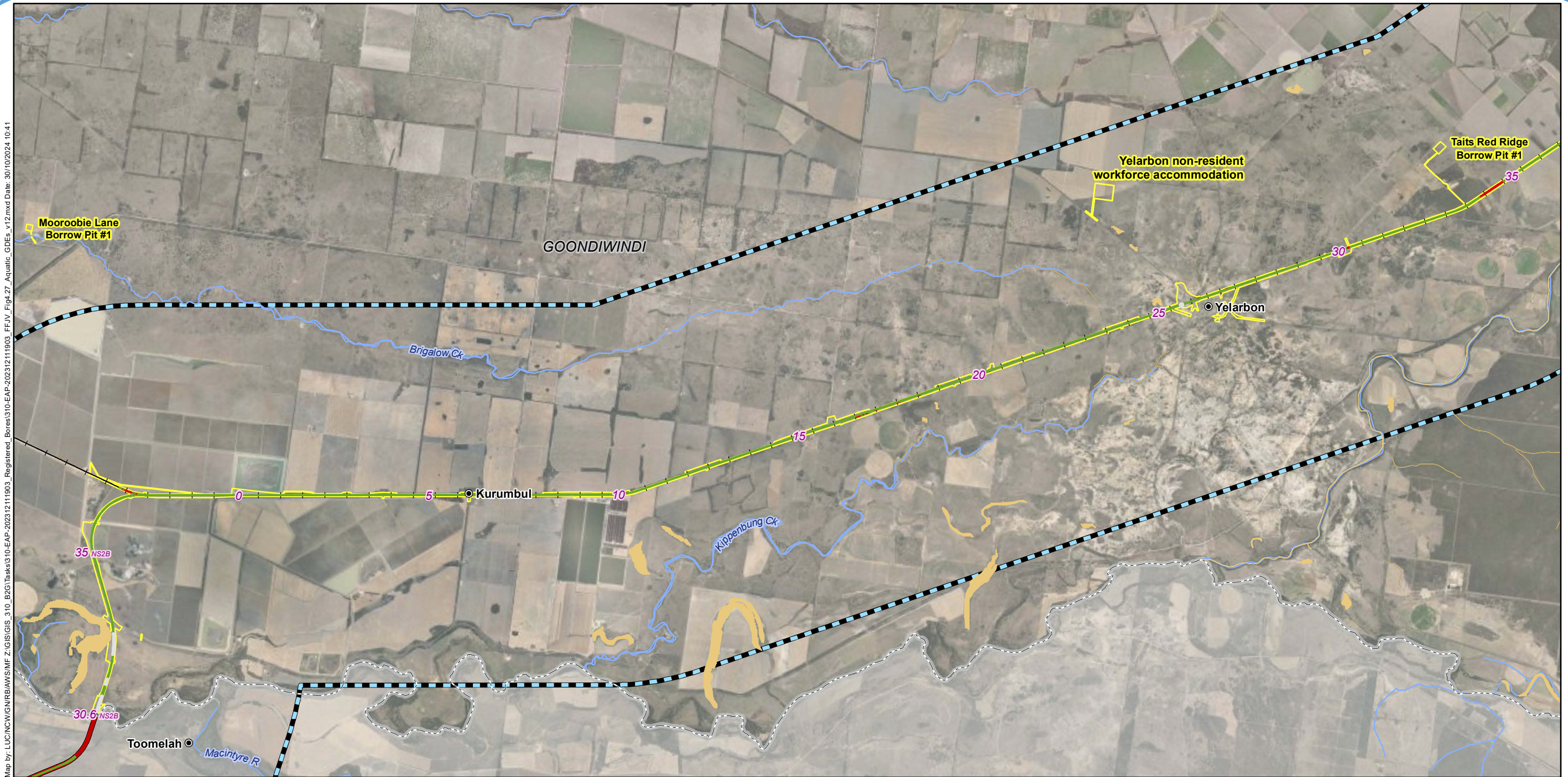
The closest registered spring to the Project alignment, Stone Spring, is 2.1 km to the north-west of Ch 173.7 km, near Pittsworth. There are no mapped Great Artesian Basin (GAB) (WCM) springs identified within a 20 km distance from the Project alignment. Locations of the mapped springs in proximity to the Project are depicted on Figure 4.27).

Table 4.18 Summary of springs within 20 km of the Project alignment

Spring name/Site #	Distance from Project alignment (km)	Direction from Project alignment	Spring type	Source aquifer
Springside/1146	5.5	N of Ch 166.9 km	Active – Intermittently Saturated	MRV
Stone Spring/1145	2.1	NW of Ch 173.7.0 km		MRV
Leigh Spring/1144	8.7	NW of Ch 174.0 km		MRV
Jimna Springs/1147	5.0	SE of Ch 179.5.0 km		MRV
Wellcamp Spring/1150	7.2	E of Ch 201.9 km		MRV
Eustondale Spring/1154	10.4	E of Ch 208.2 km		MRV
Helidon Spring/1504	26.7	E of Ch 208.2 km		MRV
Lockyer Creek Spring/1382	23.7	E of Ch 208.2 km		MRV
Kearneys Spring/1139	14.8	E of Ch 208.2 km	Active – Permanently Saturated	MRV

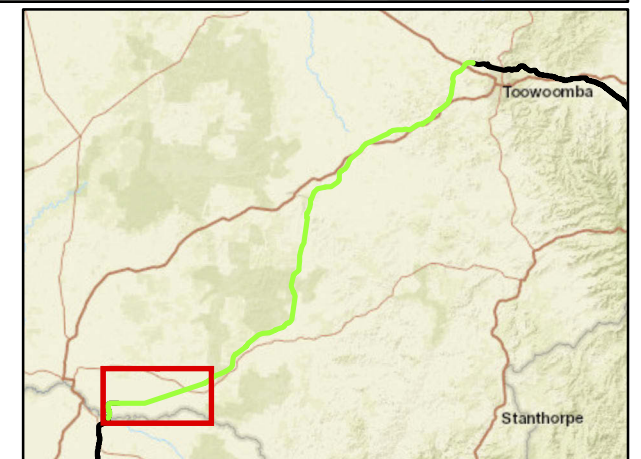
Table note:

Data sourced from Queensland Springs database on 20 December 2023 (Queensland Government, 2019).

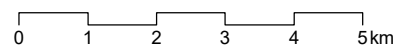


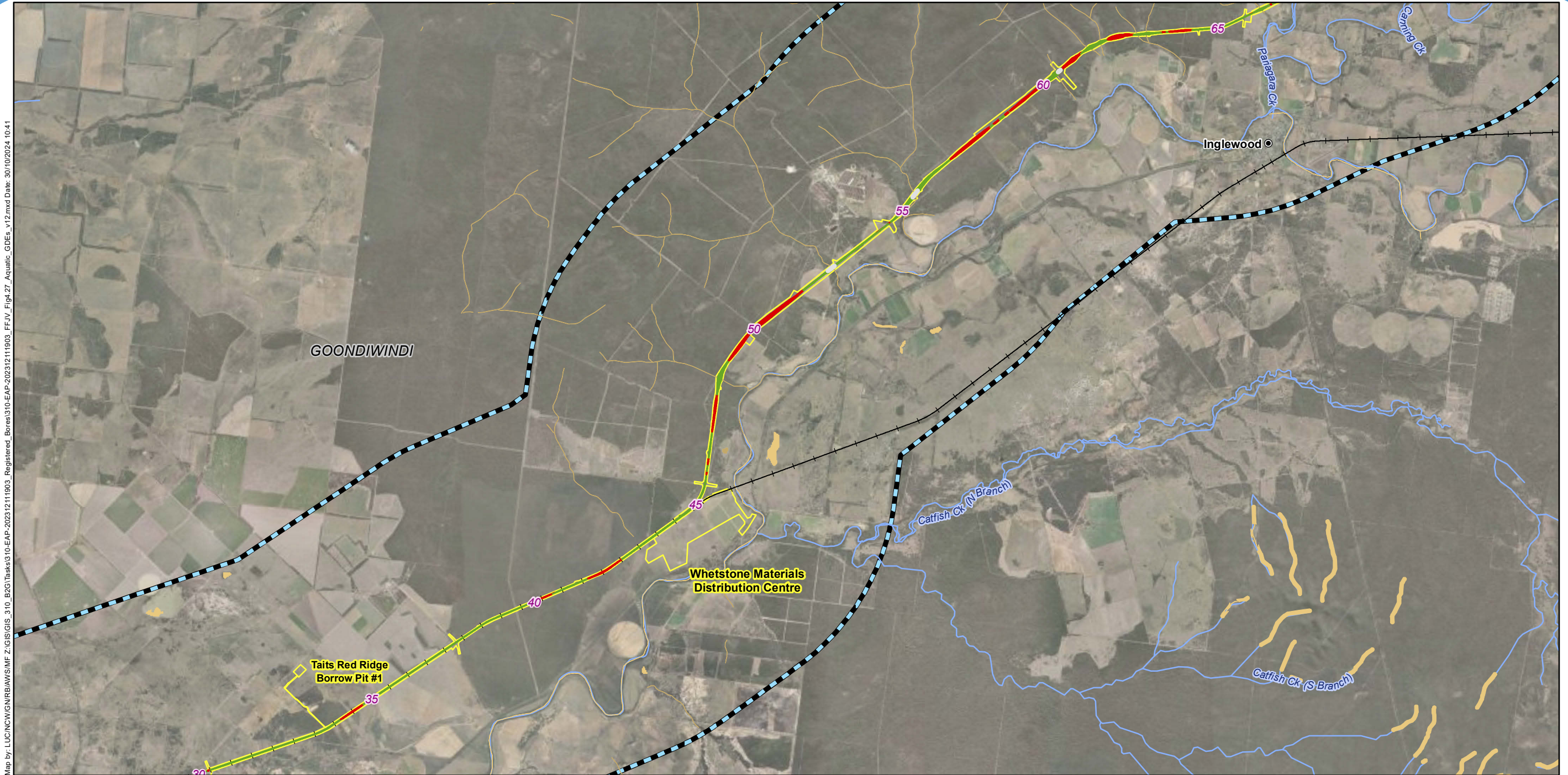
Legend

- | | | |
|--|------------------------------------|------------------------|
| 5 Chainage (km) | Rail Earthworks Cut | Aquatic GDEs |
| Localities | Rail Earthworks Fill | High potential GDE |
| North Star to NSW/QLD border alignment | Groundwater impact assessment area | Moderate potential GDE |
| Bridges | Local Government Areas | Low potential GDE |
| Existing rail (operational) | Impact assessment area | |
| Watercourses | Temporary footprint | |
| NSW/QLD border | | |



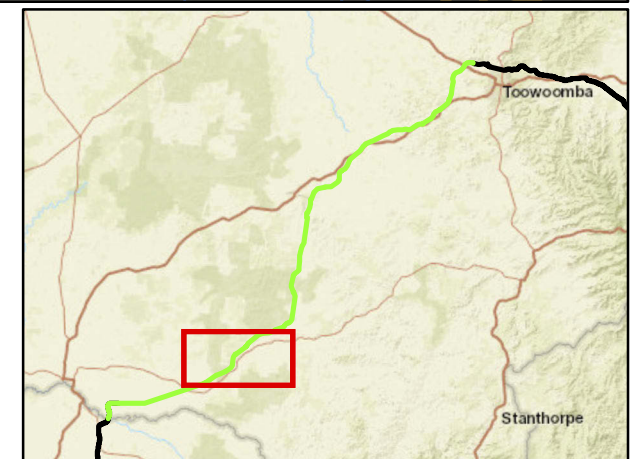
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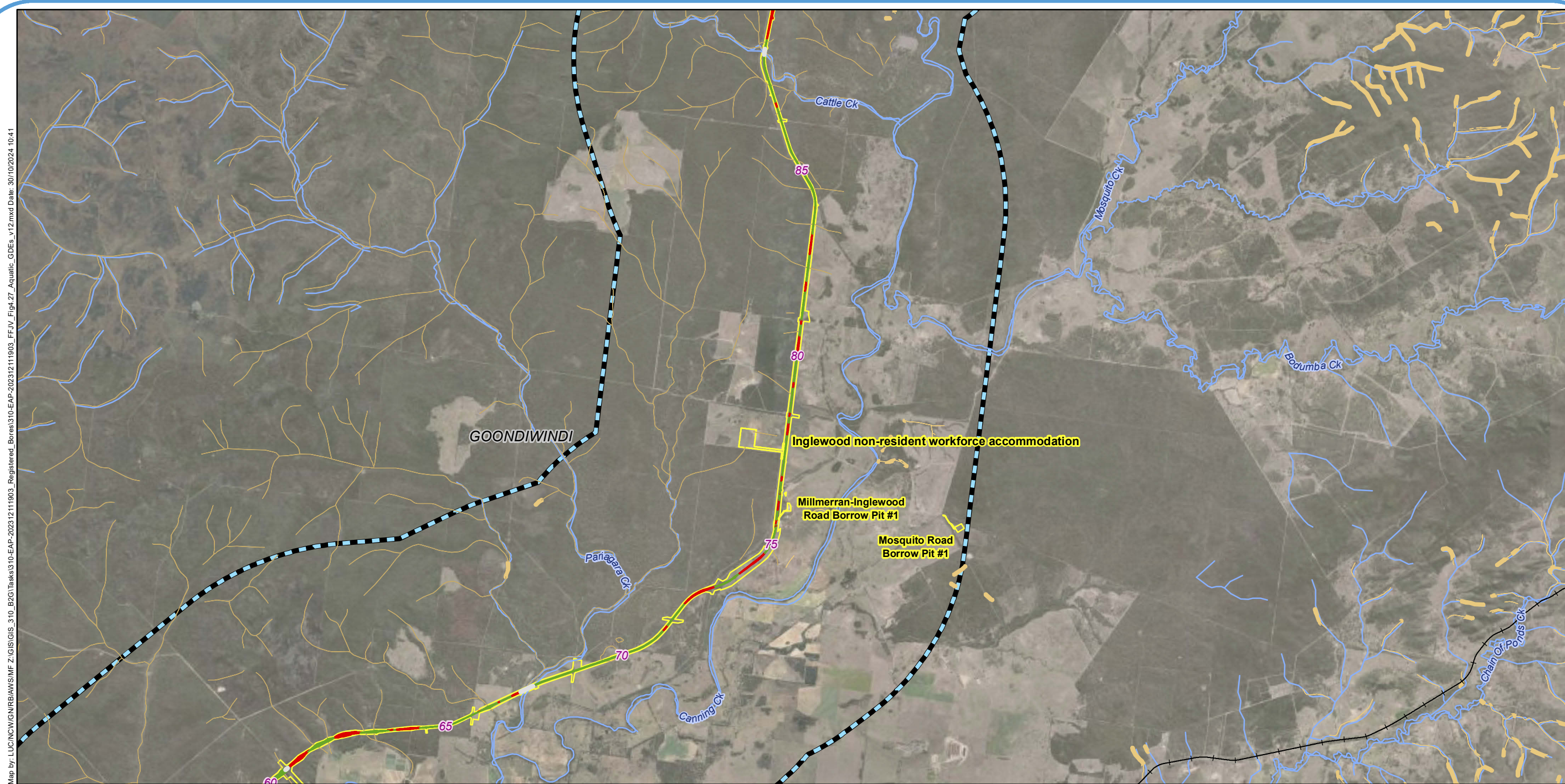
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- | | | |
|-----------------------------|------------------------------------|------------------------|
| 5 Chainage (km) | Rail Earthworks Cut | Aquatic GDEs |
| Localities | Rail Earthworks Fill | High potential GDE |
| Bridges | Groundwater impact assessment area | Moderate potential GDE |
| Existing rail (operational) | Local Government Areas | Low potential GDE |
| Watercourses | Impact assessment area | |
| | Temporary footprint | |



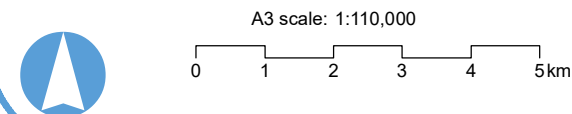
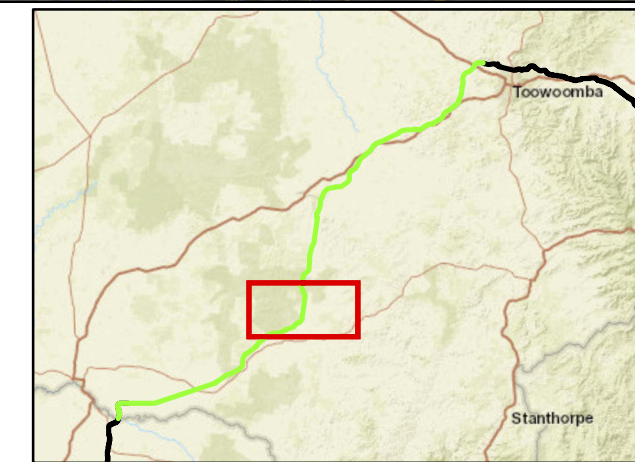
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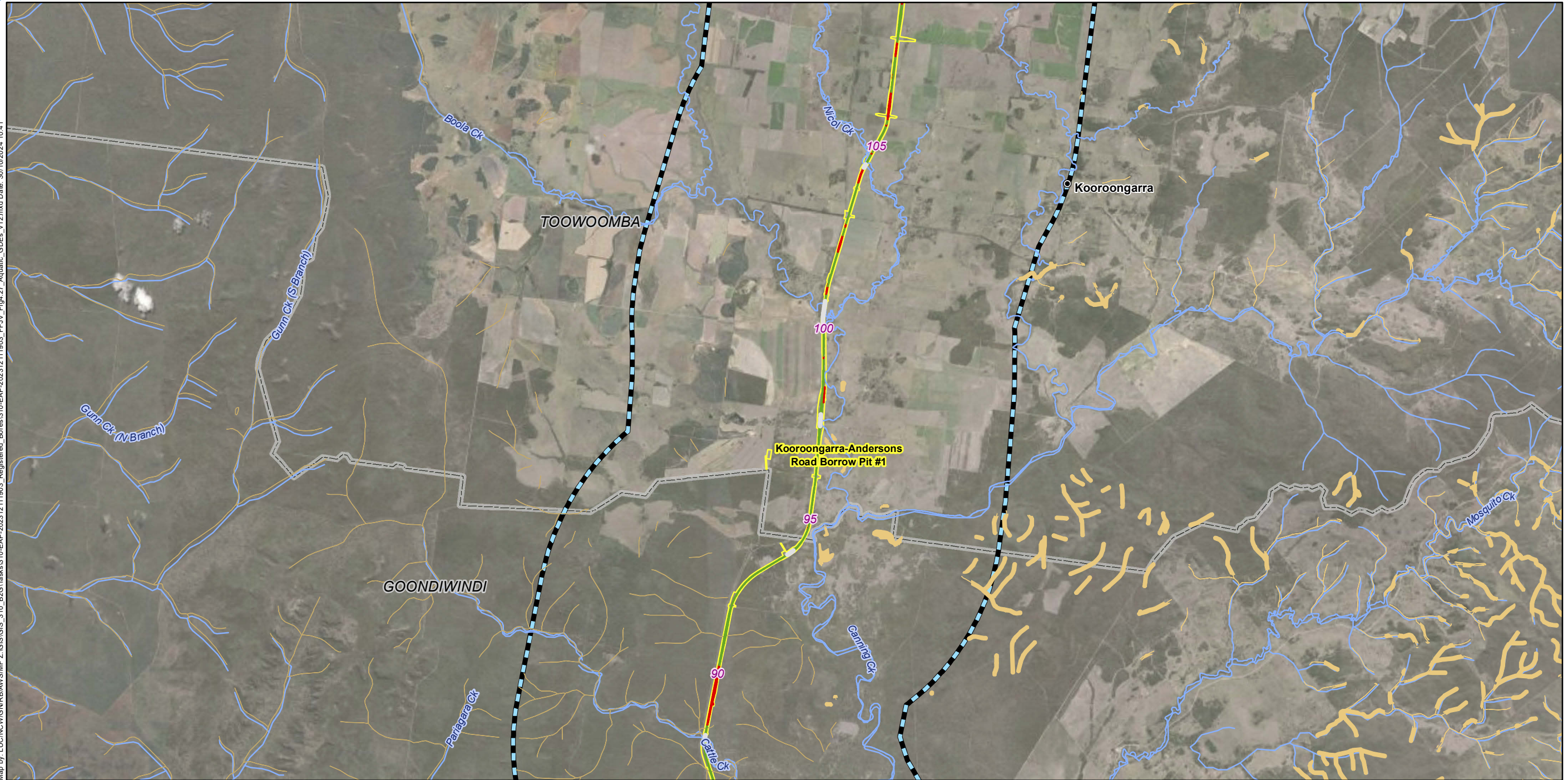
Legend

- | | | |
|-----------------------------|------------------------------------|------------------------|
| 5 Chainage (km) | Rail Earthworks Cut | Aquatic GDEs |
| Bridges | Rail Earthworks Fill | High potential GDE |
| Existing rail (operational) | Groundwater impact assessment area | Moderate potential GDE |
| Watercourses | Local Government Areas | Low potential GDE |
| | Impact assessment area | |
| | Temporary footprint | |



Border to Gowrie
Figure 4.27c:
Aquatic GDEs

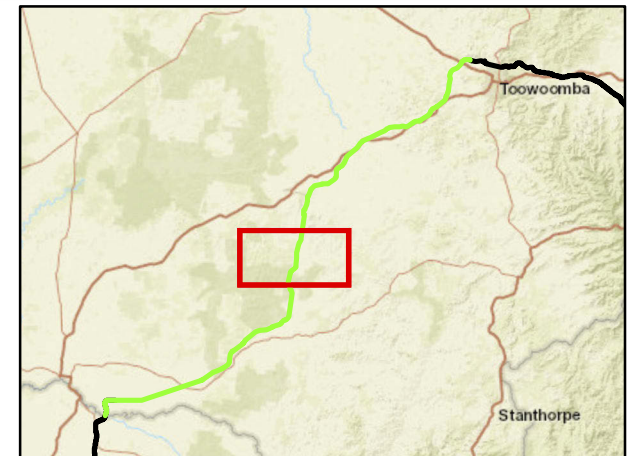
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Legend

- 5 Chainage (km)
- Localities
- Bridges
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area**
- Temporary footprint

- Aquatic GDEs**
- High potential GDE
 - Moderate potential GDE
 - Low potential GDE



A3 scale: 1:110,000
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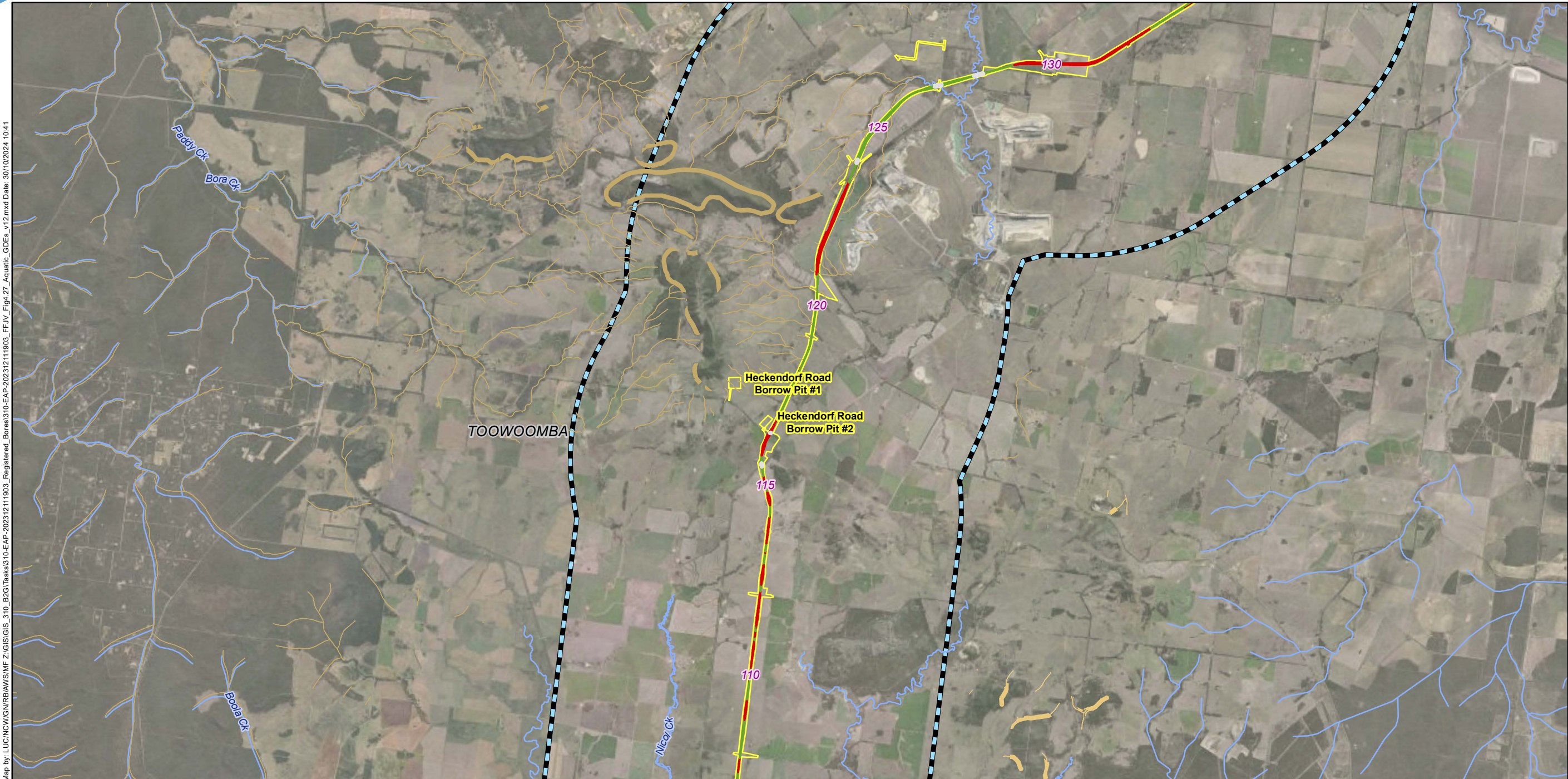


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 4.27d:
Aquatic GDEs

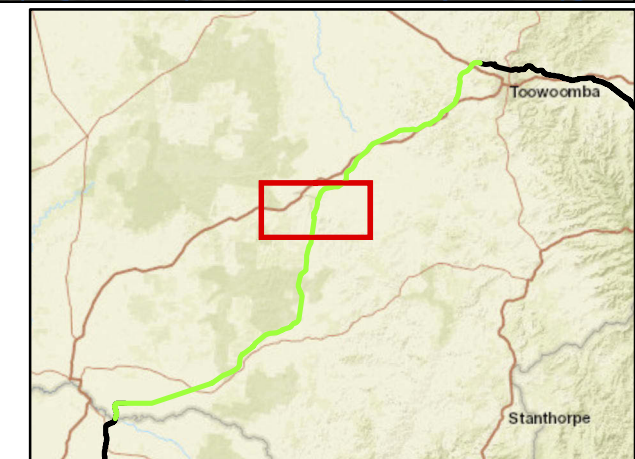
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Legend

- 5 Chainage (km)
- Bridges
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area**
- Temporary footprint

- Aquatic GDEs**
- High potential GDE
 - Moderate potential GDE
 - Low potential GDE



A3 scale: 1:110,000
0 1 2 3 4 5km

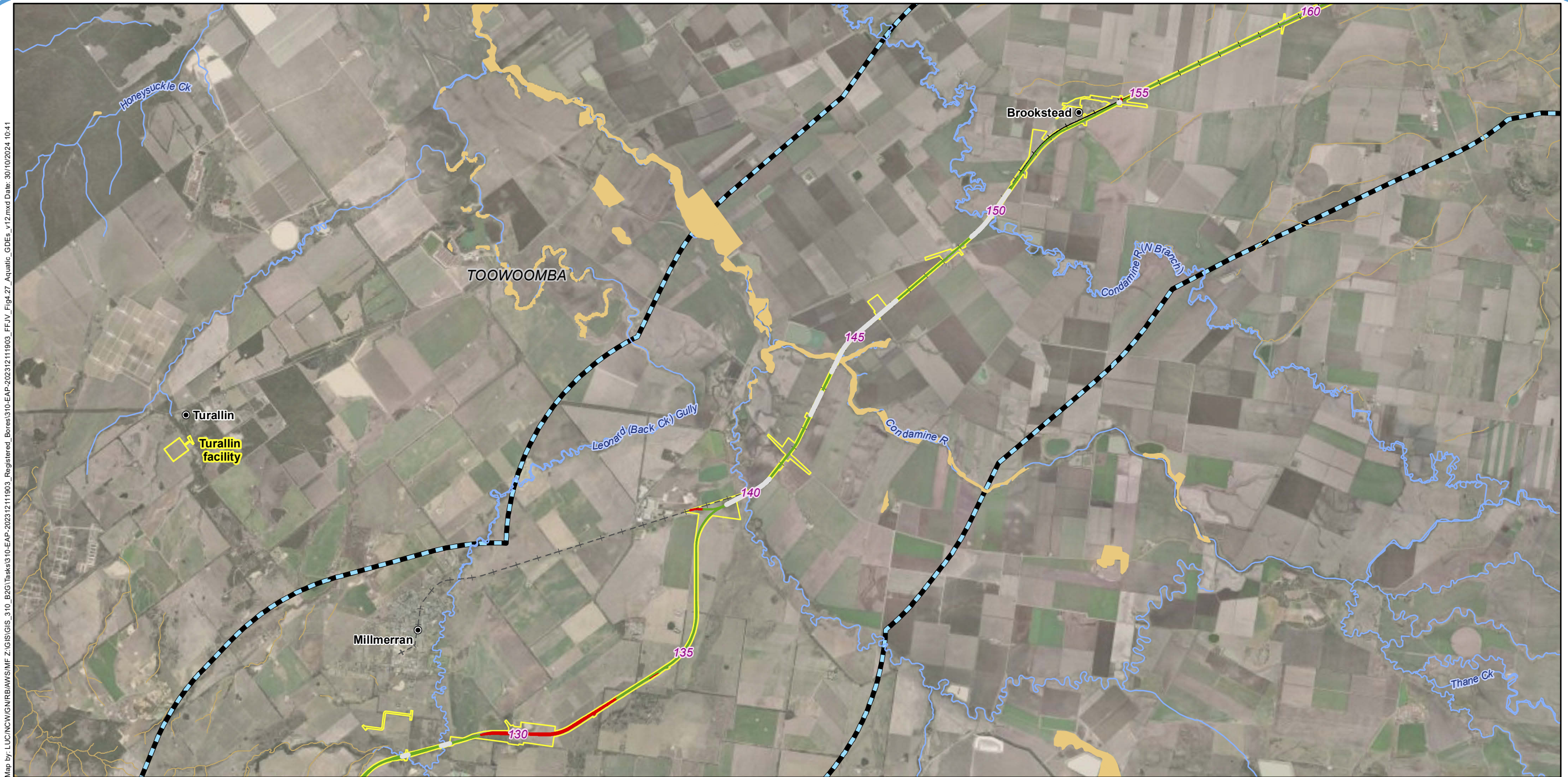


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 4.27e:
Aquatic GDEs

Map by: LUC/NCW/IGNR/BAW/SIMF Z:\GIS\GIS_310_B2G\Tasks\310-EAP-2023\2111903_Registered_Bores\310-EAP-2023\2111903_FFJV_Fig4.27_Aquatic_GDEs_v12.mxd Date: 30/10/2024 10:41



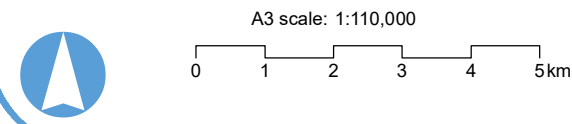
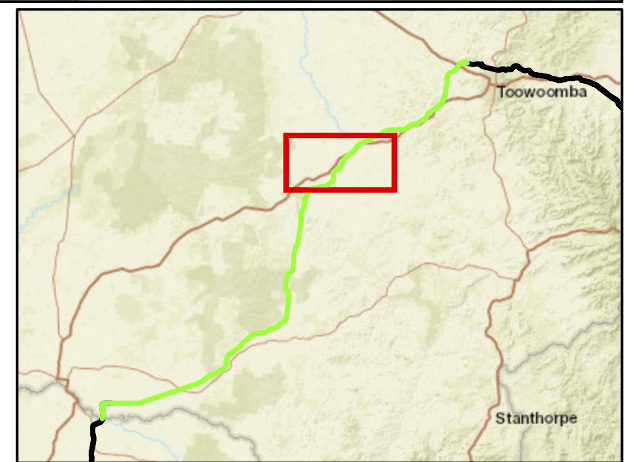
Legend

- 5 Chainage (km)
- Localities
- Bridges
- Existing rail (operational)
- Existing rail (non-operational)
- Watercourses

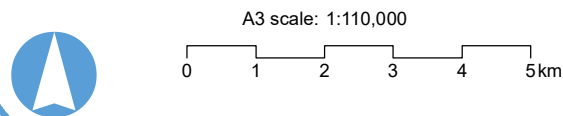
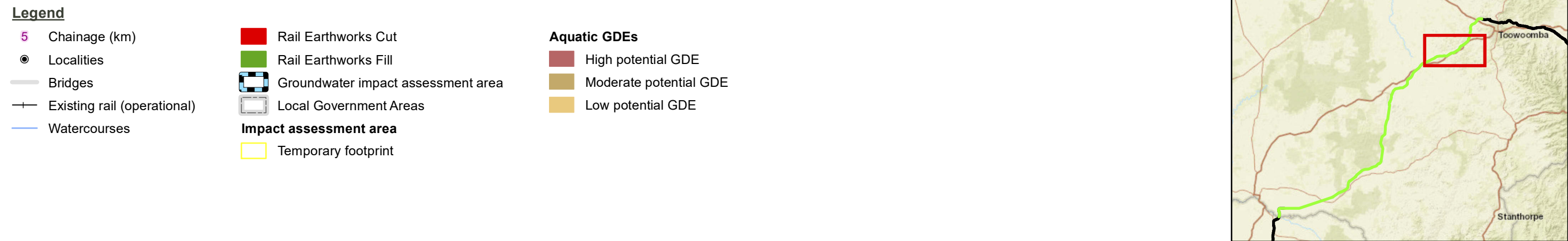
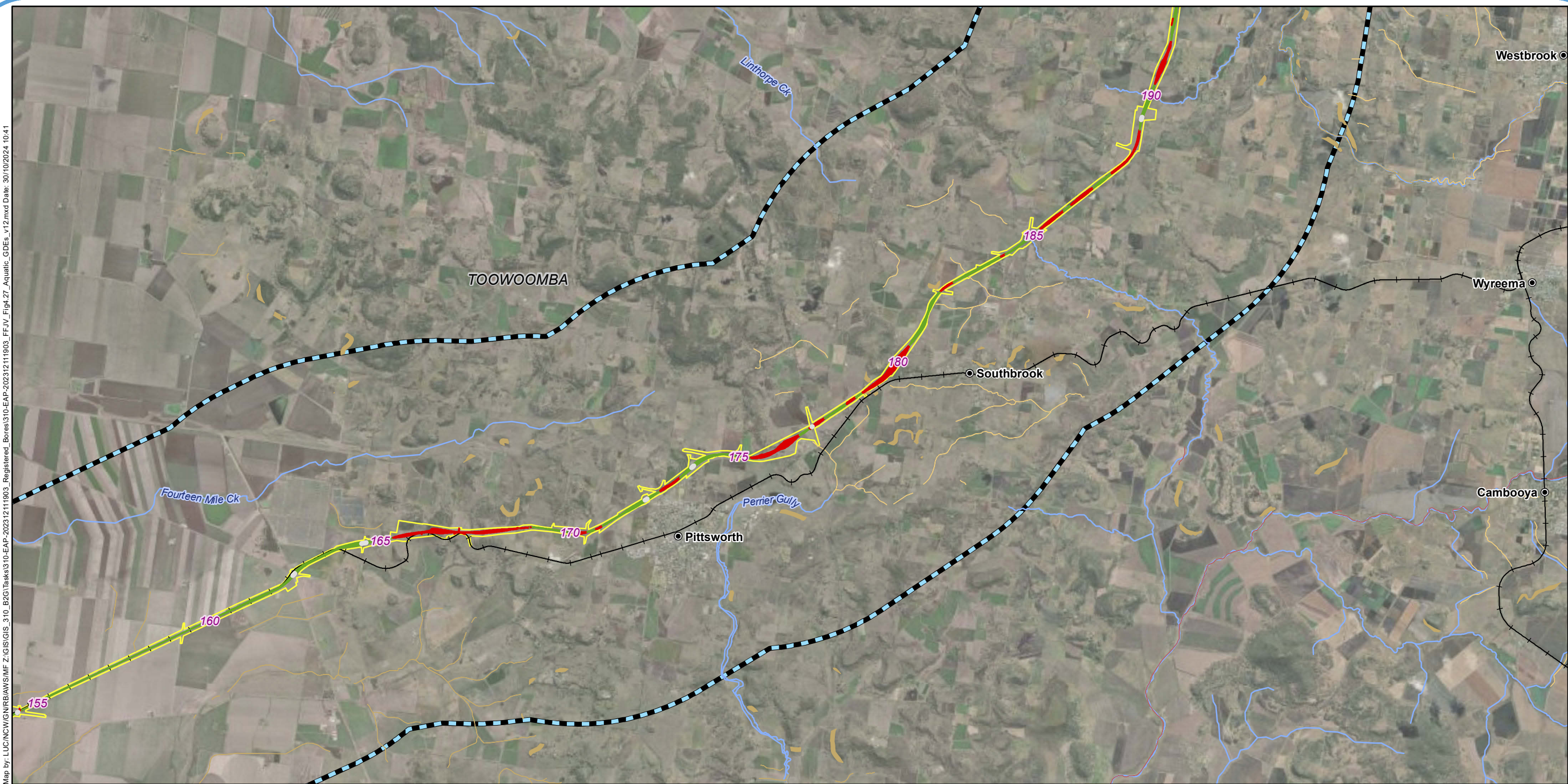
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area**
- Temporary footprint

Aquatic GDEs

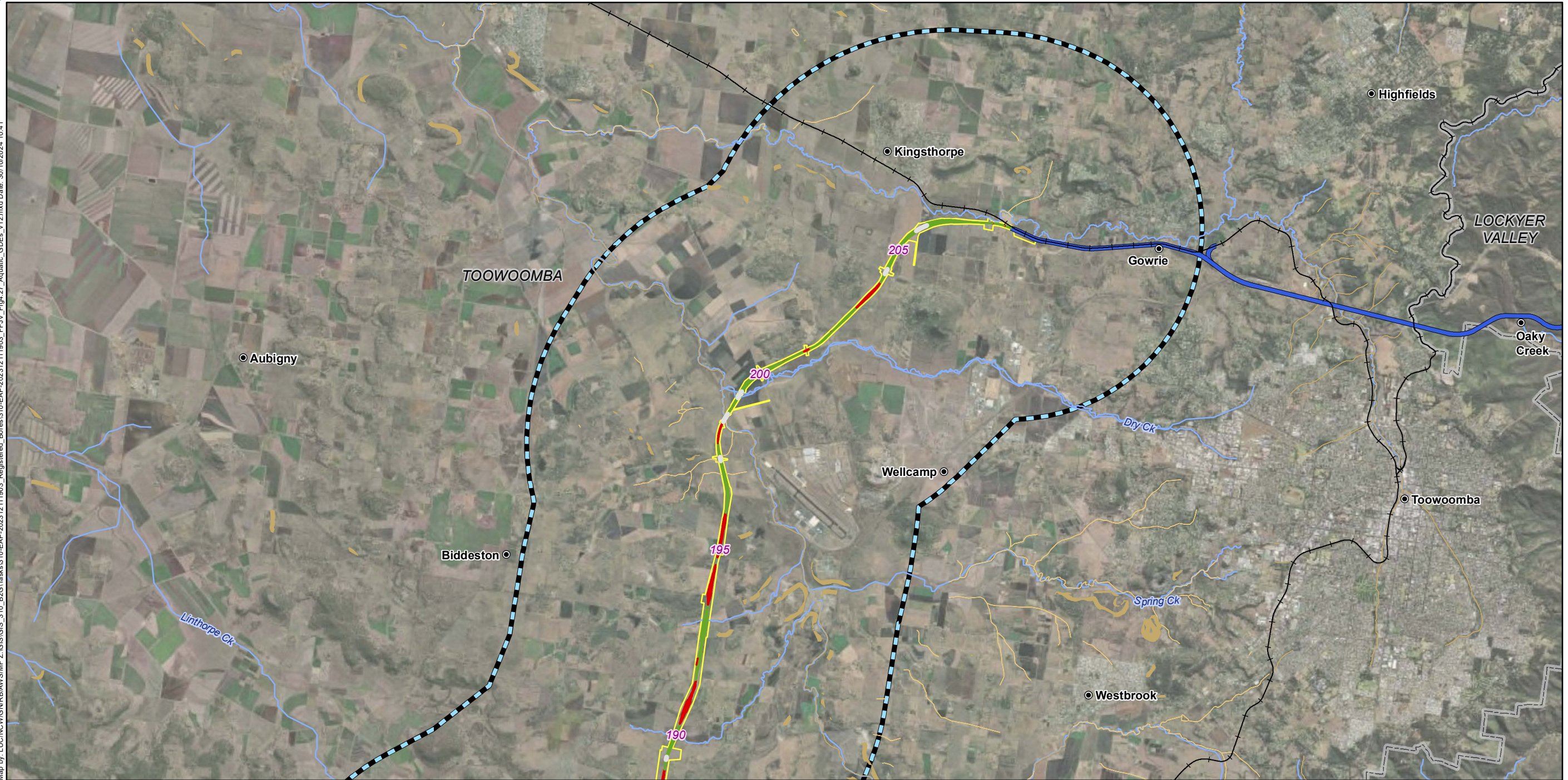
- High potential GDE
- Moderate potential GDE
- Low potential GDE



Border to Gowrie
Figure 4.27f:
Aquatic GDEs



Map by: LUC\NCW\GNR\BIA\W\SMF 2\GIS\GIS_310_B2G\Tasks\310-EAP-2023\2111903_Registered_Bores\310-EAP-2023\2111903_FFJV_Fig4.27_Aquatic_GDEs_v12.mxd Date: 30/10/2024 10:41

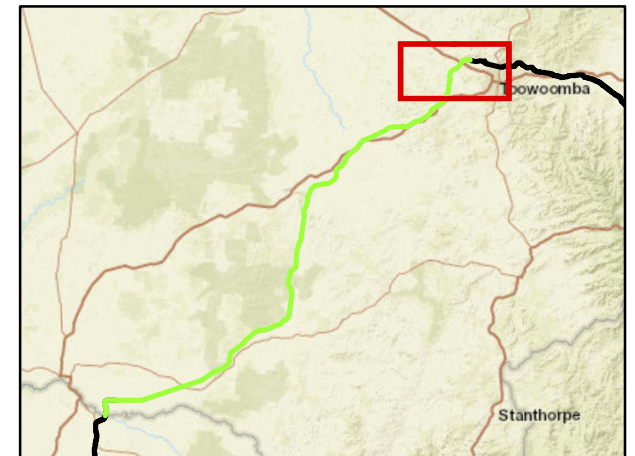


Legend

- 5 Chainage (km)
- Localities
- Gowrie to Helidon alignment
- Bridges
- Existing rail (operational)
- Watercourses

- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area**
- Temporary footprint

- Aquatic GDEs**
- High potential GDE
 - Moderate potential GDE
 - Low potential GDE

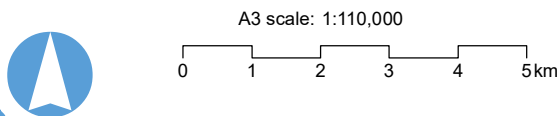
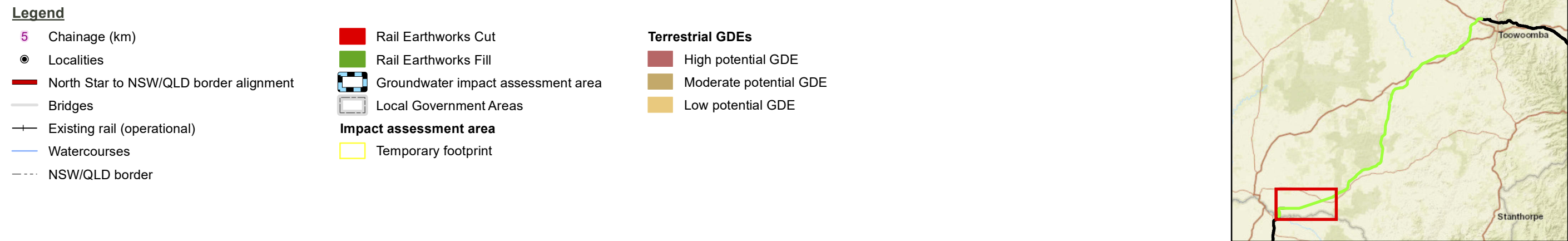


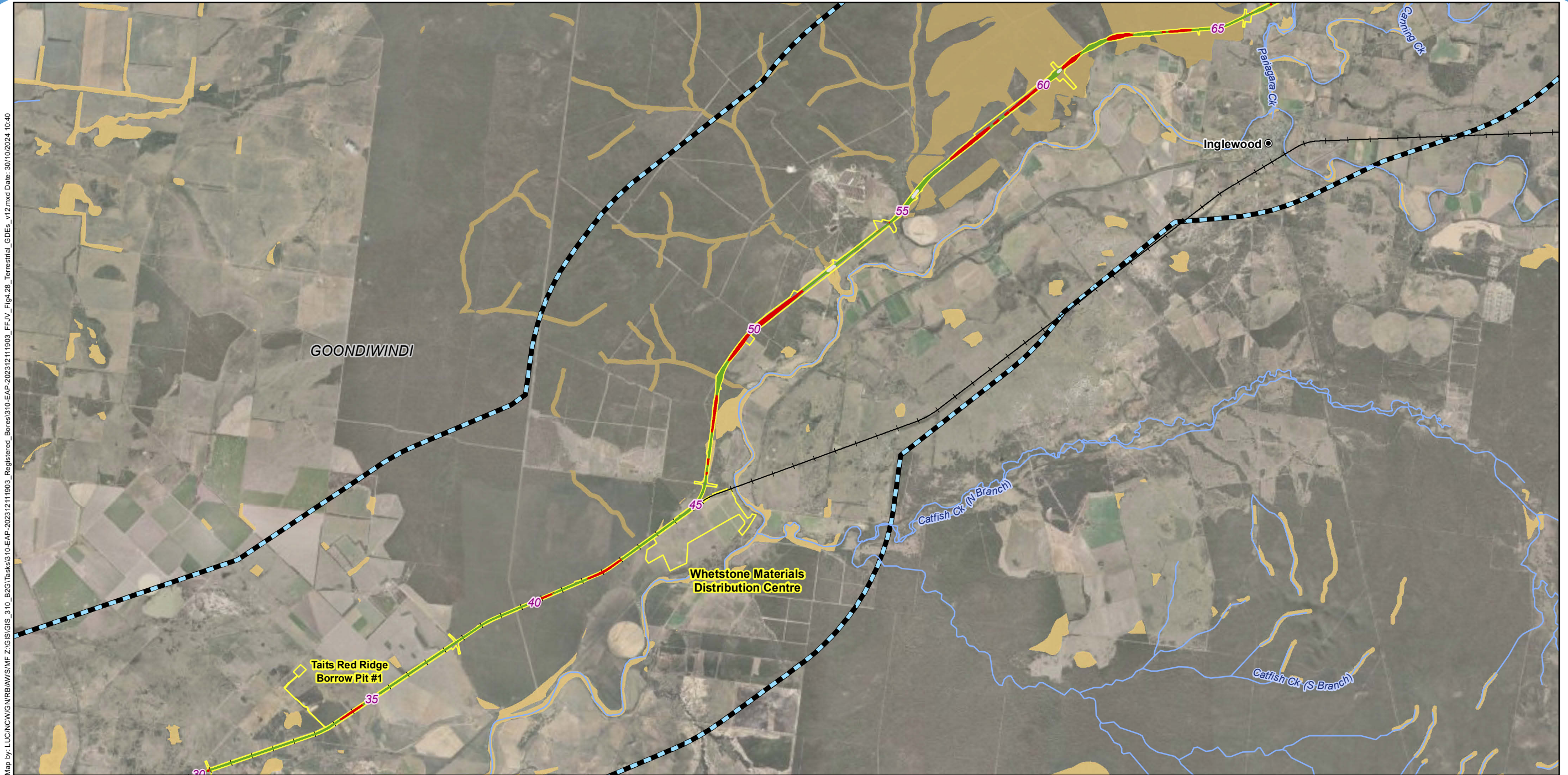
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 4.27h:
Aquatic GDEs

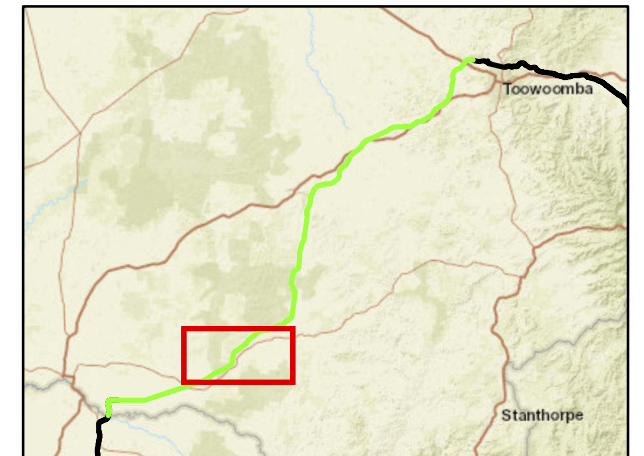




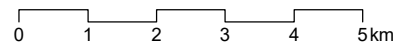
Legend

- 5 Chainage (km)
- Localities
- Bridges
- Existing rail (operational)
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area**
- Temporary footprint

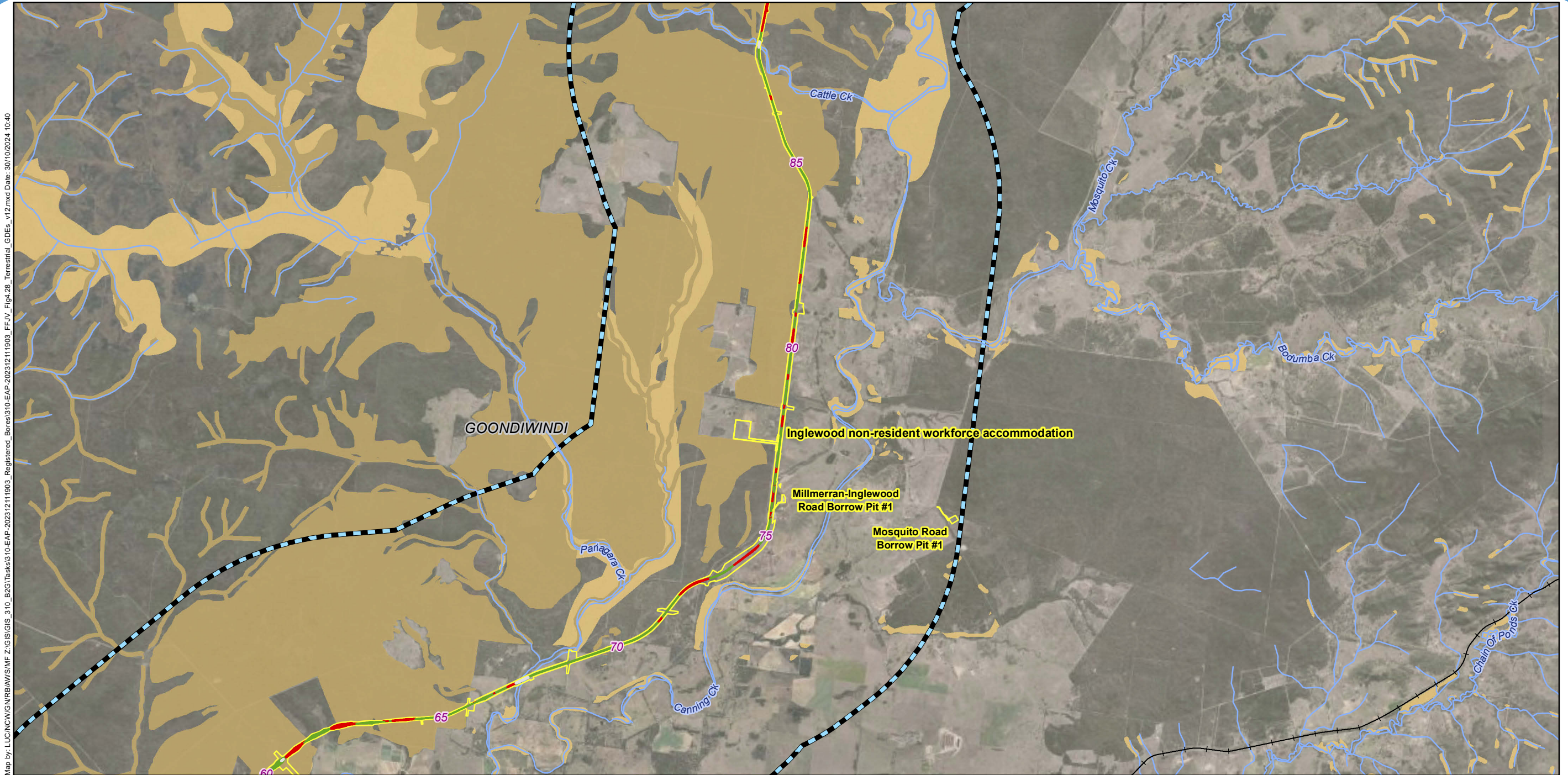
- Terrestrial GDEs**
- High potential GDE
 - Moderate potential GDE
 - Low potential GDE



A3 scale: 1:110,000

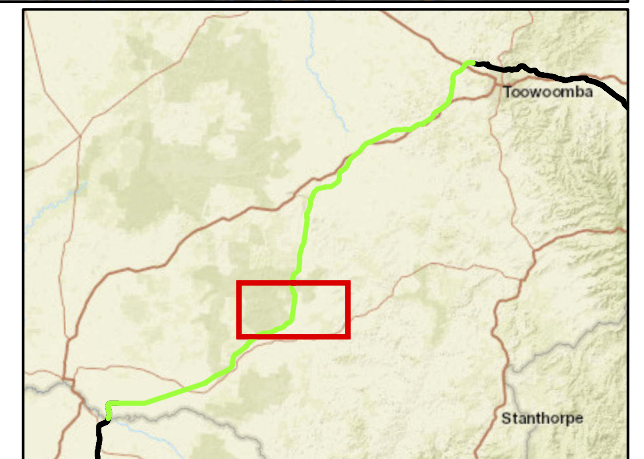


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Legend

- | | | |
|-----------------------------|------------------------------------|-------------------------|
| 5 Chainage (km) | Rail Earthworks Cut | Terrestrial GDEs |
| Bridges | Rail Earthworks Fill | High potential GDE |
| Existing rail (operational) | Groundwater impact assessment area | Moderate potential GDE |
| Watercourses | Local Government Areas | Low potential GDE |
| | Impact assessment area | |
| | Temporary footprint | |



A3 scale: 1:110,000
0 1 2 3 4 5km



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Border to Gowrie
Figure 4.28c:
Terrestrial GDEs

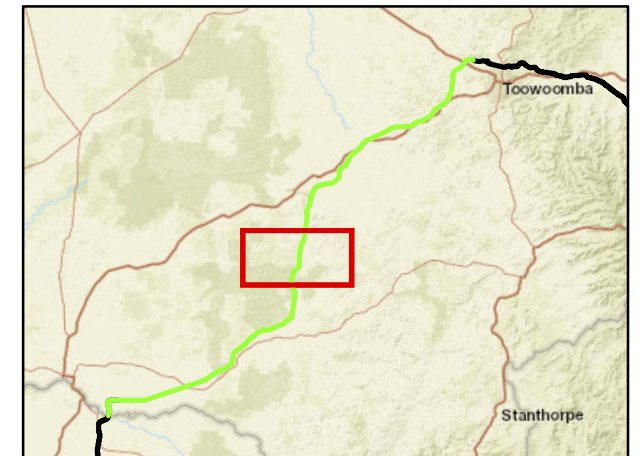
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Legend

- | | |
|-----------------|------------------------------------|
| 5 Chainage (km) | Rail Earthworks Cut |
| Localities | Rail Earthworks Fill |
| Bridges | Groundwater impact assessment area |
| Watercourses | Local Government Areas |
| | Impact assessment area |
| | Temporary footprint |

- Terrestrial GDEs**
- | |
|------------------------|
| High potential GDE |
| Moderate potential GDE |
| Low potential GDE |



A3 scale: 1:110,000
0 1 2 3 4 5km

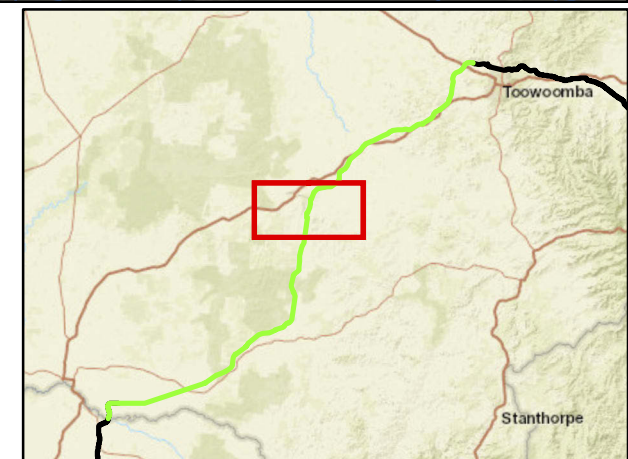
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Legend

- 5 Chainage (km)
- Bridges
- Watercourses
- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area
- Temporary footprint

- Terrestrial GDEs**
- High potential GDE
 - Moderate potential GDE
 - Low potential GDE

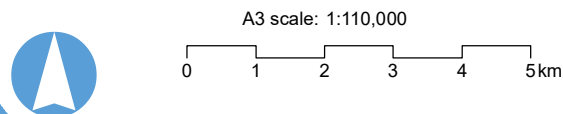
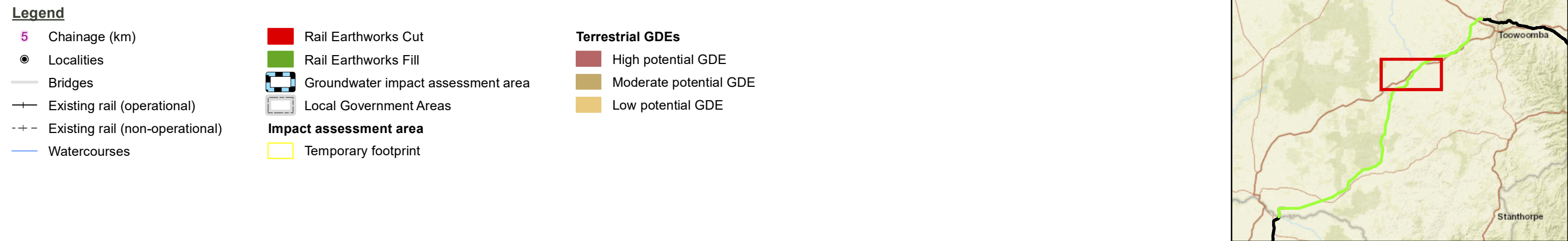
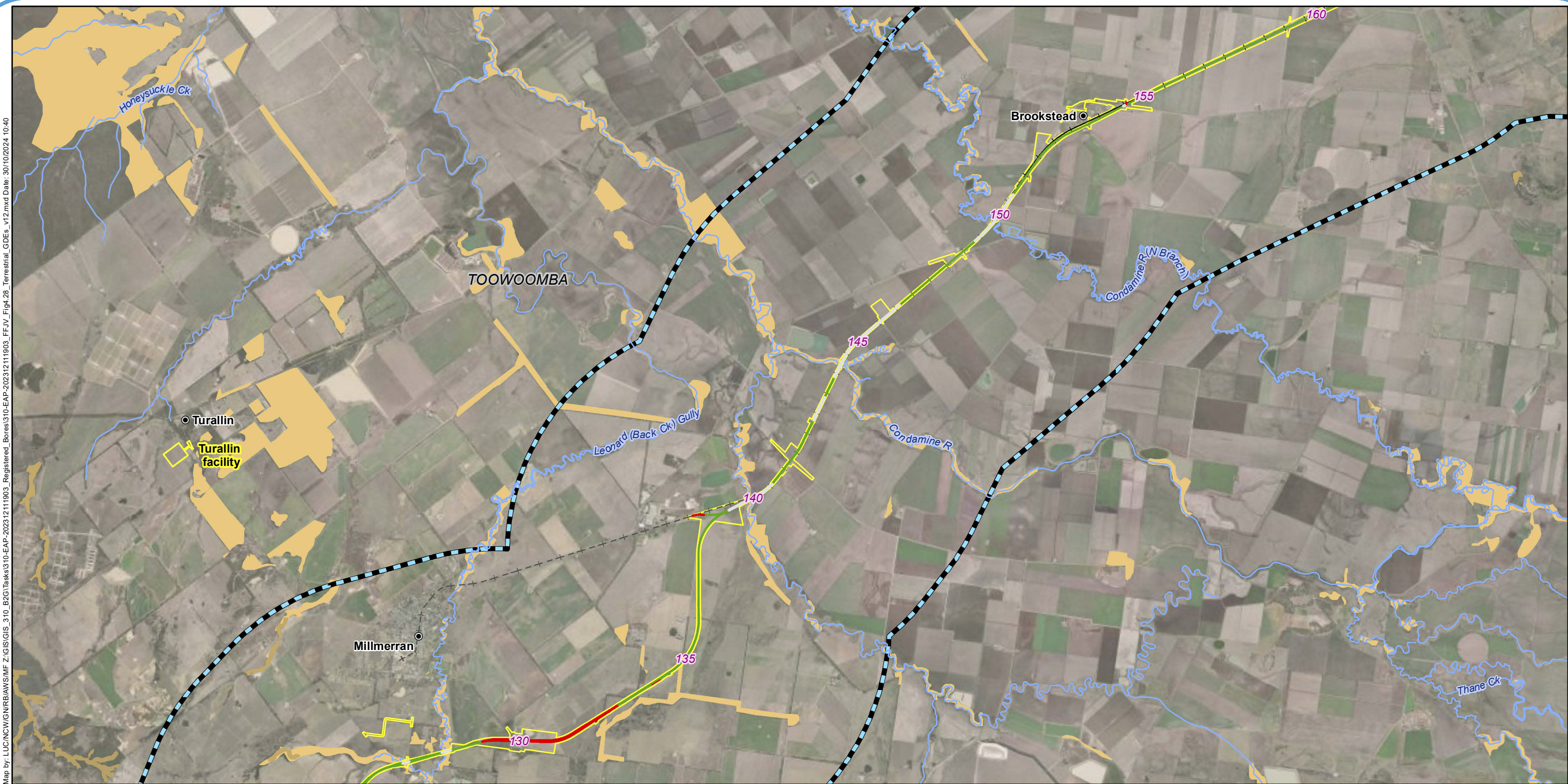


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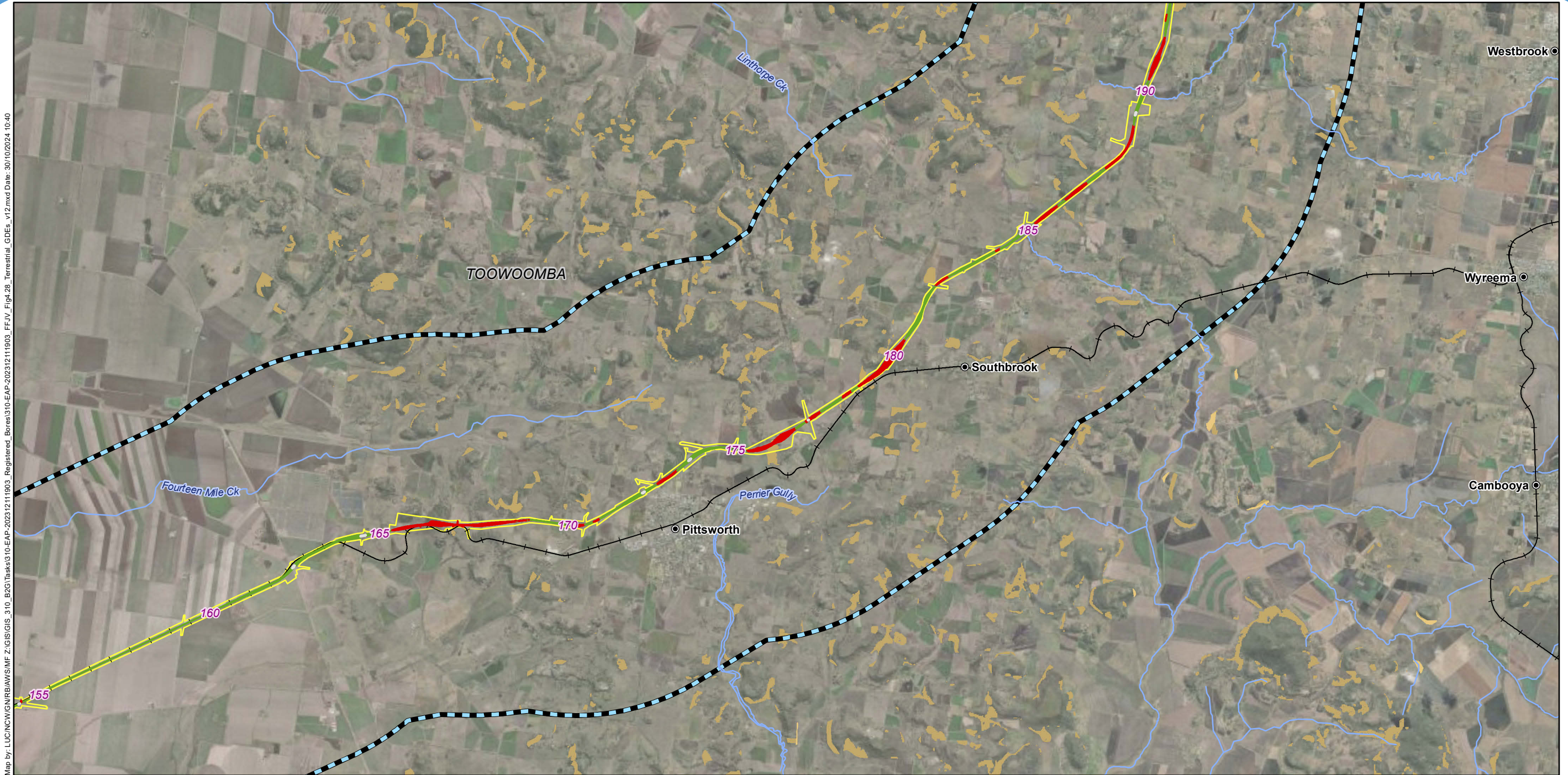


Issue date: 30/10/2024 Version: 12
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 4.28e:
Terrestrial GDEs

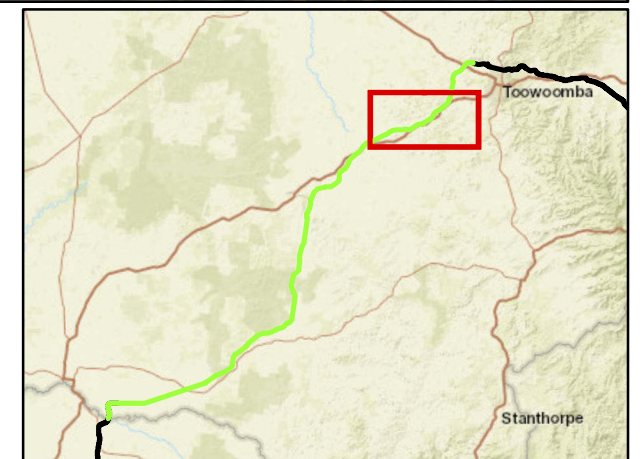


Border to Gowrie
Figure 4.28f:
Terrestrial GDEs

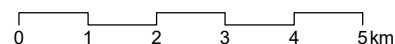


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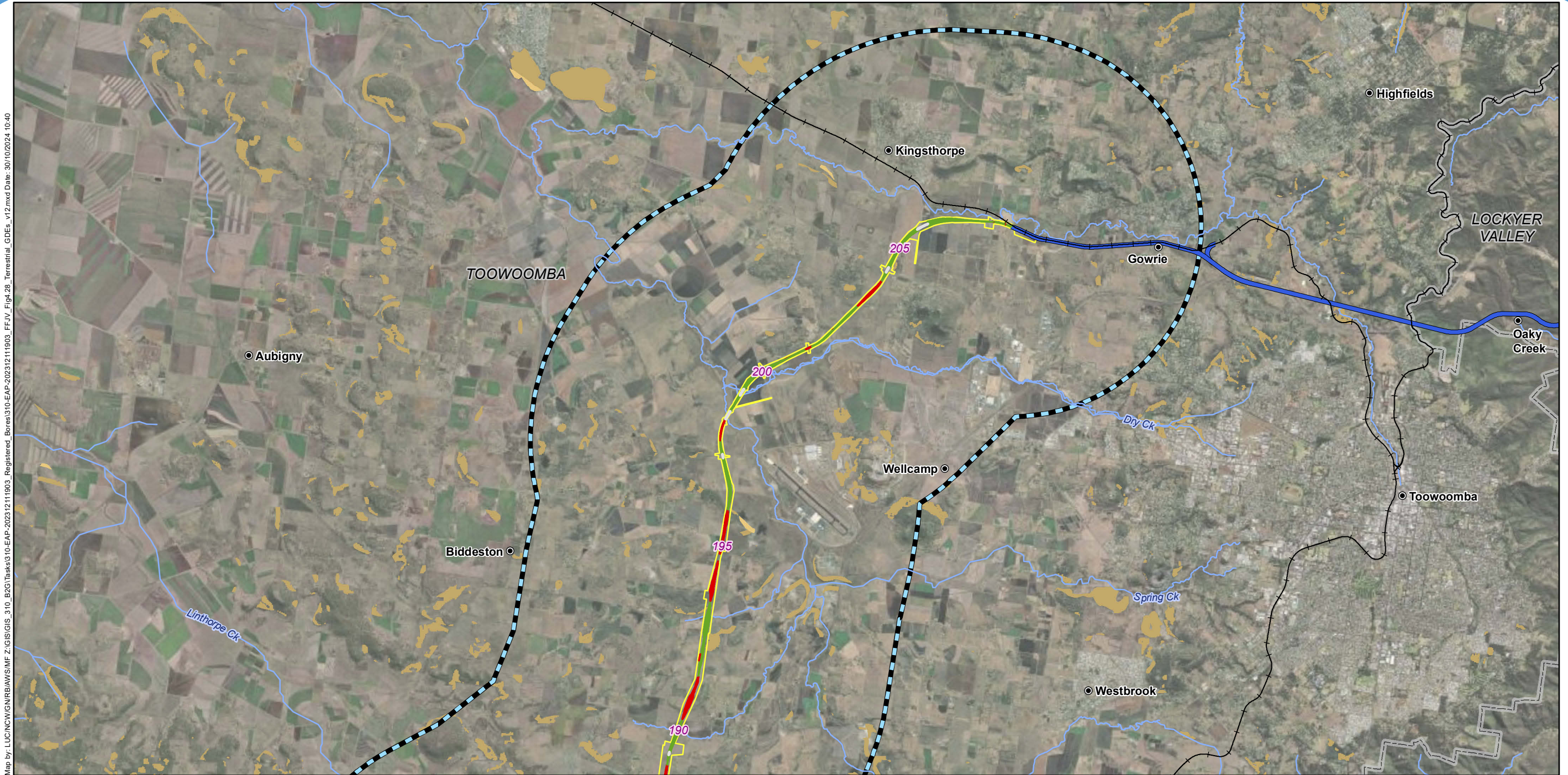
- | | | |
|-------------------------------|---|---|
| 5 Chainage (km) | ■ Rail Earthworks Cut | Terrestrial GDEs |
| ● Localities | ■ Rail Earthworks Fill | ■ High potential GDE |
| — Bridges | Groundwater impact assessment area | ■ Moderate potential GDE |
| — Existing rail (operational) | Local Government Areas | ■ Low potential GDE |
| — Watercourses | Impact assessment area | |
| | Temporary footprint | |



A3 scale: 1:110,000



Map by: LUC\NCW\GNR\B\AWS\IMF 2\GIS\GIS_310_B2G\Tasks\310-EAP-2023\2111903_Registered_Bores\310-EAP-2023\2111903_FF_V_Fig4.28_Terrestrial_GDEs_v12.mxd Date: 30/10/2024 10:40

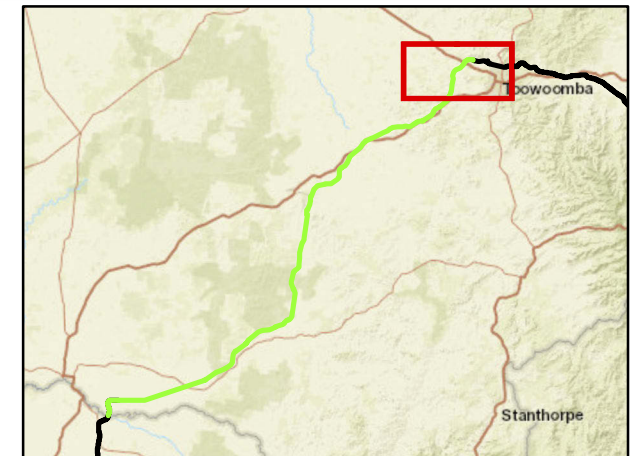


Legend

- 5 Chainage (km)
- Localities
- Gowrie to Helidon alignment
- Bridges
- Existing rail (operational)
- Watercourses

- Rail Earthworks Cut
- Rail Earthworks Fill
- Groundwater impact assessment area
- Local Government Areas
- Impact assessment area**
- Temporary footprint

- #### Terrestrial GDEs
- High potential GDE
 - Moderate potential GDE
 - Low potential GDE



A3 scale: 1:110,000
0 1 2 3 4 5km



Future Freight
Integrating Community, Environment and Engineering

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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 4.28h:
Terrestrial GDEs

5 Environmental values

For the purposes of this assessment, the ‘values’, as defined in the EPP (Water and Wetland Biodiversity), are those attributes of the groundwater systems within the impact assessment area that are sufficiently important to be protected or enhanced.

This section identifies and describes groundwater related EVs within the impact assessment area as defined under the *Queensland Murray-Darling and Bulloo River Basins – Groundwater Environmental Values and Water Quality Objectives* (DES, 2020):

- Ch 30.6 km (NS2B) to Ch 116.5 km: within the boundaries of the Border Rivers catchment. The relevant EVs for the impact assessment area are described in the *Healthy Waters Management Plan: Queensland Border Rivers and Moonie River Basins* (DES, 2019a)
- Ch 116.5 km to Ch 208.2 km: within the boundaries of the Condamine - Balonne River catchment. The relevant EVs for the impact assessment area are described in the *Healthy Waters Management Plan: Queensland Condamine River Basins* (DES, 2019b).

The *Queensland Murray-Darling and Bulloo River Basins – Groundwater Environmental Values and Water Quality Objectives* (DES, 2020) are based on the work of the HWMPs and succinctly comprises the EVs and WQOs for the entire Murray-Darling Basin in one document. The definitions of the EVs relevant to the impact assessment area are presented in Table 5.1. Table 5.2 summarises the HWMP of relevance and WQOs for relevant aquifers and corresponding criteria to evaluate whether the WQO is being attained are presented in Table 5.3. The default WQOs for aquatic ecosystem protection are listed in full in Table 5.4.

Table 5.1 Summary of environmental value definitions

Environmental value	Definition
Aquatic ecosystems	The intrinsic value of aquatic ecosystems, habitat and wildlife in waterways, waterholes and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species and their habitat.
Irrigation	Suitability of water supply for irrigation. For example, irrigation of crops, pastures, parks, gardens and recreational areas.
Farm supply/use	Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.
Stock water	Suitability of water supply for production of healthy livestock.
Aquaculture	Health of aquaculture species and humans consuming aquatic foods (such as fish and prawns) from commercial ventures.
Primary/secondary recreation	Health of humans during recreation which involves water, for example, swimming, diving, boating and fishing.
Drinking water	Suitability of raw drinking water supply. This assumes minimal treatment of water is required, for example, coarse screening and/or disinfection.
Industrial use	Suitability of water supply for industrial use – for example food, beverage, paper, petroleum and power industries. Industries usually treat water supplies to meet their needs.
Cultural, spiritual and ceremonial	Cultural values of water means its aesthetic, historical, scientific, social or other significance, to the past, present or future generations.

Table 5.2 Summary of relevant Healthy Water Management Plan environmental values by aquifer traversed by the Project

Aquifer	HWMP Environmental Values							
	Aquatic	Irrigation	Farm supply	Stock water	Aquaculture	Drinking water	Industrial	Cultural
Border Rivers Catchment								
Border Rivers Basin (Alluvium)	✓	✓	✓	✓	✓	✓	✓	✓
Macintyre Brook Alluvium	✓	✓	✓	✓	✓	✓	✓	✓
GAB - South East Kumbarilla	✓	✓	✓	✓	✓	✓	X	✓
Condamine – Balonne River Catchment								
Central Condamine (Alluvium)	✓	✓	✓	✓	✓	✓	✓	✓
Condamine North Branch (Alluvium)	✓	✓	✓	✓	X	✓	✓	✓
Toowoomba Region Basalts	✓	✓	✓	✓	✓	✓	✓	✓
South East Walloons	✓	✓	✓	✓	✓	✓	✓	✓

Table notes:

Based on the Border Rivers and Condamine – Balonne River catchment HWMPs respectively.

✓ = EV is relevant to that catchment

X = EV is not relevant to that catchment

Table 5.3 Summary of environmental values, water quality objectives and relevance to the Project

Environmental value	WQOs/Guidelines to assess WQO	Evaluation of relevance to the Project
Groundwater – aquatic ecosystems	Border Rivers catchment: WQOs defined in Tables 35 and 37 in the HWMP for aquifers in the Border Rivers catchment (DES, 2019a). Condamine – Balonne River catchment: WQOs defined in Tables 31 and 32 in the HWMP for aquifers in Condamine-Balonne River catchment (DES, 2019b). <i>Queensland Murray-Darling and Bulloo River Basins – Groundwater Environmental Values and Water Quality Objectives</i> (DES, 2020)	Regional aquatic GDE data from the GDE Atlas was evaluated at a 5 km study area. This indicated there were no high potential aquatic GDEs traversed by or in proximity to the Project footprint (Figure 4.27). Regional terrestrial GDE data from the GDE Atlas was evaluated and indicated there is one high potential terrestrial GDE traversed by the Project alignment between Ch 24.4.0 km to Ch 26.8 km, near Yelarbon. The nearest spring is Stone Spring, located 2.1 km north-west of Ch 173.7 km. There are numerous areas with low to moderate potential to support aquatic and terrestrial GDEs. Therefore, there is the potential for such GDEs to be impacted by possible dewatering or changes in groundwater quality and/or levels during the construction works stage and operations stage of the Project. Mitigation measures to minimise such impacts are discussed in Section 8.
Groundwater – irrigation	ANZG (2018) The threshold salinity tolerances for plants grown in loamy to clayey soils (considered the primary soil conditions traversed by the rail alignment) are 600 $\mu\text{S/cm}$ to 7,200 $\mu\text{S/cm}$ as stated in Section 4.2.4 of the ANZG (2018). Metals thresholds: Iron: not available Lead: 3.4 $\mu\text{g/L}$ Copper: 1.4 $\mu\text{g/L}$ Mercury: 0.6 $\mu\text{g/L}$	Groundwater use for irrigation is a significant EV for the region, particularly from shallow aquifers such as the BRA, CA, and MRV. The suitability of groundwater within the impact assessment area from bores installed during the Project hydrogeological investigation is discussed in Section 4.7.3. For example, the alluvium and MRV in the Border Rivers and Condamine Catchments generally report salinity values of less than 2,000 $\mu\text{S/cm}$ in the area. Salinity impacts can occur from site clearing and grading activities, and from salty groundwater seeping into cuts then evaporating, leaving a salt deposit behind that can infiltrate the subsurface. Metal impacts can result from operation and maintenance of the railway. Grinding maintenance activities can disperse metal particles into the surrounding land surface. The groundwater quality is generally suitable for irrigation with respect to metals.
Groundwater – farm supply/use	ANZG (2018)	Water quality results presented in Section 4.7.3 indicate that groundwater abstracted from most aquifers traversed by the rail alignment could be used for general farm purposes, although quality is noted to be highly variable. Based on the above, this EV is considered relevant to the Project.

Environmental value	WQOs/Guidelines to assess WQO	Evaluation of relevance to the Project
Groundwater – stock water	ANZG (2018) (i.e. median faecal coliforms of < 100 organisms per 100 ml) The water quality tolerances of livestock vary between livestock types (e.g. beef cattle have no adverse effects up to a TDS of 4,000 mg/L, whereas dairy cattle can only tolerate up to 2,500 mg/L TDS). Metals: Iron: not sufficiently toxic Lead: 0.1 mg/L Copper: 0.4 (sheep) – 5 (pigs/poultry) mg/L Mercury: 0.002 mg/L	The review of entitlements, allocations and licenced uses confirmed that stock watering is a major use of groundwater in the area. This EV is the second most common use of groundwater (after irrigation) from the alluvium and MRV. Stock watering is the primary use for groundwater abstracted from the GAB aquifers (i.e. Kumbarilla Beds, WCM). Available salinity data confirms that the alluvium, MRV and GAB aquifers are suitable for stock water (median EC values of < 1500 µS/cm). More variable water quality is evident in the WCM and may preclude some landowner bores from use for stock watering for less tolerant livestock. Metal impacts can result from operation and maintenance of the railway. Grinding maintenance activities can disperse metal particles into the surrounding land surface. The groundwater quality is generally suitable for irrigation with respect to metals.
Aquaculture	ANZG (2018) <i>Healthy Waters Management Plan: Queensland Border Rivers and Moonie River Basins</i> – Table 59 (DES, 2019a) Alkalinity: >40 mg/L, 100-400 mg/L Iron: < 0.1 - < 0.5 mg/L	While aquaculture is recognised as an EV for some aquifers within the impact assessment area (Table 5.2), no known commercial aquaculture operations are known to be in impact assessment area. Groundwater quality is variable with respect to aquaculture WQOs; quality results from about half of the Project bores does not currently meet the WQOs.
Groundwater – drinking water	ANZG (2018) <i>Healthy Waters Management Plan: Queensland Border Rivers and Moonie River Basins</i> – Table 61 (DES, 2019a)	The suitability of water for human consumption is defined in the <i>Australian Drinking Water Guidelines</i> (NHMRC & NRMCC, 2011). The TDS threshold for water palatability is < 900 mg/L under these guidelines. Excluding the WCM, the aquifers within the impact assessment area have median TDS values below this threshold and are potentially suitable for drinking water use. All relevant aquifers detailed in the Condamine and Border Rivers HWMPs are recognised to have a drinking water EV.
Industrial	Applicable WQOs to protect this EV are variable between different industries and are considered on a case-by-case basis.	Industrial use is noted as a relevant EV for the BRA, CA, MRV and WCM units. Review of groundwater entitlements within the impact assessment area indicate (minor) usage of groundwater for commercial/industrial purposes (Section 4.1). Therefore, this EV is considered relevant to the Project.
Cultural and spiritual	Protect or restore cultural, spiritual and ceremonial values consistent with approved policies and plans. Aboriginal waterways assessments may provide information to support the cultural, spiritual and ceremonial value.	Regionally, the Border Rivers and Condamine-Balonne River catchments have cultural and spiritual values recognised EVs for all relevant aquifers traversed by the Project, as detailed in the Border Rivers and Condamine-Balonne River catchment HWMPs (Table 5.2).
Visual amenity	Not applicable	The nearest spring is Stone Spring, located 2.1 km to the north-west of Ch 173.7 km. Therefore, this item is not considered to be applicable to groundwater within the impact assessment area.
Recreational	Not applicable	This EV is not considered relevant to in situ groundwater and is typically a consideration for surface water. There is a possibility of seasonal bore water use to fill swimming pools. There are no registered groundwater springs within 2 km of the Project alignment which could be considered for recreational use.

Table 5.4 Default groundwater water quality objectives applicable to the aquifers within the groundwater impact assessment area for protection of aquatic ecosystems

Groundwater unit	Percentile	Sodium (Na)	Calcium (Ca)	Magnesium (Mg)	Bicarbonate (HCO ₃)	Chloride (Cl)	Sulphate (SO ₄)	Nitrate (NO ₃)	EC	pH	Alkalinity	Silicon Dioxide (SiO ₂)	Fluoride (F)	Iron (Fe)	Manganese (Mn)	Zinc (Zn)	Copper (Cu)	SAR	Total nitrogen	Total P
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L
Border Rivers	20th	150	13	10	110	117	15.1	0.3	531	6.5	104	31	0.16	0.000	0.01	0.005	0.013	4.95	0.085	0.000
	50th	329	34	23	253	381	64.5	1.9	1,800	7.3	214	60	0.30	0.010	0.04	0.020	0.015	17.00	0.543	0.049
	80th	4,589	710	569	489	8,723	1,100.0	12.5	23,910	8.0	414	81	0.90	0.056	9.74	0.160	0.070	35.7	2.717	1.235
Macintyre Brook	20th	44	3	1	145	46	1.1	0.03	410	7.5	132	10	0.20	0.005	0.01	ID	ID	1.80	ID	ID
	50th	124	19	11	295	115	7.9	0.8	1,178	7.9	243	40	0.41	0.005	0.01	ID	ID	8.92	ID	ID
	80th	412	32	28	610	270	30.2	6.4	1,700	8.6	559	44	0.89	0.121	0.83	ID	ID	31.59	ID	ID
GAB - South East Kumberilla	20th	315	2	0	459	72	0.0	0.0	1,173	8.0	506	13	0.55	0.005	0.00	0.000	0.000	38.10	0.000	0.000
	50th	417	3	1	720	120	2.0	0.5	1,600	8.4	660	15	1.50	0.020	0.01	0.005	0.015	56.30	0.109	0.000
	80th	530	4	2	969	260	9.1	1.3	2,050	8.6	865	19	3.20	0.130	0.01	0.017	0.015	71.65	0.283	0.033
Central Condamine	20th	85	19	12	239	70	5.0	0.2	603	7.4	200	27	0.1	0.005	0.01	0.005	0.015	3.20	0.043	0.000
	50th	213	34	16	382	170	22.0	0.5	1,160	7.9	321	33	0.16	0.010	0.010	0.005	0.015	7.30	0.109	0.033
	80th	535	61	25	465	739	84.7	2.0	2,800	8.3	390	40	0.30	0.050	0.05	0.01	0.015	12.80	0.435	0.154
Condamine North Branch	20th	83	27	17	280	54	4.0	0.0	660	7.5	240	28	0.10	0.005	0.01	0.005	0.015	2.50	0.000	0.000
	50th	105	37	26	380	80	9.6	0.5	805	7.9	320	36	0.10	0.010	0.01	0.005	0.015	3.30	0.109	0.033
	80th	158	52	34	451	136	26.0	1.0	1,050	8.3	376	40	0.20	0.030	0.01	0.010	0.015	4.90	0.217	0.098
Toowoomba Region Basalts	20th	66	16	7	180	88	3.4	0.5	660	7.5	150	20	0.10	0.000	0.00	0.005	0.010	1.30	0.087	0.000
	50th	97	52	59	350	184	10.0	5.0	1,200	7.9	291	34	0.20	0.020	0.01	0.005	0.015	2.20	1.054	0.000
	80th	147	100	116	530	356	22.0	33.0	1,750	8.2	443	47	0.30	0.050	0.02	0.025	0.015	6.20	7.391	0.000
South East Walloons	20th	121	9	4	300	101	3.4	0.0	880	7.7	251	12	0.10	0.000	0.000	0.000	0.000	2.90	0.000	0.000
	50th	225	39	27	455	236	13.0	1.0	1,500	8.0	390	17	0.27	0.010	0.01	0.010	0.010	8.10	0.217	0.000
	80th	425	89	89	662	560	46.2	6.0	2,550	8.4	562	30	0.50	0.060	0.02	0.148	0.025	17.89	1.324	0.033

Source: *Healthy Waters Management Plan: Queensland Border Rivers and Moonie River Basins* (DES, 2019a) and *Healthy Waters Management Plan: Queensland Condamine River Basins* (DES, 2019b)

Table notes:

In some instances, values have been rounded for consistent presentation of decimal places for each parameter

ID = insufficient data

Total P = total phosphorus

6 Groundwater modelling

6.1 Construction methodology

Potential impacts on groundwater resources, including groundwater quality and levels, were identified and assessed with a conceptual hydrogeological model and a series of numerical predictive models that were developed from site-specific and literature data presented in this revised draft EIS. The models, and identification of potential impacts relevant to the Project based on ambient conditions and land uses, have informed the development of mitigation and management measures that can be adapted for any changes in conditions, if necessary.

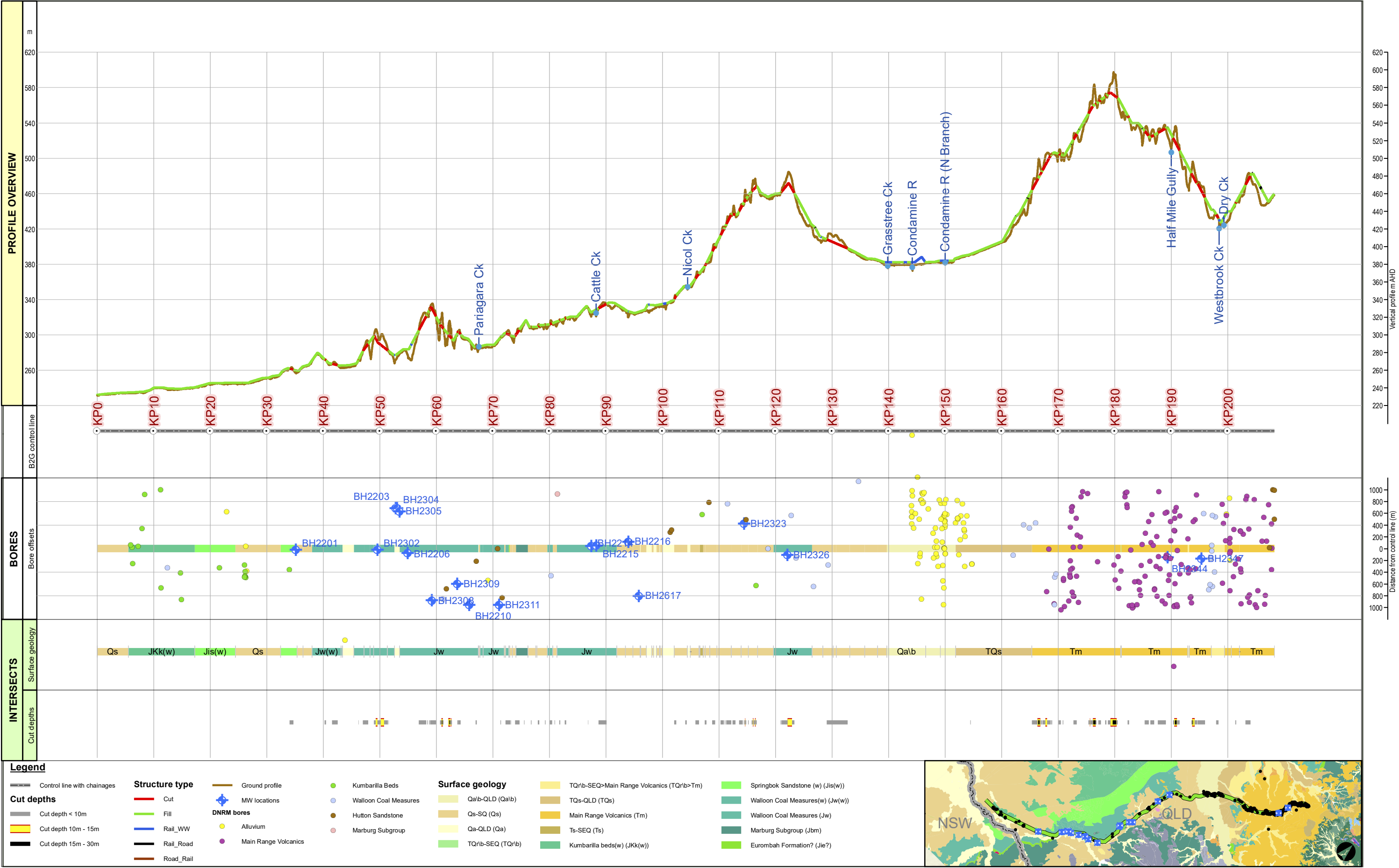
The proposed construction activities for the Project with potential to intersect and influence shallow groundwater resources and the key assumptions for each activity are provided in Table 6.1.

A profile of the rail alignment which presents the surface geology, locations of deeper cuts, bridges, embankments, and bore locations is depicted on Figure 6.1.

Table 6.1 Summary of construction activities and assumptions for the Project

Activity	Description	Assumptions/comment
Embankments	Volumes of material emplaced and compacted to raise the profile of the railway alignment to meet design specifications.	No dewatering, which may alter shallow groundwater levels, is anticipated. Compaction may occur as part of the embankment construction works. Possible alteration (compaction) of underlying sediments and soils – impact on possible throughflow – limited impact recognised due to depth of groundwater and embankment height and locations
Cuts	Removal of soil and rock to maintain the grade of the alignment design. A total of 46 cuts are proposed with a total aggregate length of approximately 32.7 km. Cut lengths range from 0.1 to 3.3 km. The maximum cut depth is 24.83 m (cut ID 310-C34, Ch 178.85 km to Ch 180.45 km). Of these 46 cuts, 12 are considered deep cuts (>10 m) where groundwater may be encountered. Seven of these cut sections were selected for predictive modelling as they represent the highest potential to intersect groundwater or in response to public submissions. Cuts are proposed in all the main geological units.	Cuts (excavations) have potential to intersect the existing shallow groundwater resources. Drawdown of groundwater levels at cut location may occur due to seepage.
Bridge and pilings	Total of 34 bridges are proposed to cross roadways and waterways. Cast in Place (CIP) pilings are likely to be used for each bridge.	Pilings are proposed to extend to depths ranging from 5 to 35 m BGL and span widths of 20 to 30 m. Piling designs are founded in soil, alluvium and bedrock of the Surat and Clarence – Moreton basins. Not continuous so won't impact on flow. Small water and material volumes removed during piling – unlikely to impact on groundwater resources

Map by: DMcP Z:\GIS\GIS_310_B2G\Tasks\310-EMN-2020\1201540-GW_section_profile\310-EMN_2020\1201540_CrossSectionA3_5.mxd Date: 08/02/2022 10:52



Horizontal lateral scale for borehole offsets: 1:60,000
Horizontal longitudinal scale as determined by chainage markers on C/L

6.2 Hydrogeological conceptualisation

Key aspects of the hydrogeological regime within the impact assessment area are summarised below, and a conceptual understanding of the hydrogeological regimes within the impact assessment area are presented on Figure 6.2 and Figure 6.3.

The groundwater conceptualisations are a representation of the groundwater systems that incorporate an interpretation of the geological and hydrogeological conditions. Further, the conceptualisations consolidate the current understanding of the key processes of each groundwater system, including the influence of stresses, to assist in the understanding of potential changes/impacts on the systems because of the Project. Conceptualisation is divided broadly into two sections of the Project, based on depositional basin and the natural division feature of the Kumbarilla Ridge:

- Ch 30.60 km (NS2B) to Ch 116.5 km: characterised by the Surat Basin consolidated strata and overlying Cainozoic unconsolidated sediments of the BRA
- Ch 116.5 km to Ch 208.48 km: characterised by the Clarence-Moreton consolidated strata and overlying Cainozoic MRV and unconsolidated sediments of the CA.

6.2.1 Main hydrostratigraphic units

As shown in Figure 6.2 hydrogeological conceptual model Section A, the Project initially traverses the BRA followed by the westward dipping Kumbarilla Beds and WCM between Yelarbon and Inglewood. A number of deep cuts in this area are incised into the weathered bedrock of the WCM with potential to intersect shallow groundwater.

As shown in Figure 6.3, further north between Millmerran and Pittsworth, the Project traverses the CA associated with Condamine River and tributaries. To the north of Pittsworth, the Project traverses the Main Range Volcanics which predominantly overlies the WCM and Eurombah formation.

6.2.2 Water levels and flow patterns

The unconfined alluvium water table in the BRA is shallow and generally follows topography, with localised drawdown observed in areas of groundwater abstraction. The water table is typically a subdued version of topography within the WCM, with the depth to groundwater increasing beneath topographic highs (Figure 6.2).

Groundwater flow of the BRA relative to the rail alignment is inferred towards the south-west. Groundwater flow in the WCM in the Condamine to Gowrie area is generally towards the north-west yet between Millmerran and Yelarbon flow direction is inferred towards the west – south-west (DNRM, 2016a). Available groundwater level data suggest that there is potential for groundwater flow from the basalts to the WCM (University of Queensland, 2014).

6.2.3 Recharge mechanisms

Recharge to alluvial aquifers occurs from both rainfall and by seepage from ephemeral watercourses (losing surface water systems). Sub-cropping rock below permeable alluvium may also act as a source of recharge where upward vertical groundwater gradients can facilitate upward discharge of groundwater (Golder, 2019c).

Primary recharge to the WCM is through seepage from the overlying and underlying units and via direct rainfall infiltration in areas of sub-crop.

Primary recharge to the MRV is via direct rainfall infiltration and local vertical leakage from the underlying units. Project bores screened across the shallow and middle MRV (Section 4.7.2.2) appear to have little overall hydraulic connection with surface water and response to rainfall however, recharge from the CA can occur after large rainfall events.

6.2.4 Discharge mechanisms

The primary discharge mechanisms in the alluvium are extraction, as baseflow to the adjacent surface water features, and local leakage into the underlying units. Evapotranspiration from vegetation growing in the creek beds and along the banks, and seepage to the underlying units from the alluvial/colluvial sediments are also considered to be primary discharge mechanisms from this unit.

Primary discharge mechanisms in the WCM are considered to include bore extraction where the WCM locally act as an aquifer and vertical seepage into the under and overlying units. Primary discharge mechanisms from the MRV are considered to include bore extraction and local vertical leakage to deeper units. Springs in MRV – discharge points.

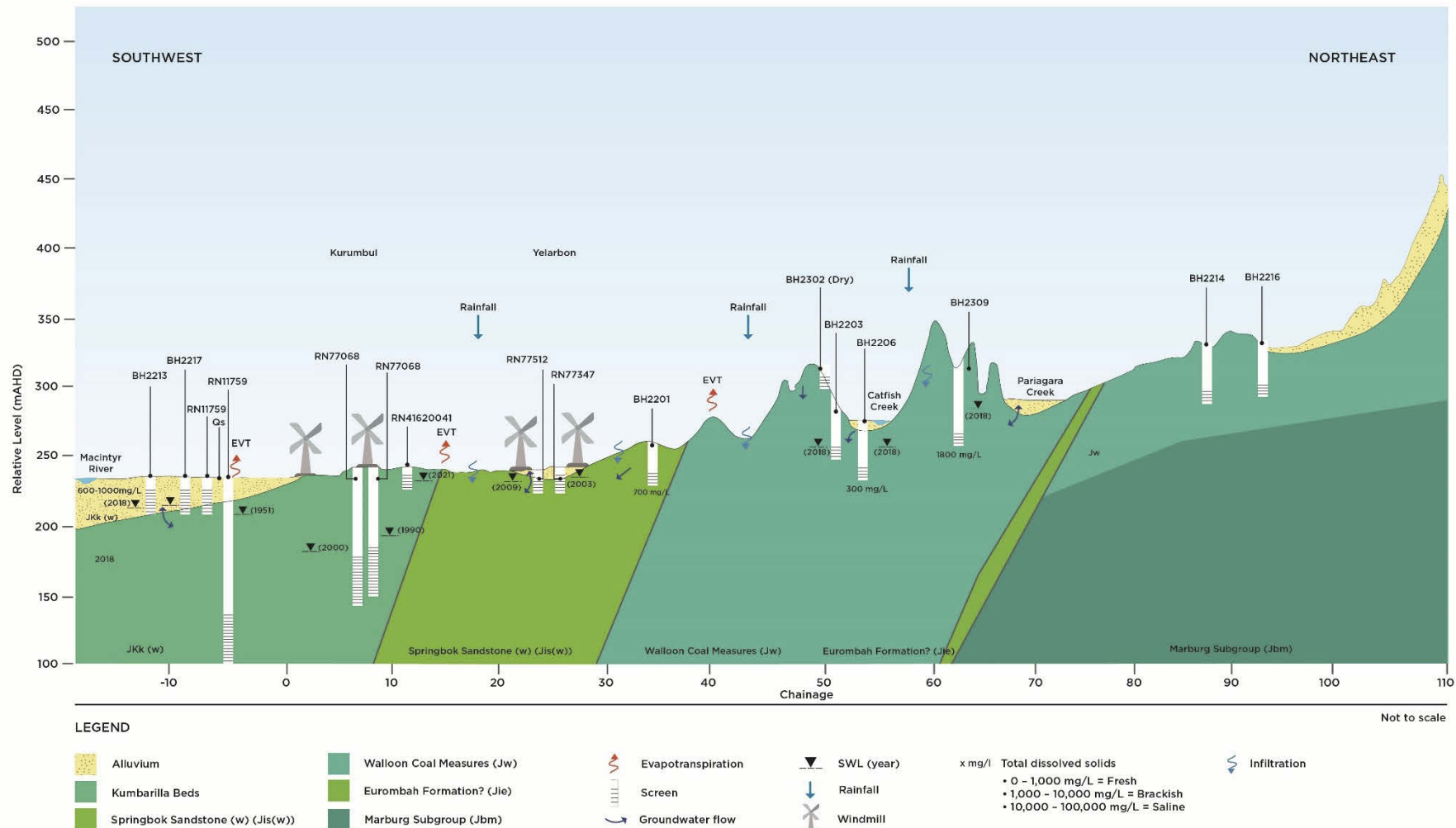


Figure 6.2 Hydrogeological Conceptualisation – Section A

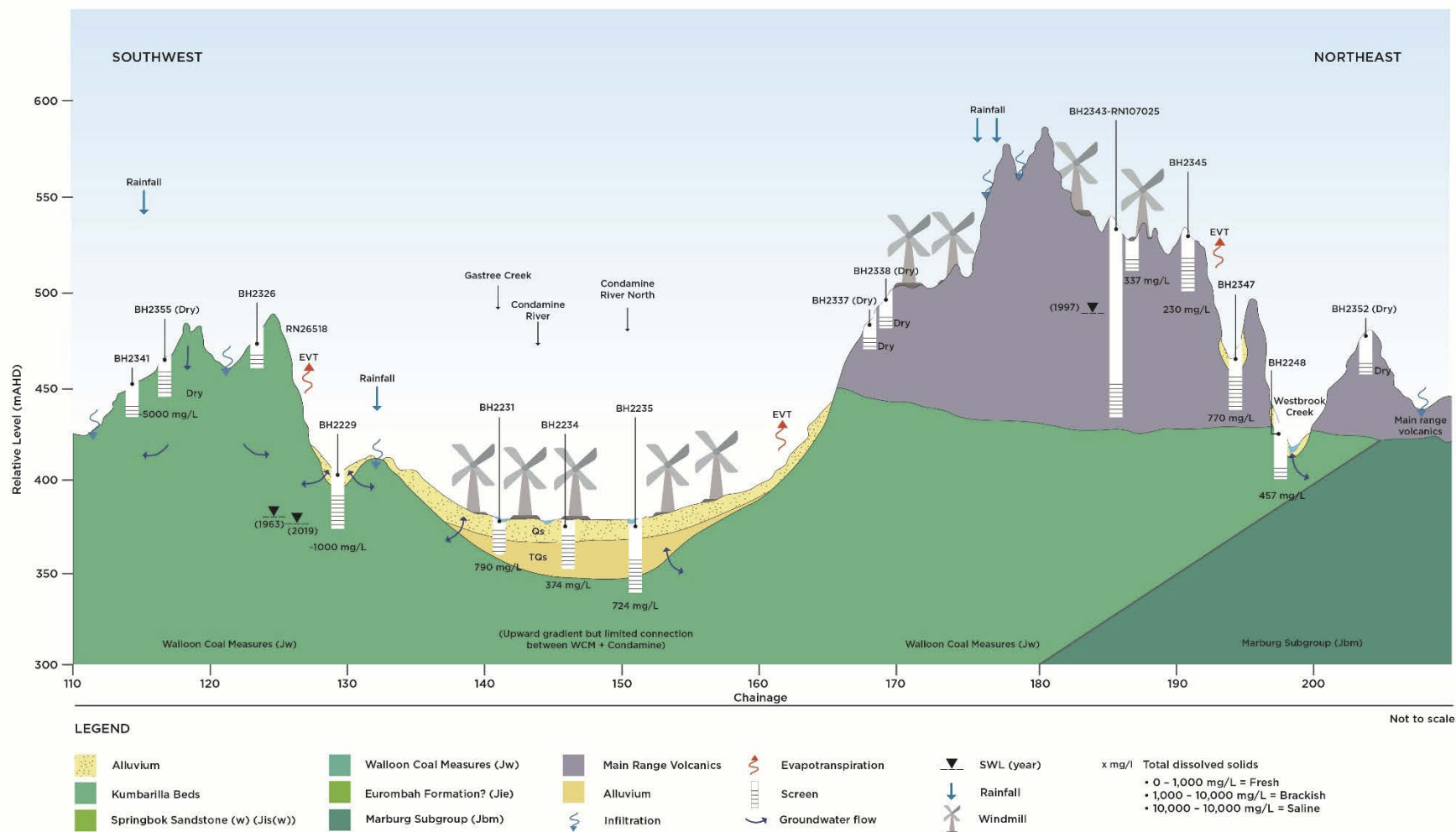


Figure 6.3 Hydrogeological Conceptualisation – Section B

6.3 Predictive modelling

To inform the Inland Rail – B2G draft EIS, Golder Associates Pty Ltd (Golder) prepared a hydrogeological assessment report entitled *100% Feasibility Design Scope of Works – Hydrogeology* (Golder, 2019c) (Attachment B). As part of their hydrogeological assessment, numerical predictive modelling of deep cuts likely to intersect groundwater was performed by Golder. The objectives of the predictive modelling were to evaluate potential groundwater drawdown, estimate potential seepage rates, and inform of changes to groundwater flow regimes for deep cuts (>10 m BGL) along the Project. The modelling considered five local scale 2-) cross-sectional models locations at the rail alignment (the deepest point of the cut in each stratigraphy intersected) to best represent the various construction methodologies, local geology, and worst-case potential impacts on groundwater resources. The modelling was undertaken using software SEEP/W^{TM4}.

Following the updates to the revised reference design, further groundwater predictive modelling has been undertaken, to inform the revised draft EIS. A review of the revised reference design alignment and design features was performed to identify representative locations for groundwater impact assessment modelling. The revised deep cuts (>10 m) with the highest potential to intersect groundwater resources have been selected for additional 2-D cross-sectional models oriented both parallel and perpendicular to the cut at the rail alignment to evaluate the extent of potential drawdown and, changes to flow regime, estimates of potential seepage were predicted consistent with the approach and methodology previously adopted by Golder for the draft EIS. The outcomes of the predictive modelling have informed of options for seepage control measures to suitably manage the predicted inflows.

6.3.1 Approach

Numerical predictive models have been developed to support the hydrogeological design and impact assessment for the Project. The objectives of the predictive modelling were to:

- Estimate potential groundwater seepage rates for cuts, that intersect groundwater (deeper > 10 m)
- Assess potential groundwater drawdown extent (zone of influence) due to groundwater seepage into the deeper cuts during construction works stage
- Assess potential residual impacts due to groundwater seepage into the deep cuts following application of seepage control measures
- Assess potential residual impacts due to groundwater seepage into the deep cuts following application of seepage control measures.

Seven deep cuts along the Project alignment were selected to undergo 2-D modelling as best representing conservative potential impacts on groundwater resources (deepest cuts into each stratigraphy) and in response to public submissions and the Coordinator-General's request for further information on the draft EIS. The selected cuts and supporting rationale are listed in Table 6.2. These indicative cuts were modelled to evaluate potential groundwater drawdown and extent, changes to flow regime, and to estimate potential seepage rates for construction works and operations stages (residual impact) of the Project. The conservative 2-D modelling methodology was selected as appropriate to consider impacts perpendicular to the cut, and groundwater flow up and downgradient of the Project alignment.

The SEEP/WTM finite element software package was selected to construct the required numerical models estimate steady state and upper level (conservative) inflows to deep cuts and the resulting drawdown impacts from excavations.

⁴ <https://www.geoslope.com/products/seep-w>

Table 6.2 Cuts included in the predictive modelling

Cut ID (310)	Cut chainage (km)	Cut length (m)	Cut depth (m BGL)	Reason for selection
C07	60.7 to 61.2	450	15.9	Second deepest cut within the Walloon Coal Measures. Water strike during drilling at nearest project bore 310-01-BH2308 (~1.75 km) = 14.68 m BGL.
C08	62.1 to 62.7	550	16.8	Deepest cut within the Walloon Coal Measures. Water strike during drilling at nearest project bore 310-01-BH2308 (~2.95 km) = 14.68 m BGL.
C23	114.5 to 114.7	250	11.6	Deepest cut within the Alluvium (CA). Water strike during drilling at nearest project bore 310-01-BH2323 (~0.43 km) = 14.26 m BGL.
C24	115.8 to 116.5	750	10.6	Second deepest cut within the Alluvium (CA). Water strike during drilling at nearest project bore 310-01-BH2355 (~0.40 km) = 9.79 m BGL.
C31	175.4 to 176.7	1,300	12.8	Deep cut within the WCM. Assess information and potential impacts to nearby landholder bore. No near project bores.
C34	178.85 to 180.45	1,600	22.6	Deepest cut within Main Range Volcanics. No near project bores.
C39	193.55 to 195.90	2,350	16.1	Deep cut within the MRV. Shallow groundwater level (~9.1 m BGL) observed at nearby project bore 310-01-BH2347 (~0.15 km), indicating potential to intersect groundwater.

Table note:

A 2-D model was selected as appropriate to consider potential groundwater impacts associated with deep linear cuts, as the 2-D modelling allows for estimates of seepage and possible groundwater level drawdown perpendicular across the entire cut at locations along the Project alignment (Barnett et al., 2012).

Each model was developed to consist of two geologic layers corresponding to the interpreted in situ profile at the model section (cross-section), generally a top layer of alluvial or residual soils and second hard rock (WCM or MRV) layer. The geological layers of the model sections are presented in Table 6.3.

Table 6.3 Geological layers of model selections

Cut ID	Model section, chainage (km)	Layer 1	Layer 2
310-C07	Ch 61.0 km	Residual Soils – Sandy Clay and Clayey Sand	Walloon Coal Measures
310-C08	Ch 62.4 km	Residual Soils – Sandy Clay and Clayey Sand	Walloon Coal Measures
310-C23	Ch 114.65 km	Residual Soils/ Alluvial Soils – Clay, Sandy Clay	Walloon Coal Measures
310-C24	Ch 116.0 km	Residual Soils/ Alluvial Soils – Clay, Sandy Clay	Walloon Coal Measures
310-C31	Ch 176.35 km	Residual Soils – Silty Clay	Tertiary Sediments – MRV
310-C34	Ch 179.9 km	Residual Soils – Silty Clay	Tertiary Sediments – MRV
310-C39	Ch 193.75 km	Residual Soils – Silty Clay	Tertiary Sediments – MRV

The seven models were set up to represent the anticipated hydrogeological conditions of each respective deep cut. A summary of the modelled cut locations and the corresponding design details is presented in Table 6.4.

Table 6.4 Summary of numerical models/locations where cuts may encounter groundwater

Cut ID	Model section, chainage (km)	Model section ground elevation (m AHD)	Model section cut elevation (m AHD)	Maximum cut depth (m BGL)	Estimated median groundwater elevation at cut (m AHD)	Estimated depth of cut below the median groundwater elevation (m)*
310-C07	Ch 61.0 km	325.0	309.05	15.9	312.9	3.8
310-C08	Ch 62.4 km	314.0	298.2	15.8	294.9	NA
310-C23	Ch 114.65 km	364.1	452.1	12.0	453.8	1.7
310-C24	Ch 116.0 km	474.8	463.8	10.9	459.5	NA
310-C31	Ch 176.35 km	583.3	560.1	23.2	559.8	NA
310-C34	Ch 179.9 km	592.5	571.1	21.4	564.9	NA
310-C39	Ch 193.75 km	495.6	480.4	15.2	480.2	NA

Table notes:

NA – Modelled cut does not intercept groundwater

* - Typical case

There are inherent uncertainties in the adoption of any numerical modelling, as the process involves development of a simplified representation of a real system. Sensitivity analysis was incorporated into the methodology to account for potential uncertainties in the 2-D modelling, such as heterogenous geological conditions, variable aquifer characteristics (as encountered in the alluvium and MRV), wet and average climatic conditions, and the paucity of location-specific data.

The predictions generated by numerical models are not unique and multiple combinations of setups and parameters can achieve reasonable sensitivities when calibration data is limited. Sensitivity analysis was performed to compare model outputs with different sets of reasonable parameter estimates to allow for more accurate predictions. Sensitivity analysis also tested the robustness of the model to changes in parameters. As part of the sensitivity analysis the below parameters were adjusted to simulate an upper level or 'worst case' scenario:

- The estimate of expected hydraulic conductivity (K) of model layers was increased by one order of magnitude
- Annual rainfall recharge was doubled to account for potential extreme weather events (i.e. 1 per cent of mean annual rainfall was increased to 2 per cent)
- Groundwater level was increased by 3 m for alluvial aquifers and 5 m for the MRV. These groundwater level increases were adopted based on review groundwater level response exhibited at projects bores following a significant rainfall event.

The predictive models developed are considered an initial assessment of the Project on groundwater resources. Due to these known uncertainties, the numerical models are considered to be Class 1 (Barnett et al. 2012), which is defined as having a high degree of uncertainty. However, the numerical simulations undertaken for this assessment are considered to be suitable for developing coarse relationships between groundwater seepage rates and associated impacts as the impacts on groundwater from the Project are expected to be limited due to the depth of groundwater typically reported below the maximum cut depth. Revision of the modelling of deep cuts may be required through the detailed design process to confirm potential drawdown and seepage rates and ensure that appropriate controls are adopted as part of the design.

6.3.2 Available data and hydraulic parameters

Hydraulic properties for the hydrogeological units intercepted were adopted from the previous assessment undertaken (Golders, 2019c). These aquifer hydraulic properties were interpreted from aquifer hydraulic conductivity tests undertaken as part of the reference design geotechnical investigation in the form of variable head (slug) tests. The adopted aquifer hydraulic properties were reviewed against the results of additional aquifer testing conducted as part of the baseline groundwater monitoring program.

Table 6.5 presents the aquifer hydraulic conductivity values assigned to each model layer based on the results of the previous assessment and the site-specific slug test results.

Table 6.5 Hydraulic conductivity parameters (in m/s)

Cut ID	Model section, chainage (km)	Layer 1		Layer 2	
		Typical	Upper	Typical	Upper
310-C07	Ch 61.0 km	1.0×10^{-8}	1.0×10^{-7}	3.7×10^{-9}	3.7×10^{-8}
310-C08	Ch 62.4 km	1.0×10^{-8}	1.0×10^{-7}	3.7×10^{-9}	3.7×10^{-8}
310-C23	Ch 114.65 km	1.0×10^{-8}	1.0×10^{-7}	3.7×10^{-9}	3.7×10^{-8}
310-C24	Ch 116.0 km	1.0×10^{-8}	1.0×10^{-7}	7.0×10^{-7}	7.0×10^{-6}
310-C31	Ch 176.35 km	1.0×10^{-8}	1.0×10^{-7}	7.0×10^{-7}	7.0×10^{-6}
310-C34	Ch 179.9 km	1.0×10^{-8}	1.0×10^{-7}	7.0×10^{-7}	7.0×10^{-6}
310-C39	Ch 193.75 km	1.0×10^{-8}	1.0×10^{-7}	7.0×10^{-7}	7.0×10^{-6}

Table notes:

Hydraulic conductivity values are in metres per second (m/s)

Assumed anisotropy 0.1 for all layers

6.3.3 Model assumptions

A groundwater model is a simplified representation of the real environment, and as such, assumptions are required to simplify aspects and meet the objectives of the predictive modelling, particularly in instances of limited data. Objectives of the numerical modelling were to identify the seepage into cuts and drawdown as a result of Project works. The Upper (Wet) case is based on a 'wet' scenario representative of high rainfall recharge, increased hydraulic conductivity parameters and subsequent elevated groundwater level. If these wet conditions are encountered, the elevated seepage rates would be periodic and temporary. Further, these predictions do not consider any treatment of cuts or management measures as is generally industry standard.

The following assumptions were made in order to develop the models for the Project, for the model scenarios, as follows.

Assumptions for all models:

- It was assumed that pumping/extraction from bores and watercourses nearby will not have an impact on the calculated pressure distributions (groundwater levels). This allows for uninfluenced predictions of groundwater flow/seepage to be determined
- At the modelled locations, 1 per cent of the annual rainfall (650 mm/year) was assigned to the upper model surface as boundary condition for the typical scenario, while 2 per cent of the assumed annual rainfall (650 mm/year) was assigned to the upper model surface as boundary condition for the 'wet' scenario.

Upper range (conservative) model assumptions:

- The estimate of expected hydraulic conductivity (K) of model layers (Table 6.5) was increased by one order of magnitude
- Estimated assumed rainfall rate was doubled to inform upper range recharge values (as above)
- Expected groundwater elevation estimates at the right and left side of the model sections (Section 6.3.4) were increased by 3 m for alluvial aquifers and 5 m for the MRV.

6.3.4 Boundary conditions

Boundary conditions represent locations in the model where water flows into or out of the model region due to external factors. These external factors can include lakes, streams, recharge, and wells.

The boundary conditions applied to the model sections are discussed in the subsections below.

6.3.4.1 Water levels

To determine groundwater level boundary conditions for the models, static water levels versus ground elevation were plotted to establish the correlation between these two parameters. The result was used to assess the constant head (water level) boundary condition which was then assigned to the left and right side (boundary of assessment) for each 2-D model section, based on local topography.

These correlation plots are presented below in Figure 6.4 (all units combined), Figure 6.5 (WCM), and Figure 6.6 (MRV).

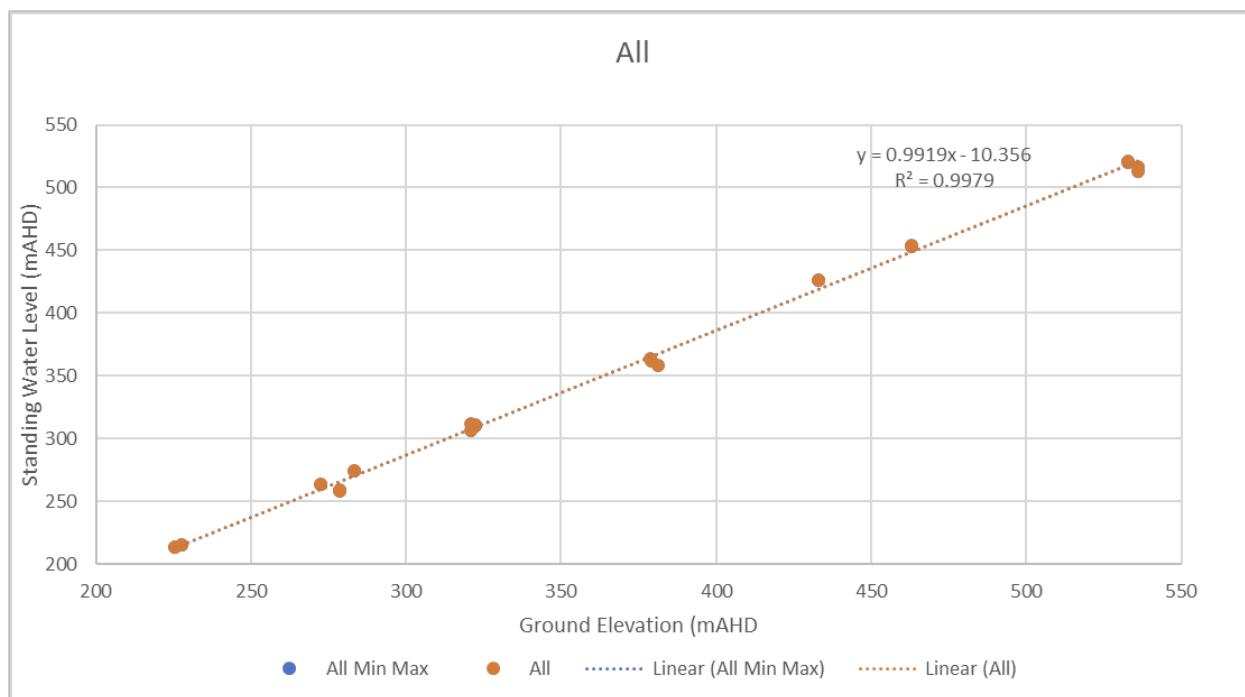


Figure 6.4 Correlation between ground surface elevation and static water level (all units)

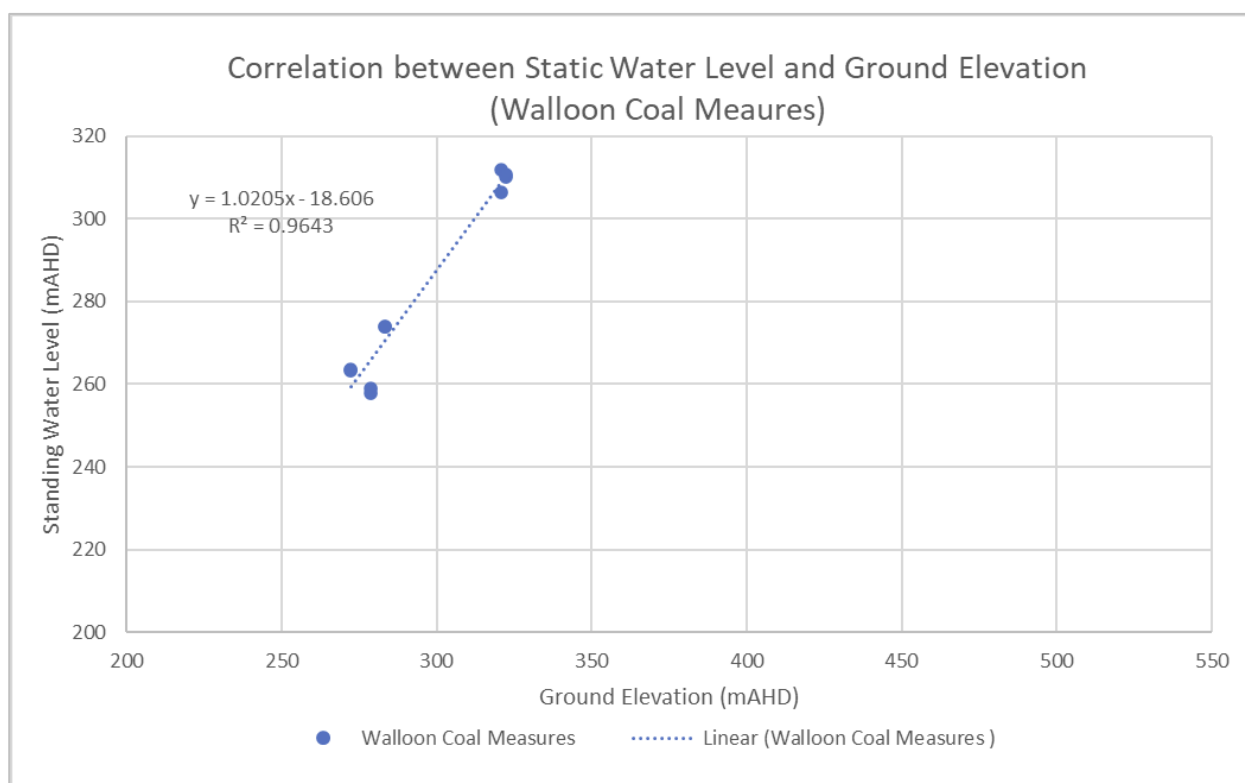


Figure 6.5 Correlation between ground surface elevation and static water level (WCM)

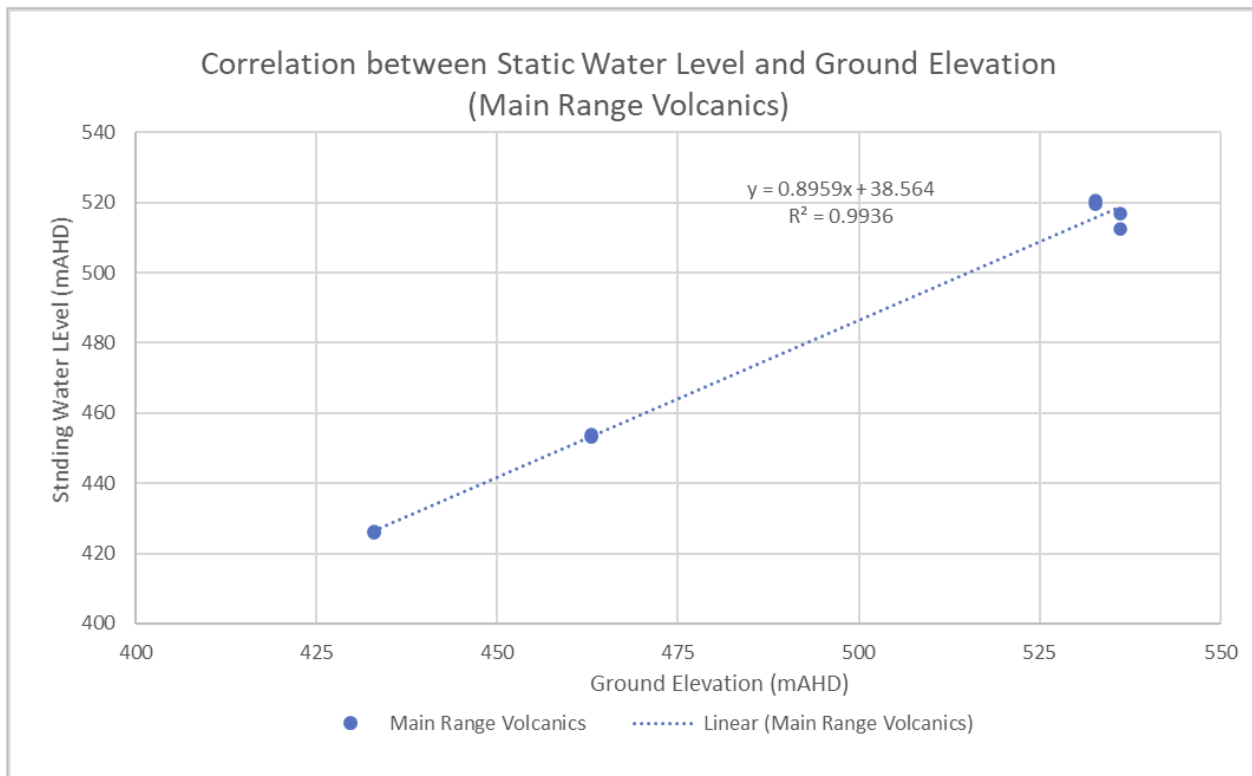


Figure 6.6 Correlation between ground surface elevation and static water level (MRV)

6.3.4.2 Rainfall

Annual rainfall of 650 mm/year was applied for the typical model scenario, with 1 per cent of this rainfall assigned to the upper model surface as a boundary condition.

For the upper (wet) range model scenario the rainfall recharge amount was doubled, with 2 per cent of 650 mm/year applied to the upper model surface as a boundary condition.

6.3.4.3 Seepage face

Seepage face boundary conditions was assigned to cut surfaces for all model scenarios.

Figure 6.7 through Figure 6.13 depict the geometry and boundary conditions for the seven predictive models at the selected representative cuts.

Note for all plates: red dots are the constant head boundary conditions on the left and right sides of the model; blue is rainfall on top of the model; light blue is the seepage face.

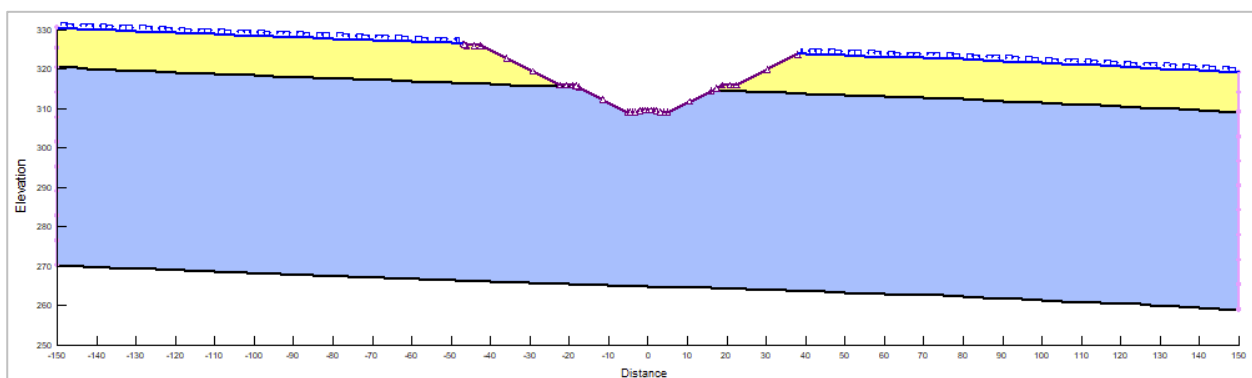


Figure 6.7 Geometry and boundary conditions at Ch 61.0 km (cut 310-C07)

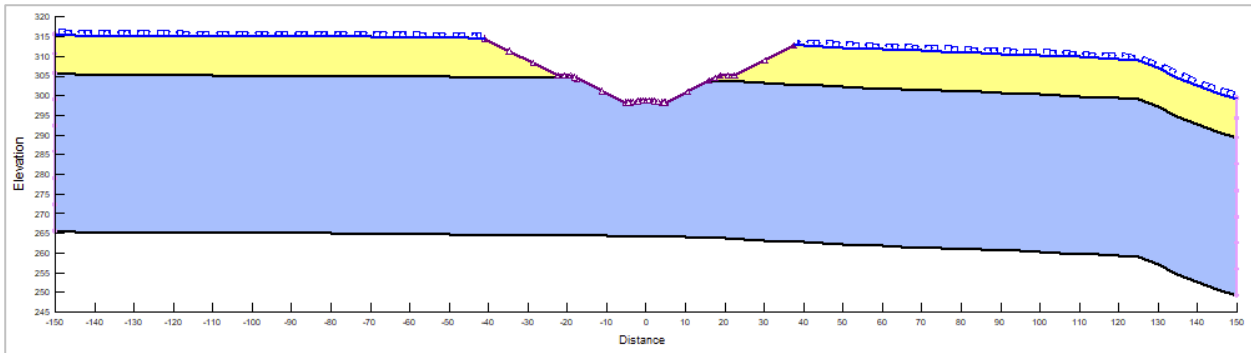


Figure 6.8 Geometry and boundary conditions at Ch 62.4 km (cut 310-C08)

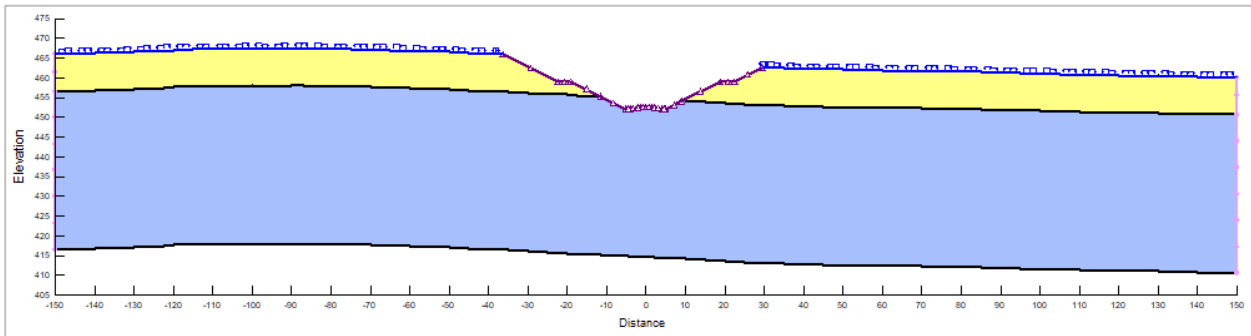


Figure 6.9 Geometry and boundary conditions at Ch 114.6 km (cut 310-C23)

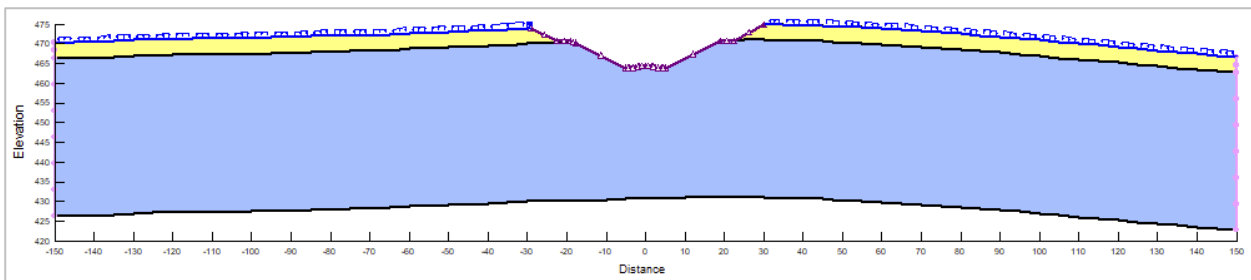


Figure 6.10 Geometry and boundary conditions at Ch 116.0km (cut 310-C24)

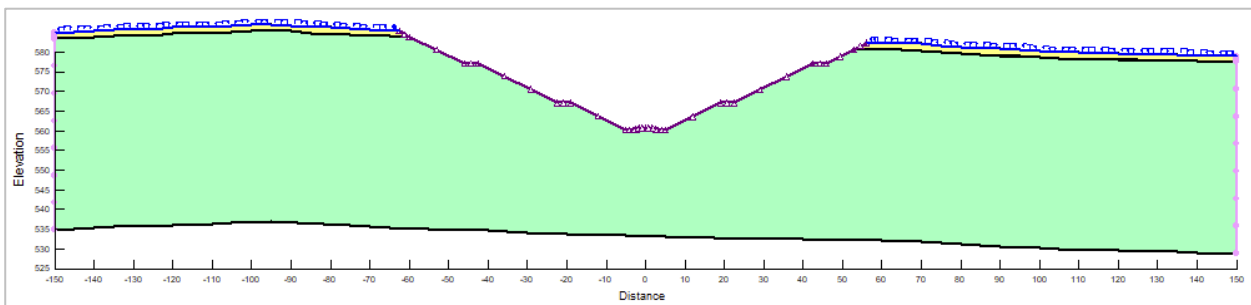


Figure 6.11 Geometry and boundary conditions at Ch 176.35 km (cut 310-C31)

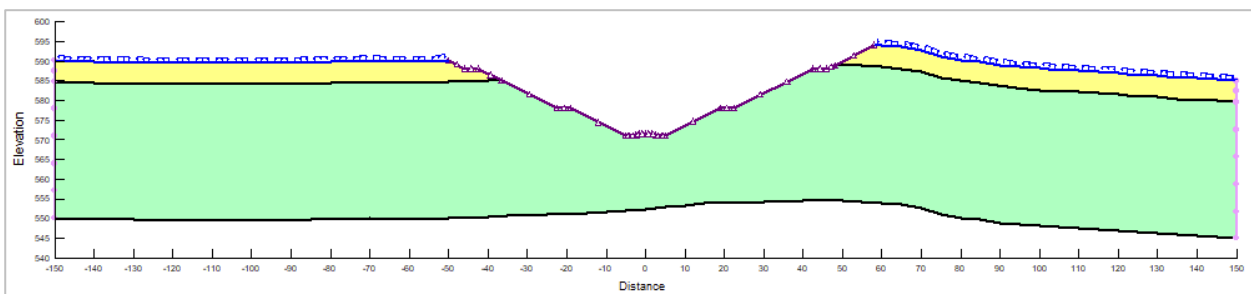


Figure 6.12 Geometry and boundary conditions at Ch 179.9 km (cut 310-C34)

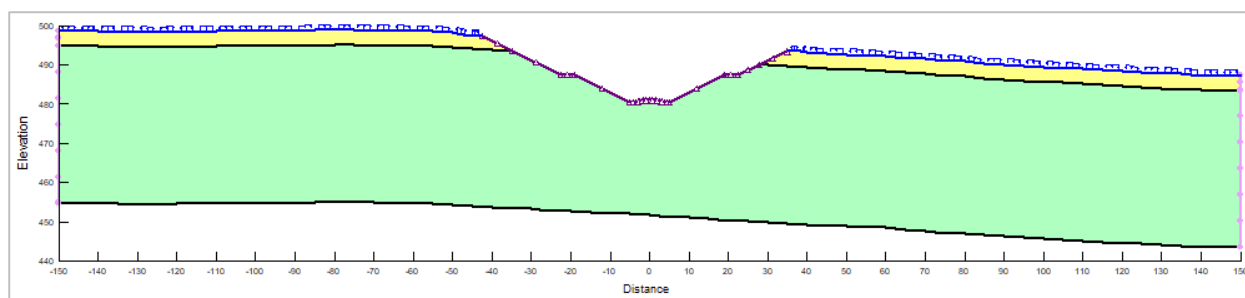


Figure 6.13 Geometry and boundary conditions at Ch 193.75 km (cut 310-C39)

6.3.5 Model results

6.3.5.1 Seepage rate estimates

Seepage rate estimates were obtained for the entire length of each deep cut, through the multiplication of modelled seepage rates by the total length of the deep cut, as specified in Table 6.2. As the modelled cross sections were developed to represent a worst-case scenario at a location with the highest potential to intersect groundwater, extrapolation of the resulting seepage rates across the entirety of the cut is considered to result in conservative estimates.

The estimated seepage results are presented in Table 6.6.

Table 6.6 Seepage estimates to cuts based on predictive modelling

Cut ID	Model section, chainage (km)	Cut length (m)	Typical		Upper (wet case)	
			Model section (m ³ /year)	Entire cut (m ³ /year)	Model section (m ³ /year)	Entire cut (m ³ /year)
310-C07	Ch 61.0 km	450	0.14	62.8	1.37	617.8
310-C08	Ch 62.4 km	550	0.0003	0.2	0.0006	0.3
310-C23	Ch 114.65 km	250	0.17	42.6	1.39	347.4
310-C24	Ch 116.0 km	750	0.08	58.1	0.29	223.2
310-C31	Ch 176.35 km	1,300	0.000004	0.7	56.1	72,902.3
310-C34	Ch 179.9 km	1,600	0.0	0.0	0.0	0.0
310-C39	Ch 193.75 km	2,350	0.285	670.9	81.2	190,783.3

Predictive simulations indicate:

- Seepage is concentrated at the bottom of the cuts, on both sides of infill material
- Temporary increases in seepage may be observed in cuts with sandy soil or weathered sandstone following rainfall events
- Seepage of groundwater from bedrock is anticipated to be low except where it was enhanced by weathering of fractures.

Estimated seepage rates, as included in Table 6.6, are generally low for the typical (base case) scenario with seepage rates ranging from 0.0 m³/year (310-C34) to 670.9 m³/year (310-C39), which equates to 0.02 L/s.

The Upper (wet) case range values (most conservative) range from 0.0 m³/year (cut 310-C34) to ~191,000 m³/year (cut C310-C39) which equates to 6.0 L/s. It is noted that this upper case is based on a 'wet' scenario representative of high rainfall recharge, increased hydraulic conductivity parameters and subsequent elevated groundwater level. If these wet conditions are encountered, the elevated seepage rates would be periodic and temporary directly following a large weather event (cyclone) or climatic event (wet season with heavy flooding). These predictions do not consider any treatment of cuts or management measures, as is generally industry standard, that will be applied for the Project.

6.3.5.2 Drawdown

The predicted groundwater drawdown resulting from the seepage rate estimates for the typical and upper scenario are presented in Table 6.7. It is noted that whilst both typical and upper estimates are presented, the upper scenario has been applied for impact assessment as a conservative measure.

Groundwater drawdown is predicted to occur at three of the seven deep cut modelled locations for the upper scenario, cuts 310-C07, 310-C23, and 310-C39. At these locations, the maximum predicted extent of drawdown ranges from 10 m to 43 m from the rail centreline, and all drawdown is wholly contained within the Project footprint. In these locations, there are no known bores located within the extent of predicted drawdown.

The predicted extent of drawdown (upper) at cuts 310-C07, 310-C23, and 310-C39 are shown on Figure 6.14, Figure 6.15 and Figure 6.16.

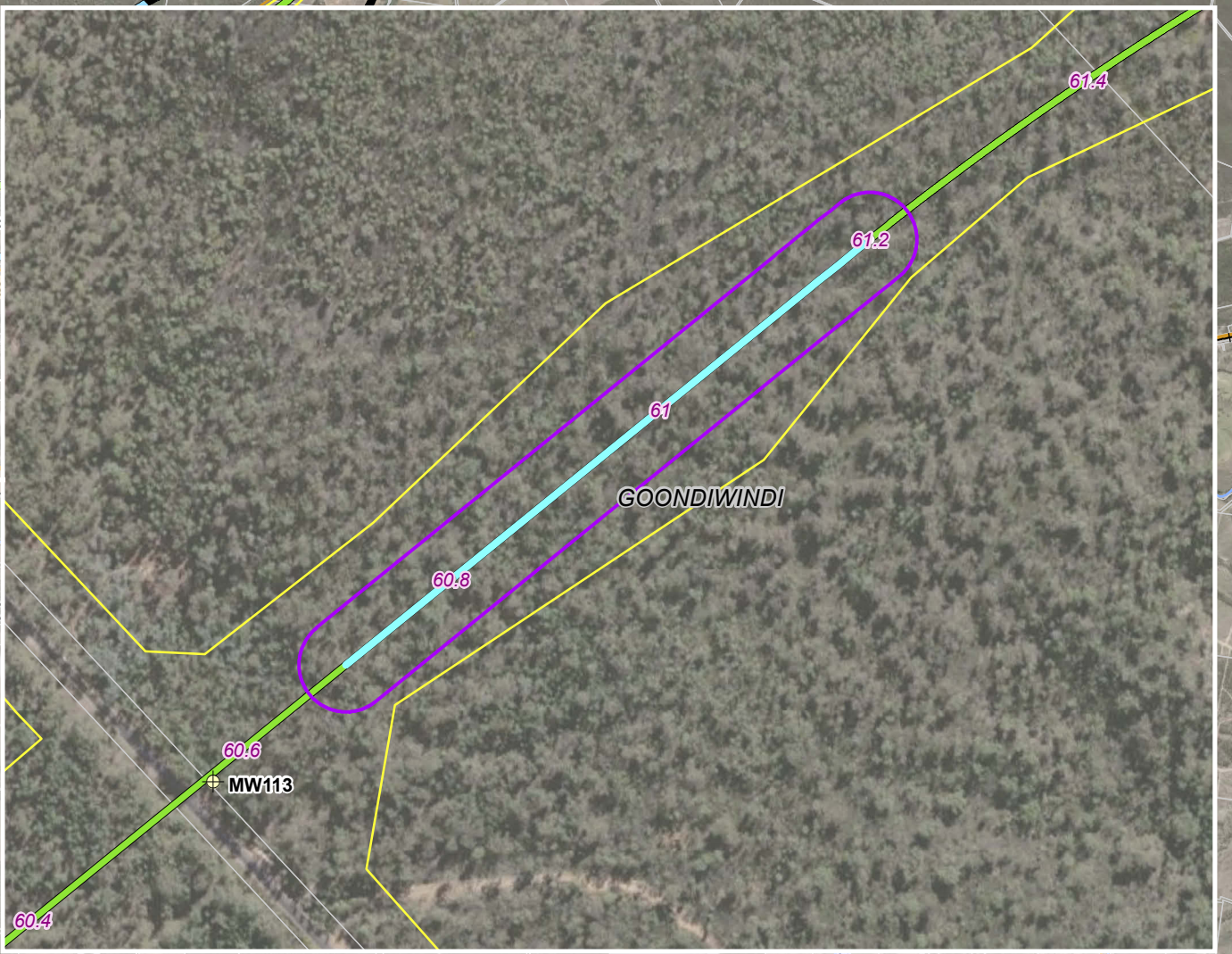
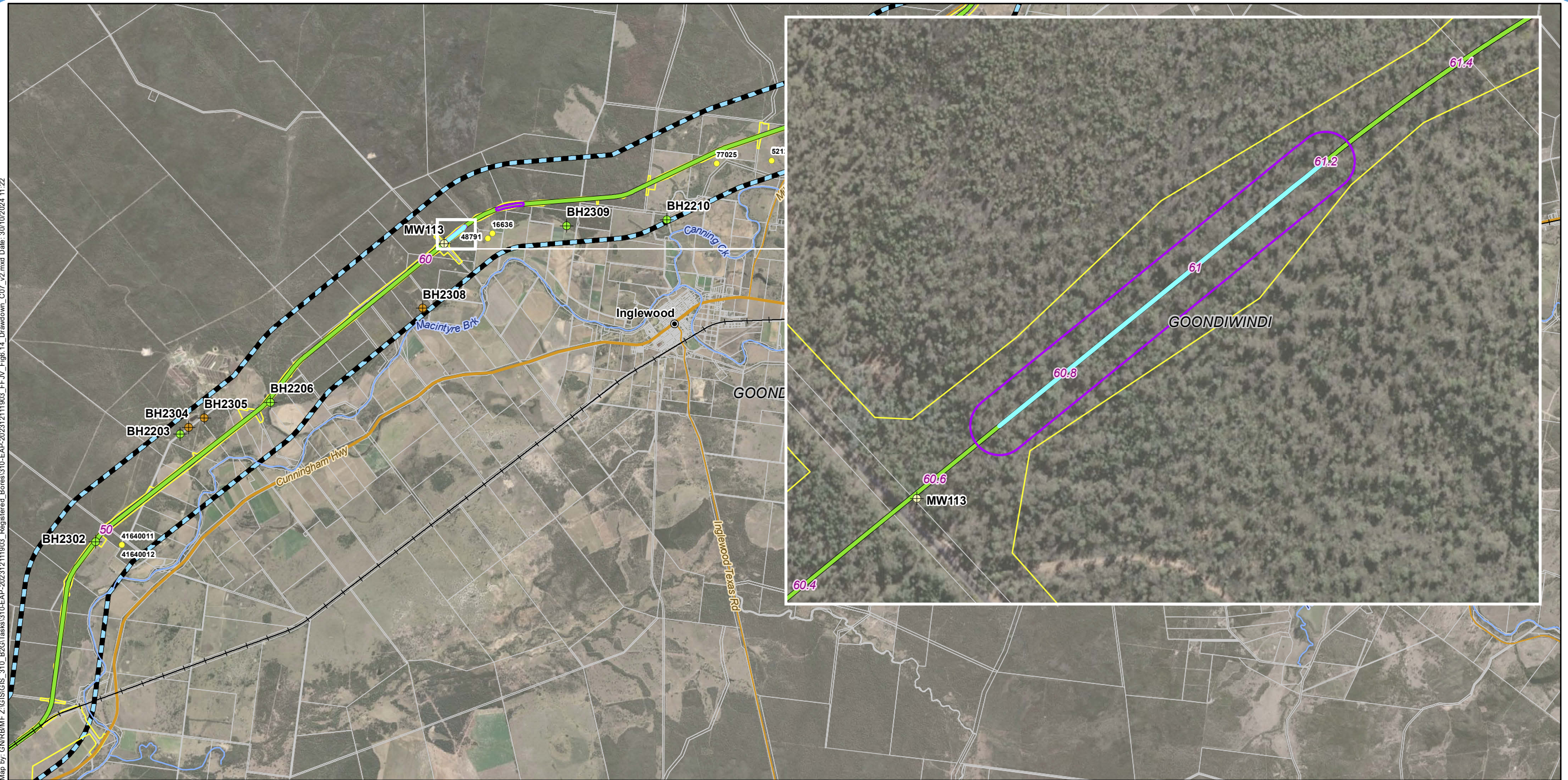
Table 6.7 Predicted drawdown values at modelled cuts

Cut ID	Modelled section location (chainage) (km)	Estimated drawdown at rail centreline (m)		Extent of drawdown from centreline (m)		Extent of impact within footprint?
		Typical	Upper	Typical	Upper	
310-C07	Ch 61.0 km	4.0	8.8	NA	32-35	Yes
310-C08	Ch 62.4 km	<1.0	1.8	NA	NA	Yes
310-C23	Ch 114.65 km	1.7	6.7	NA	32-43	Yes
310-C24	Ch 116.0 km	<1.0	<1.0	NA	NA	Yes
310-C31	Ch 176.35 km	<1.0	2.65	NA	NA	Yes
310-C34	Ch 179.9 km	<1.0	<1.0	NA	NA	Yes
310-C39	Ch 193.75 km	<1.0	2.6	NA	10-15	Yes

Table notes:

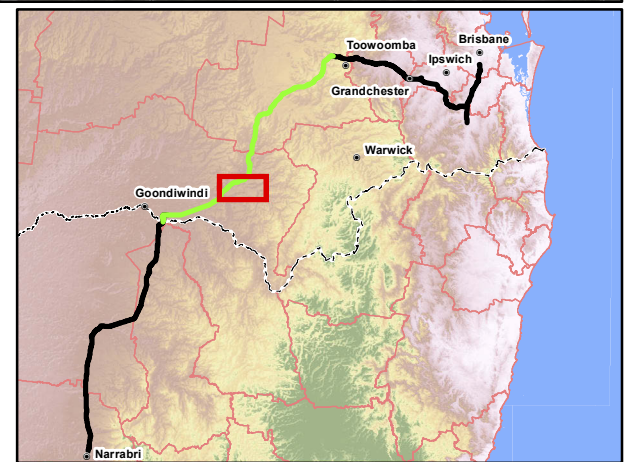
NA – No drawdown from centreline predicted

Map by: GNR/BMF Z:\GIS\GIS_310_B2G\Task\310-EAP-2023\12111903_Registered_Bores\310-EAP-2023\12111903_FF_IV_Fig 6.14_Draindown_C07_v2.mxd Date: 30/10/2024 11:22



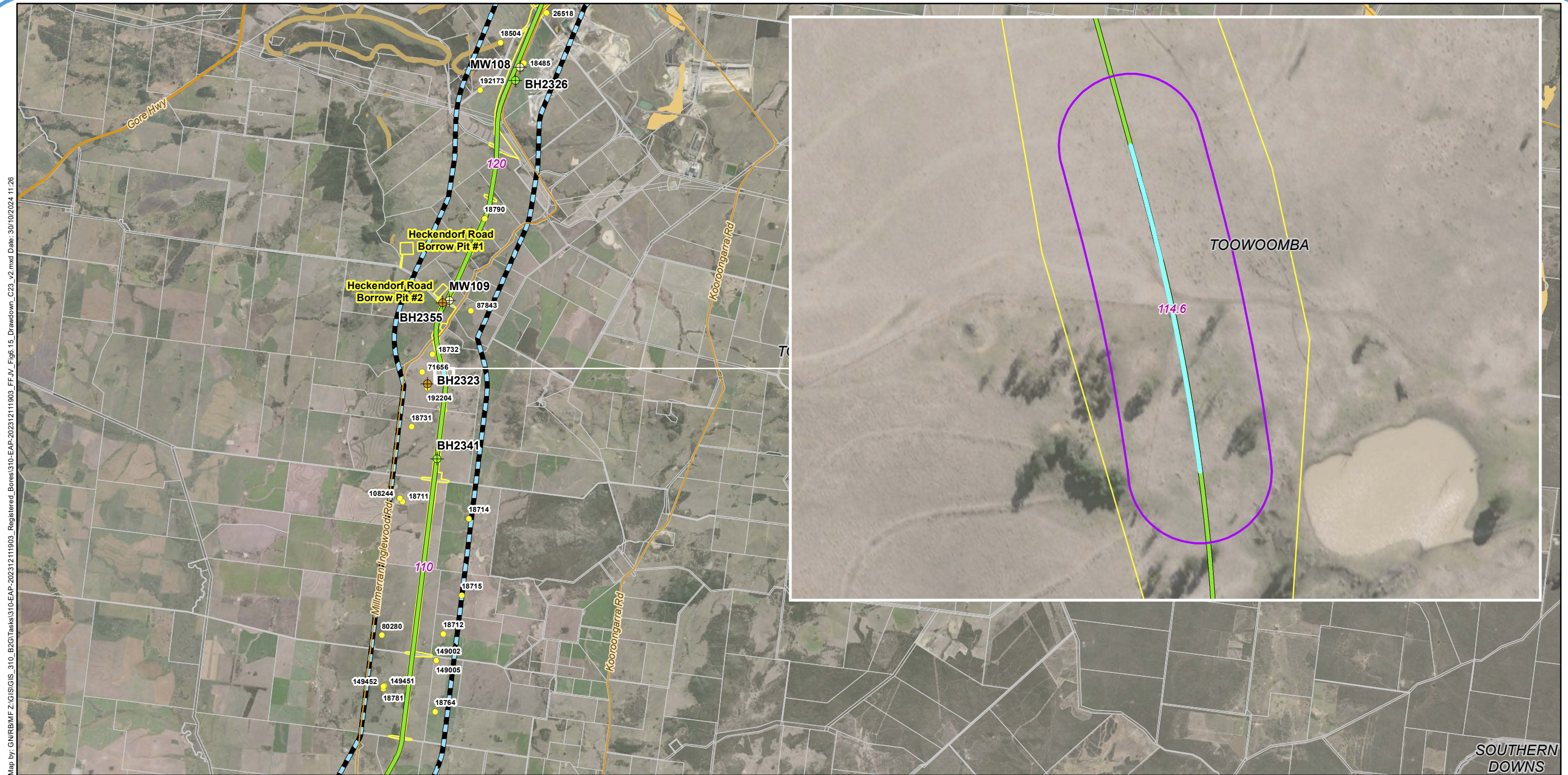
Legend

- | | | |
|-----------------------------------|-----------------------------|------------------------------------|
| 5 Chainage (km) | Cut 310-C07 | Modelled drawdown extent |
| Localities | Border to Gowrie alignment | Groundwater impact assessment area |
| Registered bores | Existing rail (operational) | Cadastre |
| Existing site investigation bores | Major roads | Local Government Areas |
| Former site investigation bores | Minor roads | Impact assessment area |
| New site investigation bores | Watercourses | Temporary footprint |



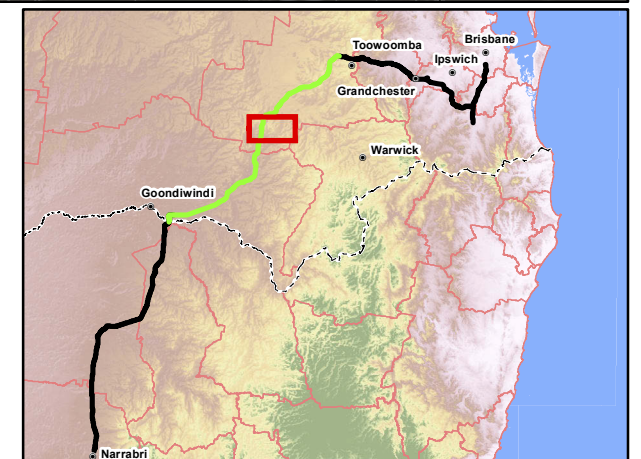
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0 1 2 3 4 5 km

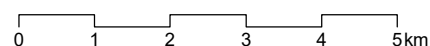


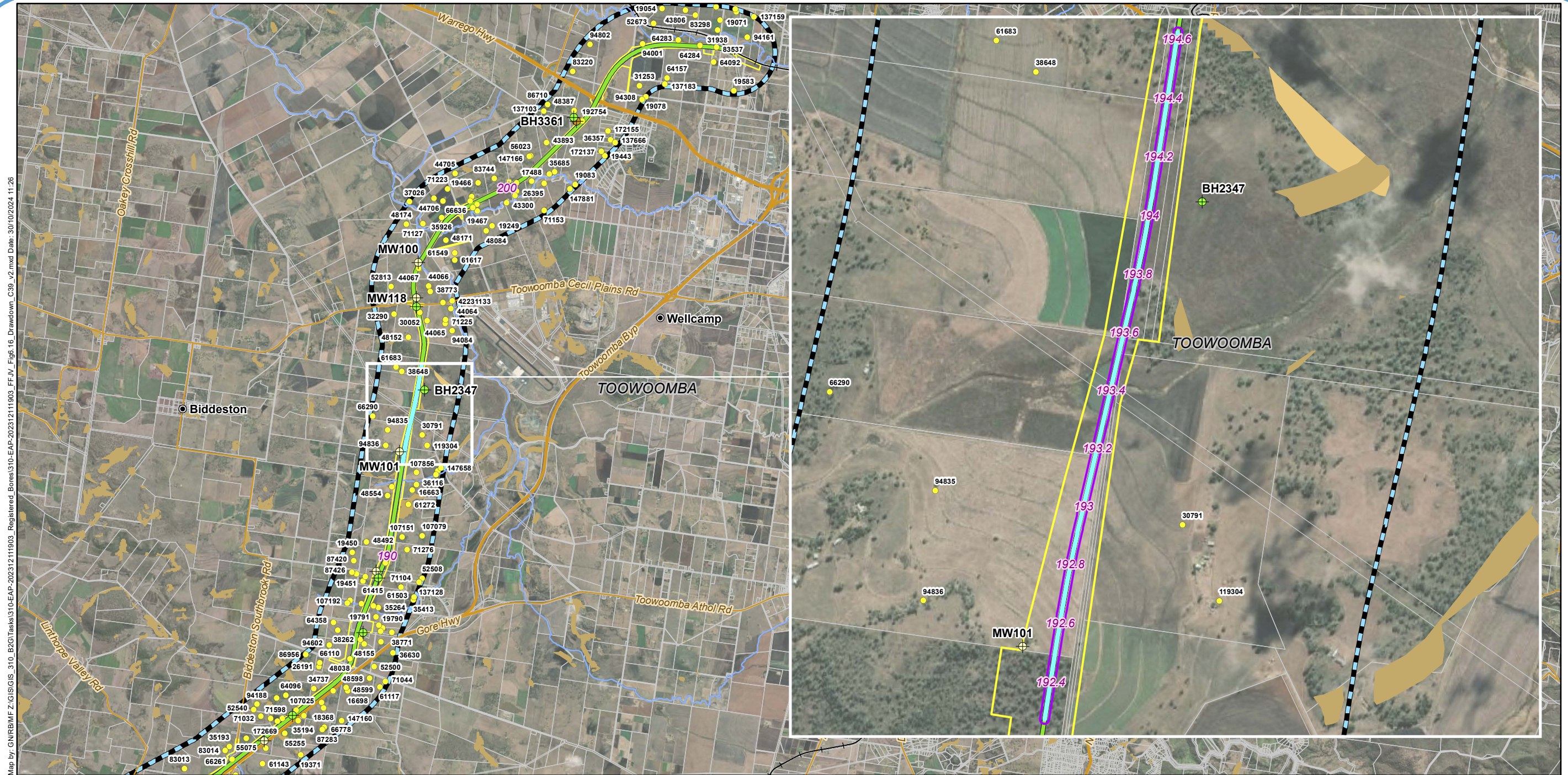
Legend

- | | | | |
|-----------------------------------|----------------------------|------------------------------------|-------------------------|
| 5 Chainage (km) | Cut 310-C23 | Modelled drawdown extent | Terrestrial GDEs |
| Existing site investigation bores | Border to Gowrie alignment | Groundwater impact assessment area | High potential GDE |
| Former site investigation bores | Major roads | Cadastre | Moderate potential GDE |
| New site investigation bores | Minor roads | Local Government Areas | Low potential GDE |
| Registered bores | Watercourses | Impact assessment area | |
| | | Temporary footprint | |



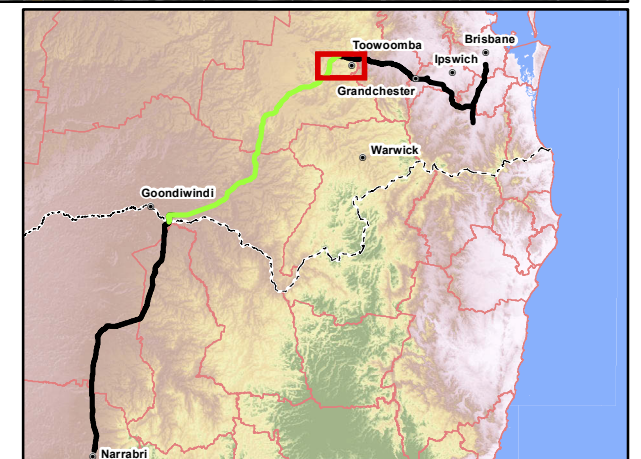
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Legend

- | | | | |
|-----------------------------------|-----------------------------|------------------------------------|-------------------------|
| 5 Chainage (km) | Cut 310-C39 | Modelled drawdown extent | Terrestrial GDEs |
| Localities | Existing rail (operational) | Border to Gowrie alignment | |
| Existing site investigation bores | Major roads | Groundwater impact assessment area | |
| Former site investigation bores | Minor roads | Cadastre | |
| New site investigation bores | Watercourses | Local Government Areas | High potential GDE |
| Registered bores | | Impact assessment area | Moderate potential GDE |
| | | Temporary footprint | Low potential GDE |



A3 scale: 1:100,000

0 1 2 3 4 5km

6.3.5.3 Operations stage (residual) seepage and drawdown

Slope protection treatments in accordance with the QR *Civil Engineering Standard QR-CTS-Part 35 – Stone and Concrete Slope Protection* (2010), may be required following the excavation of cuts. It is anticipated that the method of slope protection will be determined during the detailed design stage and will be dependent on the substrate material, the height and angle of the cut, plus the depth of groundwater intersected within the cut. For the purpose of this indicative modelling to evaluate groundwater conditions during the rail operations, it is assumed that cut slopes (batters) will be finished with shotcrete (concrete).

Where necessary, the slope protection measures may include vertical drains and weep holes in accordance with ARTCs *Earthworks Construction Specification* (ETC-08-04) (2019). Whilst the weep holes and drains are considered an engineering control, and not specifically a seepage mitigation measure, they are anticipated to manage seepage from the cut faces. Groundwater seepage and direct rainfall will be channelled from the cut face via the drain and/or weep holes to the base of the cut, where it will be transported via bench drains and water is expected to be lost through evaporation, eventual transpiration, and/or infiltration (groundwater/recharge).

To estimate operational ('residual') seepage and post-construction groundwater levels (drawdown extent after construction), seepage modelling was again conducted. The modelling included the following parameters, that were applied to each model section to simulate an operational or 'residual' scenario:

- Impermeable barrier placed along the seepage face to simulate shotcrete
- 'Seepage holes' to simulate drains or weep holes, which are near horizontal, incised (2 m) into the rock face starting at 0.6 m above the base of cut (as per the QR standard)
- Additional seepage holes were added, above the bottom seepage holes set at 0.6 m above the base of the cut, at even spacing up to the top of the predicted groundwater level. This allows for seepage through the face to prevent long-term groundwater mounding against the shotcrete.

As the unmitigated 'construction works stage' modelling results (Section 6.3.5.2) indicate that drawdown is only expected to occur at three of the modelled cut locations, being 310-C07, 310-C23, and 310-C39, only these cuts were selected for the operational scenario. The above parameters were applied to these deep cutting cross sectional models to aid with assessing residual, post-construction (operation stage) seepage.

Figure 6.17 through Figure 6.19 depict the geometry, boundary conditions and number of seepage holes required for the three 'operational' predictive models at the selected cuts.

Note for all plates: pink dots are the constant head boundary conditions on the left and right sides of the model; blue dots are rainfall on top of the model; blue shading is the groundwater level or phreatic surface, blue line is the seepage face, the reddish purple are the simulated 'seepage holes'.

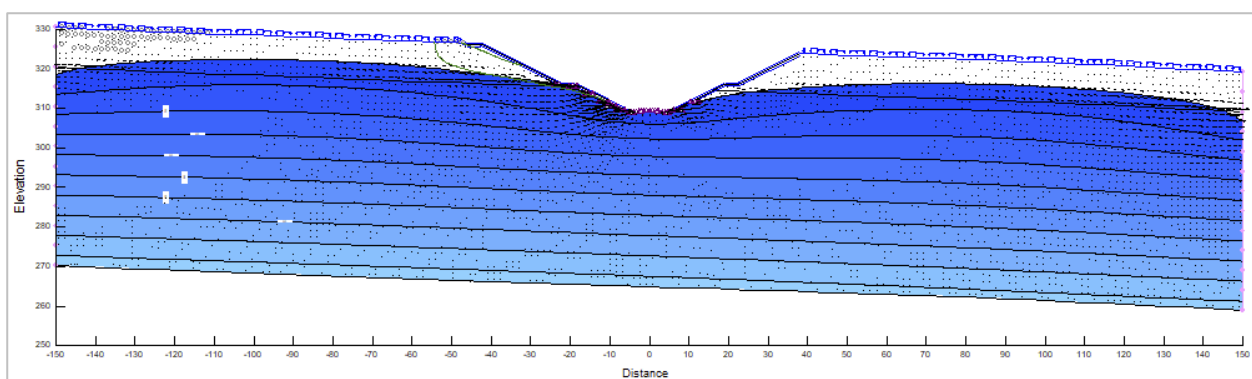


Figure 6.17 Model cross-section at Ch 61.0 km (cut 310-C07)

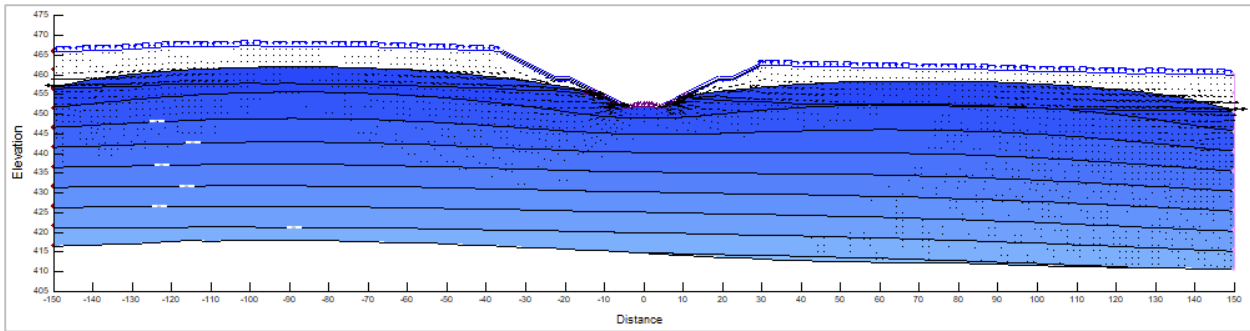


Figure 6.18 Model cross section at Ch 114.6 km (cut 310-C23)

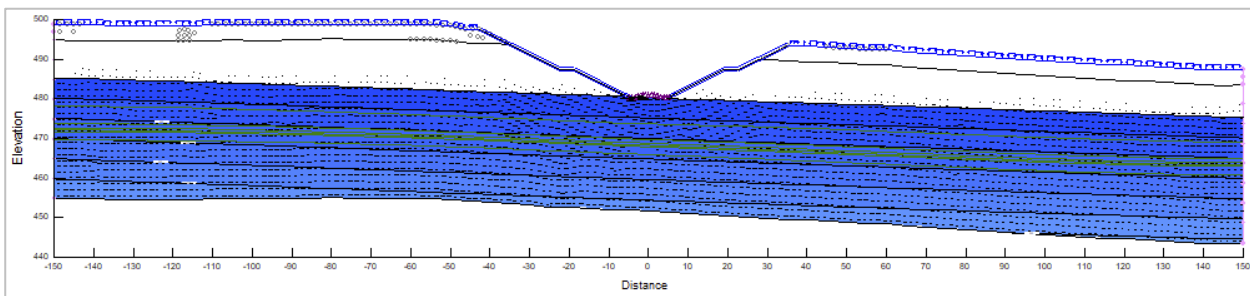


Figure 6.19 Model cross section at Ch 193.75 km (cut 310-C39)

Figure 6.20 shows an example of the model seepage face at 310-C07 with the ‘seepage holes’ acting as designed to retain the phreatic surface away from the shotcrete face.

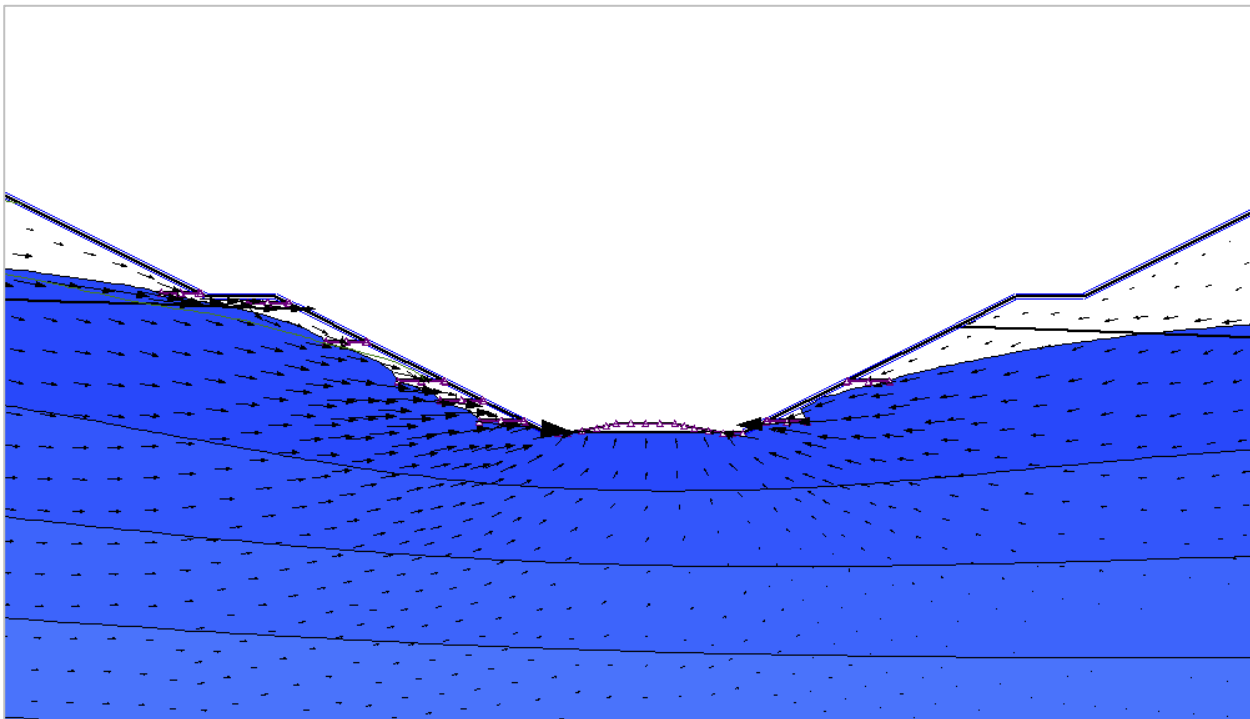


Figure 6.20 Model seepage face at Ch 61.0 km (cut 310-C07)

The predicted operational seepage estimates required to mitigate possible long-term groundwater mounding (and pressure) for the base case are presented in Table 6.8. It is noted that an upper (wet) case was not required as seepage will be maintained at the rate allowed by the weep or drain holes. Seepage rates are noted to increase marginally from that of the ‘construction’ unmitigated scenario as a result of the reduction of evaporation from the exposed cut face and the effectiveness of the drains.

Table 6.8 Operational seepage estimates for cuts based on predictive modelling

Cut ID	Model section, chainage (km)	Cut length (m)	Typical		Water Plan and management area
			Model section (m ³ /year)	Entire cut (m ³ /year)	
310-C07	Ch 61.0 km	450	0.16	70.9	Water Plan (Border Rivers and Moonie) 2019, underground management area
310-C23	Ch 114.65 km	250	0.20	50.0	Water Plan (GABORA) 2017), not applicable for alluvium
310-C39	Ch 193.75 km	2,350	0.20	469.6	Water Plan (Condamine and Balonne) 2019, underground water management area, sub area Toowoomba City Basalts

The predicted drawdown resulting from the operational scenario (typical case) are presented in Table 6.9. It is noted that periodic and temporary groundwater mounding is anticipated to occur within the cut behind the drain or weep holes following significant rainfall events and is unlikely to induce drawdown.

Table 6.9 Predicted operational drawdown values at modelled cuts

Cut ID	Modelled section chainage (km)	Estimated drawdown at rail centreline (m)	Extent of drawdown from centreline (m)	Aquifer being impacted	Extent of impact – within footprint (Y/N)
310-C07	Ch 61.0 km	3.80	11	WCM	Yes
310-C23	Ch 114.65 km	1.71	0	CA	Yes
310-C39	Ch 193.75 km	0.02	0	MRV	Yes

Modelling results indicate that operations stage drawdown is predicted (above negligible) to occur at one of the three modelled deep cut locations, cut 310-C07. At this location, the extent of drawdown is predicted to extend up to 11 m from the rail centreline and remain wholly within the Project footprint. The predictive models will be updated as more site-specific information is ascertained through the detailed design stage. It is expected the updated models will be utilised to inform of any required secondary approvals for residual groundwater management for seepage/inflows (i.e. water licence or entitlement as prescribed by relevant Water Plan). Currently no unallocated underground water exists for the CA and MRV.

6.3.5.4 Seepage water quality

Of the proposed cuts along the alignment, seven are considered possible to intercept groundwater. Groundwater EC at these locations has been inferred from Golder 2019c and the reviewed against the subsequent baseline monitoring data, while the pH range has been derived from the minimum and maximum values for each unit from the baseline monitoring data. The cut names, chainage, estimated groundwater level, electrical conductivity, pH, and assumed water bearing geology are presented in Table 6.10.

Table 6.10 Estimated groundwater quality at cut locations anticipated to intercept groundwater

Cut ID	Cut chainage (km)	Estimated groundwater level range at cut model section (m AHD)*	Unit	EC (µS/cm)	pH (pH units)
310-C07	60.7 to 61.2	307.1 to 318.6	WCM	306.7	5.5 to 7.3
310-C08	62.1 to 62.7	286.7 to 303.3	WCM	262.8	5.5 to 7.3
310-C23	114.5 to 114.7	450.8 to 456.8	Alluvium/WCM	448.2	5.5 to 7.6
310-C24	115.8 to 116.5	457.7 to 461.2	Alluvium/WCM	460.1	5.5 to 7.6
310-C31	175.4 to 176.7	557.1 to 562.5	MRV	551.6	6.6 to 8.0
310-C34	178.85 to 180.45	562.6 to 567.7	MRV	572.1	6.6 to 8.0
310-C39	193.55 to 195.90	475.2 to 485.2	MRV	454.0	6.6 to 8.0

Table note:

* Base case

7 Potential impacts

7.1 Construction

Construction for the Project includes several activities which have the potential to impact on groundwater resources. These activities include site preparation, bulk earthworks (cut and fill sections), drainage construction, haul road and access track construction, operation and maintenance of heavy machinery and bridge piling installation.

The location of these proposed activities along the Project alignment are presented on Figure 6.1. These potential impacts are discussed below in terms of impacts on groundwater resources and quality. Mitigation measures to minimise impacts on groundwater during the construction works stage are provided in Section 8.

7.1.1 Activities impacting on groundwater resources

7.1.1.1 Site clearing and grading

Site clearing and grading activities could potentially impact on shallow groundwater resources due to:

- Removal of vegetation reduces evapotranspiration, which can influence the groundwater recharge/discharge mechanisms or water balance (i.e. result in higher groundwater levels)
- Compaction of ground resulting in reduced groundwater recharge
- Alteration of possible existing areas where ponding surface water occurs naturally, which could reduce groundwater recharge in these areas.

EVs with potential to be impacted include; aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, industrial and cultural and spiritual values.

The Project footprint has been delineated to include the minimum extent of land required to construct and operate the Project safely and efficiently. The Project alignment has also been selected to maximise the use of existing rail corridor, where possible. As a consequence, approximately one third of the total Project alignment is located in existing rail corridor. The total area proposed to be cleared and graded for construction purposes limited in comparison to the total recharge surface area of the alluvial aquifers which underlay the Project. Consequently, negligible impact on the groundwater resources due to site clearing and grading activities is expected.

7.1.1.2 Loss or damage to existing groundwater bores, including restriction of access

Existing groundwater bores within the Project footprint are likely to be decommissioned to enable construction and operation of the Project. Groundwater bores that are not decommissioned may be damaged or become inaccessible due to temporary or permanent Project activities.

EVs with potential to be impacted include; irrigation, stock water, farm supply/use, drinking water and industrial.

Thirty-eight registered bores that are not Project bores are located within the Project footprint. A further three unregistered groundwater bores have been identified through the bore survey. It is anticipated that each of these bores, will need to be decommissioned to enable construction of the Project. Decommissioning of bores will be in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (Edition 4) (NUDLC, 2020). No impacts to groundwater outside the Project footprint are anticipated.

Landowners to be affected by the Project have been consulted (where the landowner was willing to participate) to confirm the location of registered bores and to establish the presence of any unregistered bores within the Project footprint to identify potential impact on such bores. Where a groundwater bore is expected to be decommissioned or have access to it impaired because of the Project, 'make good' measures shall be developed on a case-by-case basis and agreed in consultation with the affected landowner during detailed design. Consultations with affected landholders has commenced and ongoing.

Where a bore is impacted by the temporary footprint and is assessed as impaired, 'make-good' measures will be developed on a case-by-case basis and agreed in consultation with the affected landowner. An overview of the make-good process, including timing, is provided in Section 8.2.

7.1.1.3 Drawdown due to seepage

Localised drawdown of groundwater levels may occur as a consequence of seepage of groundwater through exposed cut faces that intersects the shallow groundwater. This drawdown has the potential to reduce the availability of groundwater from bores in proximity to a cut (i.e. drawdown of groundwater levels in bores proximal to a cut may reduce the available drawdown within the bore). Drawdown also has potential to impact GDEs if located within the groundwater drawdown impact extent.

EVs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, industrial and cultural and spiritual values.

As discussed in Section 6.3, predictive modelling results indicate that drawdown of the water table may be experienced at three deep cuts (i.e. C07, C23, and C39) as a result of seepage during construction (Table 6.7). The predicted extent of drawdown is wholly contained within the Project footprint. No registered bores are anticipated to be impacted by drawdown (bores located in the disturbance footprint will be decommissioned and therefore drawdown impacts at landholder bores will not be realised).

Should excessive inflows be encountered, which cannot be managed via construction environmental management techniques, a temporary water permit may be warranted. In this instance, during construction, the licenced volume is expected to be within the allowable extraction limits for the relevant Water Plan. Therefore, the Project is not expected to impact on, or alter, the identified relevant Water Plans or other plans under the Water Act outside of their designated use and objectives.

A review of the potential aquatic and terrestrial GDEs from the BoM GDE Atlas (2022) indicated that no potential aquatic GDEs are mapped in proximity to cuts where drawdown is anticipated. Further, predictive modelling results suggest drawdown will not extend outside the Project footprint.

7.1.1.4 Ground settlement

Ground settlement, due to possible dewatering or compaction through fill or embankment activities, can occur within compressible substrates (i.e. alluvium). Differential settlement can potentially damage buried services, or adjacent structures, such as embankments, culverts, and utilities.

Deep cuts, which intersect the shallow water table, have the potential to induce localised ground settlement in areas of unconsolidated compressible sediments and soil where drawdown impacts are anticipated (i.e. alluvium associated with rivers and creeks at cut C23 and cut C24). Cuts in more competent substrate, such as basalt and sandstone, have low likelihood of settlement.

7.1.1.5 Construction of new fill embankments

Establishment of new embankments may cause the obstruction of natural drainage pathways, resulting in more frequent inundation of areas upstream of the embankments. Increased inundation could enhance groundwater recharge, that can result in groundwater mounds forming beneath these areas.

Groundwater mounding may also result from the compaction of underlying soils following the addition of embankment soils. The reduction in aquifer hydraulic conductivity (permeability) can restrict groundwater throughflow, leading to the mounding of groundwater on the upgradient side of the embankment/fill (compacted substrata). In addition, groundwater level drawdown may form in areas downgradient of the compacted substrata due to reduced throughflow.

EVs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, industrial and cultural and spiritual values.

The subgrade beneath the proposed embankments (Figure 6.1) comprises primarily Cainozoic age alluvium and MRV, with some overlaying the WCM. The depth to groundwater is typically deeper than 10 m for the BRA, CA, and WCM, such that the risk of mounding as a result of altered throughflow at this depth is low.

Where embankments are located on the MRV, groundwater mounding is possible given the potential shallow depth to water within the MRV aquifer and degree of groundwater level fluctuations observed in Section 4.7.2.2.

7.1.1.6 Construction water supply

It is estimated that approximately 2,997.7 ML of construction water may be required in support of the civil earthworks during the construction program (over an approximate 4-year period). Water requirements for various activities associated with construction of the Project, including for earthworks, concrete production, and dust suppression.

An additional water demand of 6 ML is estimated to be required for dust suppression during track works. A summary of the estimated water requirement by construction activity is detailed in EIS Appendix B5: Construction Water.

The quality characteristics of water used by the Project during construction will be dependent on its intended use. The water quality requirements for the various activities associated with construction of the Project are summarised in Table 7.1.

EVs with potential to be impacted will be resultant on the final source(s) of construction water. However, irrigation, stock water, farm supply/use, industrial and drinking water have initially been identified as having potential to be impacted.

Table 7.1 Water quality requirements for construction activities

Activity	Water quality requirement
Earthworks, track works and revegetation	Specified to be of a quality that is: ■ Non-deleterious to earth fill properties ■ Consistent with the quality requirements specified for irrigation and general water use in the <i>Australia and New Zealand Guidelines for Fresh and Marine Water Quality 2018</i> ■ For recycled water, water will be: – Consistent with the quality requirements of the <i>Australian Guidelines for Water Recycling: Managing Health and Environmental Risks</i> (Phase 1) (Environment Protection and Heritage Council (EPHC), 2006), EIS Chapter 5: Project Description if water is obtained from a recycled source – Used consistent with the <i>Guideline for low-exposure recycled water schemes</i> (Queensland Health, 2001). ■ In accordance with Department of Transport and Main Road's <i>Technical Specification MRTS16: Landscape and Revegetation Works</i> (2017).
Concrete batching	Specified in ■ <i>Australian Standard (AS) 1379: Specification and supply of concrete</i> (Standards Australia, 2007) ■ <i>AS 2159: Piling – Design and installation</i> (Standards Australia, 2009) ■ <i>AS 3600: Concrete Structures</i> (Standards Australia, 2018).

Activity	Water quality requirement
Non-resident workforce accommodation	Potable water will need to achieve the quality requirements specified in the <i>Australian Drinking Water Guidelines</i> (NHMRC & NRMCC, 2011). Recycled water providers are obliged to supply recycled water that is: ■ 'Fit for use' and does not represent a 'public health risk', as defined in the <i>Public Health Act 2005</i> (Qld) ■ Consistent with the quality requirements of: – The <i>Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1)</i> (EPHC, 2006) – For augmentation of drinking water supplies, the <i>Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – Augmentation of Drinking Water Supplies</i> (EPHC, 2008) – For harvesting and reuse of stormwater, the <i>Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – Stormwater Harvesting and Reuse</i> (EPHC, 2009b).

Commercial and private land uses in the Project area have a strong reliance on groundwater for domestic and agricultural purposes. This reliance on groundwater (security of water) as a resource is even stronger during periods of drought, as was recently (2019) experienced. Information from the Queensland water entitlements database and consultation feedback from DRDMW indicates that the alluvium and MRV aquifer units in the area are close to full allocation through existing water entitlements (Section 4.7.5.2).

A preliminary assessment of construction water options has been undertaken and will be review and updated as the Project progress through design and construction. The establishment of new groundwater bores to supplement the 3 year construction water demand for the Project is not considered a practical sourcing solution due to:

- The existing pressure placed on groundwater as a resource in the region
- The licensing and approval requirements to establish new groundwater bores
- The flow rates required to meet construction water demands may not be readily (practicably) met through groundwater abstraction schemes Challenges regarding the management of groundwater quality
- Aquifers in the region are close to full allocation through existing water entitlements (requiring complex and expensive groundwater trading).

The use of existing sustainable groundwater allocated entitlements to supplement the construction demand for the Project may be considered if private owners of registered bores have capacity under their water entitlement that they wish to lease to ARTC under a short-duration water trading (vetted by DRDMW) agreement. Therefore, the volumes extracted would be within the existing licensing limits and the extent of drawdown experienced would be localised and consistent with that which is currently permissible for each licenced bore. In all cases, domestic water needs will be prioritised above construction water supply.

Construction water options assessment has been undertaken and are ongoing. Construction water sources will be finalised as the construction approach is refined during the detailed design stage of the Project (post-EIS). Potential sources identified include non-potable surface water, recycled water from council facilities, treated effluent from non-resident workforce accommodation facilities, treated effluent from Millmerran Power and (treated) CSG production water.

Potable water required for the Project (i.e. for non-resident workforce accommodation facilities) will be sourced from administers of local networks (i.e. Queensland Urban Utilities) and commercial retailers.

Therefore, the Project is not expected to impact on, or alter, the identified relevant Water Plans or other plans under the Water Act outside of their designated use and objectives.

7.1.1.7 Dewatering

Dewatering is the process of actively pumping groundwater to locally lower groundwater levels in proximity to excavation or other sub-surface works to create a temporary dry working environment. Active dewatering may be required where sub-surface works encounter groundwater at depths greater than 10 m.

EVs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, and cultural and spiritual values.

If dewatering is required in support of construction activities, the duration of the impacts is likely to be temporary as the construction works are limited in duration. Impact is not anticipated to extend long after construction works are completed, if at all, dependant on the localised recharge of the affected aquifer unit.

7.1.1.8 Bridges and piling

The Project includes 37 new bridge sections with structural support from CIP pilings. The expected subgrade for the bridge and piling works includes Cainozoic alluvium, WCM, and the MRV.

Pilings are proposed to stabilise sub-surface conditions at bridge locations along the rail alignment. The piling works are expected to involve a CIP technique, with concrete emplaced via a tremie line or other pumping method. This technique allows for the removal of augered soil/rock concurrently while pumping concrete or grout through the hollow stem auger to stabilise the ground.

The potential impacts of the piling work during construction activities, on groundwater resources, may include:

- Alteration of aquifer characteristics (lower permeability) - the potential impact of altered aquifer parameters is considered limited due to the small area of influence within the saturated sediments compared to the overall extent of alluvium aquifer. This will be a temporary/localised construction impact
- Altered groundwater flow patterns (mounding or drawdown up and down gradient of the piles; upward leakage along the pile/soil interface) – with spacing of the piles such that throughflow in the hydrostratigraphic units intersected by the piles, groundwater flow patterns will not be markedly influenced. Spacing will be sufficient such that mounding (on the upgradient side) or dewatering (due to a reduction in the throughflow on the downgradient side of structures) is not expected to occur
- Altered quality due to the introduction of cement grout – the limited volumes of grout/cement required for CIP compared to the overall aquifer is negligible. Any alteration is likely to be short-term and localised to immediately adjacent to the piles
- Reduction in groundwater resources through extraction of wet soil/rock during piling - the potential reduction in groundwater levels due to water being brought to surface is considered limited as the CIP augering method allows for concrete slurry to be pumped through the hollow stem auger. As a result, the CIP method restricts the amount of groundwater brought to surface.

EVs with potential to be impacted include Aquatic and Terrestrial Ecosystems, Irrigation, Stock Water, Farm Supply/use, Drinking Water, industrial and Cultural and Spiritual Values.

Only minor volumes of groundwater (within the wet sediment/soil/rock) are anticipated to be brought to surface, e.g. 5 to 10 litres per 20 m deep auger hole. It is unlikely that active dewatering will be necessary in support of the proposed piling methodology, and that only minor volumes of groundwater (as a slurry with soil/rock) will need to be managed at each pile/drill site.

7.1.1.9 Groundwater flow

Construction activities with potential to impact the groundwater flow regime may include:

- Deep cuttings with potential to intersect shallow groundwater
- Piles or other structures spaced closely together and installed within substrate material
- Compaction and reduced permeability of the substrate beneath embankments.

EVs with potential to be impacted include Aquatic and Terrestrial Ecosystems, Irrigation, Stock Water, Farm Supply/use, Drinking Water, Cultural and Spiritual Values.

It is possible for the antecedent groundwater flow regime to be interrupted at deep cut locations. However, the length and depth of the cuts in comparison to the overall aquifer is negligible. Further, C31, C34 and C39 are predicted to intersect the MRV aquifer, which, due to the fractured nature of this aquifer, is unlikely to be impacted outside of the localised area to the cuts.

The foundation pilings associated with bridges for this Project will be spaced a sufficient distance apart (>20 m) and diameter to avoid impacts on existing groundwater flow patterns. Noting that the distance/spacing is cut/bridge-specific and will be finalised during the detailed design stage. Only small volumes of groundwater are required to be dewatered during the CIP piling installation and are therefore unlikely to impact on groundwater flow.

7.1.2 Groundwater quality

7.1.2.1 Contamination and accidental discharge

During construction, contamination of groundwater may arise because of:

- Accidental spills and leaks (accidental discharge) of hydrocarbons (oils, fuels and lubricants) and other chemicals related to the use and maintenance (workshops) of construction machinery
- Accidental discharge from washdown areas
- Upward seepage along piles/soil interfaces of saltier groundwater from the deeper confined aquifers into the fresher alluvium aquifers
- Incorrectly installed groundwater bores creating a vertical pathway between aquifers or if the bores deteriorate due to abandonment. In such instances, potential impacts may include:
 - Mixing of different groundwater qualities – blending and composite water quality
 - Contamination of non – flowing bores from surface runoff into the bore.

EVs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, industrial and cultural and spiritual values.

Direct infiltration of contaminants in areas of low relief with shallow water levels is likely to be reduced due to the dominant fine-grained sediments of the upper soil profile (clays and silts) limiting potential infiltration (reduced groundwater vulnerability).

The ephemeral nature of the majority of surface water bodies along the Project is also likely to reduce the chance of contaminants in surface water infiltrating into shallow aquifers during dry months.

If used in sufficient volume, water applied during the construction works stage of the Project has the potential to infiltrate past the root zone (deep drainage) and contribute to rising water tables/levels and water quality alteration in shallow aquifers. Leakage and releases (accidental discharge) from water storage areas may also contribute to rising water levels and alteration of water quality, but only significant volumes.

Water to be applied as construction water shall meet water quality guidelines to protect the relevant environmental values for the aquifer. For further details are discussed in EIS Chapter 9: Land Resources

7.1.2.2 Acid rock drainage

Acid rock drainage (ARD) occurs naturally when sulphide minerals are exposed to air and water. Intersection of sulphide-bearing rocks by cuts or use of sulphide-bearing materials in embankment fill could present an ARD risk with subsequent rainfall infiltration and leachate with potential to impact on EVs (i.e. aquatic GDEs and groundwater users). The leachate may be neutral to acidic with dissolved heavy metals and significant sulphate levels.

Rainfall infiltration into cuttings with sulphide-bearing minerals above the saturated zone may also pose an ARD (leachate) risk even if the entire cut is in the unsaturated zone (above groundwater).

EVs with potential to be impacted: Aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, and cultural and spiritual values.

Geology within the Project footprint indicates a potential for the Kumbarilla Beds and WCM to host disseminated sulphide minerals (i.e. pyrite), particularly within shale and mudstone units. However, given that cuts will primarily be into the weathered to extremely weathered upper portions of the Kumbarilla Beds and WCM and will be treated, the risk is limited and mitigated as sulphide minerals are likely to have already been oxidised.

Refer to EIS Chapter 9: Land Resources for additional details.

7.1.2.3 Potential acid sulfate soils

Acid sulfate soil mapping provided on ASRIS '*Atlas of Acid Sulfate Soils* (CSIRO, 2014b) indicates a low probability of potential acid sulfate soils (PASS) within the impact assessment area. However, few isolated areas of high probability ASS associated with natural and man-made water storages are noted throughout the impact assessment area (EIS Chapter 9: Land Resources).

If exposed through excavation, PASS presents a risk to underlying groundwater through oxidation and generation of acidic conditions with subsequent leaching of acid precipitate into underlying groundwater.

EVs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, and cultural and spiritual values.

The risk associated with exposure of high probability ASS is low as significant excavation/cutting is unlikely in these areas.

Refer to EIS Chapter 9: Land Resources for additional details.

7.2 Operational impacts

This section provides a discussion of the potential impacts on groundwater resources and related EVs because of the operations stage of the Project.

7.2.1 Activities impacting on groundwater resources

7.2.1.1 Loss or damage to existing groundwater bores, including impaired access

There is potential for long-term access restrictions to existing landowner bores due to the severance of properties. EVs with potential to be impacted; irrigation, stock water, farm supply/use, and drinking water.

ARTC have undertaken a bore survey of landowners impacted by the Project footprint to confirm the location of registered bores and to establish the presence of any unregistered bores. This data will assist when identifying bores subject to access restrictions resulting from the Project.

Where a groundwater bore is expected to have access to it impaired by either severance or restrictions as a result of the Project, 'make good' measures shall be developed on a case-by-case basis and agreed in consultation with the affected landowner. All identified landholders with registered bores to be impacted have been consulted, where they chose to do so, and consultation and is ongoing. The 'Make-good' process, along with timing, is outlined in Section 8.2.

7.2.1.2 Embankments

Mounding of groundwater levels can result due to long-term surface loading of alluvial soils from embankments and other constructions along the Project alignment where groundwater is shallow.

Evs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, industrial and cultural and spiritual values.

Possible areas for compressible alluvial soils with potential for inhibited drainage and subsequent groundwater mounding include localised portions of Macintyre Brook, Canning Creek, and Condamine River floodplains associated with abandoned river channels and tributaries. It is expected these impacts will be localised due to the linear nature of the Project and the typical depth to groundwater, based on available information, being greater than 10 m BGL in the alluvium and WCM such that the risk of mounding as a result of altered throughflow at this depth is considered to be low.

7.2.1.3 Drawdown due to seepage

In accordance with QR *Civil Engineering Standard QR-CTS-Part 35 – Stone and Concrete Slope Protection* (2010), drain or weep holes may be required to be installed to relieve potential groundwater pressure that may build up behind finished cut face. Minor localised (<11 m extent) drawdown of groundwater levels may occur as a consequence of ongoing seepage. Resultant drawdown extent has the potential to reduce the availability of groundwater resources.

EVs with potential to be impacted; aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, industrial and cultural and spiritual values.

As discussed in Section 6.3.5, the operational predictive modelling results indicate that only minor drawdown of groundwater is expected in the immediate vicinity of deep cuts and any impacts to groundwater resources will be wholly contained within the Project footprint (rail alignment). Seepage from the faces of cuts with potential to intersect groundwater will be minimised via the application of engineering controls during the construction works stage (i.e. shotcrete with weep holes and drains).

No registered bores, located outside of the Project footprint, are anticipated to be impacted by drawdown during the operations stage of the Project.

7.2.1.4 Alteration of existing groundwater flow pathways due to new infrastructure or modified landform

Long-term impacts on groundwater flow are not anticipated given the spacing of the pilings for the rail alignment.

Localised impacts may occur in the vicinity of the deep cuts predicted to have long-term seepage. However, due to the proposed application of standard seepage control measures and limited cut extent when compared to the overall aquifer, it is expected the groundwater flow regime will equilibrate to the cuts constructed in/through unconsolidated sediments. Flow within the fractured MRV are expected to be limited to the cut and immediate vicinity.

7.2.1.5 Maintenance works (operation) water supply

Operational maintenance works are not expected to be reliant on groundwater for the sourcing of water.

The Project's operational water requirements are anticipated to be minor relative to the construction works stage requirements. Water may be required to support localised maintenance activities, such high-pressure cleaning of culverts. The volumes and quality required will be dependent on the specific activities and frequency of undertaking, and therefore cannot be quantified at this stage of the Project. An assessment of the suitability of each source of water for maintenance works will need to be made for each maintenance activity requiring water, based on the following considerations:

- Legal access
- Volumetric requirement for the activity
- Water quality requirement for the activity
- Source location relative to the location of need.

The source and required water quality will also consider the potential for maintenance water to be released during maintenance activities such as cleaning. Small volumes of suitable water are envisaged such that the possible release will have limited potential impact on receiving environments.

7.2.2 Groundwater quality

Contamination of groundwater may arise as a consequence of unintended spills and leaks (accidental discharge) of hydrocarbons (oils, fuels, and lubricants) and other chemicals related to maintenance activities (accidental discharge, grinding and blasting) or rail incidents (e.g. loss of load).

EVs with potential to be impacted: aquatic and terrestrial ecosystems, irrigation, stock water, farm supply/use, drinking water, cultural and spiritual values.

In the instance a spill or leak (accidental discharge) occurs during normal operation activities, the impact is likely to be superficial in nature and not expected to impact on shallow aquifers. Maintenance crews and emergency response teams will be equipped with spill kits and environmental response equipment to intercept spills and leaks and prevent such incidents from impacting groundwater.

8 Mitigation measures

This section provides discussion of mitigation measures and controls that have been incorporated into the revised reference design development process, as appropriate and where possible (Section 8.1), as well as those measures that are proposed to be adopted for future stages of Project delivery (Sections 8.2 and 8.3).

8.1 Mitigation through the revised reference design stage

Development of the revised reference design for the Project has progressed in parallel with the impact assessment process. As a result, design solutions for avoiding, minimising and/or mitigating potential impacts have been incorporated into the revised reference design as appropriate and where possible.

Mitigation measures and controls that have been factored into the revised reference design, or otherwise implemented during the revised reference design stage for the Project, are summarised in Table 8.1.

Table 8.1 Initial mitigation measures of relevance to groundwater

Aspect	Initial mitigation measures
Groundwater resources	■ The Project uses the existing South Western Line (49.07 km) and Millmerran Branch Line (21.20 km) rail corridors, where possible to minimise the need to develop on non-rail land and minimise the potential to impact on groundwater resources ■ Geotechnical and groundwater investigations have been undertaken to describe and assess groundwater conditions. Investigations were targeted to specific locations as part of the reference design, such as: – Locations of bridge abutments – Locations of significant cuts – Locations of significant fill. ■ Geotechnical and groundwater field data has been used to derive design criteria for structures and rail formation. This has enabled the Project to be designed to cater for field verified geotechnical and groundwater conditions ■ Design and ratings of earthworks in support of culverts, viaducts, and bridges are in accordance with <i>AS 5100.1 Bridge design: Part 1: Scope and general principles</i> (Standards Australia, 2017a) and <i>AS/Rail Industry Safety and Standards Board (RISSB) 7636 Railway structures</i> (Standards Australia and Rail Industry Safety and Standards Board, 2022) and other applicable Australian Standards ■ Seepage control measures will be adopted in accordance with <i>QR Civil Engineering Standard QR-CTS-Part 35 – Stone and Concrete Slope Protection</i> (2010). Bench drains at every seven-to-ten-metre vertical intervals for deep cuts has been included within the revised reference design. The bench design contains a cross fall to drain water away from the cut face and to drain longitudinally to prevent ponding of water (refer benching requirements within <i>Earthworks Construction Specification ETC-08-04</i> (ARTC, 2019)). The bench drain is also wide enough to enable safe access for specific maintenance vehicles/equipment to actively monitor, manage and maintain the earthworks cut faces, including seepage. Beyond this, other seepage control measures include: – Drainage blanket with weep holes and drain holes – Shotcrete/concrete/stone pitching/interlocking blockwork design for erosion stability and drainage – Installation of piezometers in major cuts to monitor groundwater levels pre/during/post construction. In accordance with the QR Civil Engineering Standard, exposed cut faces will be lightly compacted prior installation of strip drains and application of a 300 mm drainage blanket of granular material around weep or drain hole locations. ■ Weepholes are installed in two rows along the cut face, one at 600 mm above the cut base and one at mid-height of the cut face. Drain hole specifications will be developed as part of the detailed design stage and shall be as shown on the detailed design drawings as directed by the Inspector on a cut-by-cut basis. Cut faces will then be finished with stone pitching, interlocking blockwork, or concrete. Groundwater seepage and rainfall infiltration will be channelled from the cut face via the drain and weepholes to the base of the cut, to be transported by the bench drain and dissipate via longitudinal drain to transpiration or infiltration and recharge

Aspect	Initial mitigation measures
	■ Drain holes will be installed to relieve groundwater pressure in colluviums, residual soil, weathered rock or along joints in the rock mass and are not specifically designed as seepage control measures. Deep cuts will be drained in perpetuity. However, due to the depth of groundwater (>10 m), these measures will act to mitigate the minor seepage anticipated ■ The revised reference design has been developed to achieve as close to a net balance in earthworks as is practicable, thereby reducing the potential to impact water resources (e.g. dewatering of cuttings and embankment placement). For the most part, this has been achieved through: – Aligning the Project to avoid, where possible, steep terrain and topographical constraints to minimise earthworks and provide for more efficient track geometry and grade – Considering the shape and size of batters to encourage cut and fill balancing – Optimising the number, width, and depth of cuts to avoid the generation of material that would be considered surplus to Project requirements.
Groundwater quality	■ Groundwater sampling was conducted of the 37 monitoring bores installed for the collection of baseline water quality and salinity parameters is on hold until detailed design stage. The data will be used to establish baseline conditions and WQOs for the Project.

8.2 Proposed mitigation measures

In order to manage and mitigate potential groundwater impacts associated with the Project, several mitigation measures have been proposed for implementation in future stages of Project delivery and identified to address Project specific issues and opportunities.

Table 8.2 identifies the relevant project stage, the aspect to be managed and the proposed mitigation measure. The mitigation measures presented in Table 8.2 have been factored into the assessment of residual impact significance, as documented in Table 9.1.

Table 8.2 Proposed groundwater mitigation measures relevant to groundwater resources and quality

Delivery stage	Aspect	Mitigation and management measures
Detailed design	Interaction with groundwater by elements of the Project	■ The groundwater monitoring network has been updated to address identified groundwater data gaps from the reference design to the revised reference design (completed in 2023), for further review and development through the detailed design process ■ Further geotechnical and hydrogeological investigations will be undertaken in parallel to the detailed design process to ensure site-specific geotechnical and groundwater conditions are reflected in the finalised design solution. Investigations will be targeted to specific locations, such as: – Locations of bridge abutments – Locations of significant cuts – Locations of significant fill/embankments. ■ The predictive groundwater modelling will be revised using additional information obtained during the detailed design stage to enhance the seepage estimates and groundwater level variation resultant from cuts, both up and down gradient. Geological information and seepage analysis will be used to inform secondary approvals, the drainage blanket specifications, or alternative design controls, for deep cuts into hard rock. ■ Site inspections will be conducted at cut locations to visually examine surface outcrops for sulphide minerals or remnant products indicative of sulphide mineralisation. This would inform the need for management of potential ARD from cuttings in sedimentary units prior to construction works. ■ The management of ARD (leachate) potential, if identified through additional site investigation, would be in accordance with <i>Preventing Acid and Metalliferous Drainage: Leading Practice Sustainable Development Program for the Mining Industry</i> (Commonwealth of Australia, 2016) ■ Culverts and embankments will be designed to minimise pre-loading and compaction of alluvial sediments. This will reduce the risk of altering shallow groundwater levels and recharge patterns. The current embankment designs allow for openings (i.e. culverts and bridge spans) near creeks and rivers to assist with flow. ■ Where embankment height allows, toe benching and drainage blankets are to be provided for all transverse slopes greater than 7 degrees (1V:8H). ■ Where embankment height allows, full embankment benching is to be provided for all transverse slopes greater than 14° (1V:4H). ■ Cutting face treatments and seepage control measures will be designed in accordance with <i>QR Civil Engineering Standard QR-CTS-Part 35 – Stone and Concrete Slope Protection</i> (2010) as part of the detailed design stage.
	Impacts to landholder bores	■ ARTC have undertaken a bore survey of landowners impacted by the Project footprint to confirm the location of registered bores and to establish the presence of any unregistered bores. The results of the bore survey identified an additional three unregistered bores within the Project footprint. ■ The bore survey was conducted targeting all properties within/intersecting the construction footprint and those located within near proximity (80 m) of deep cuts. The survey supported previous engagement conducted in 2020 with directly impacted landowners to confirm their key water assets, including groundwater bores. ■ Where a groundwater bore is expected to be decommissioned or have access/usage impaired as result of the Project (the predicted impacts on groundwater resources is realised), 'make good' measures will be agreed in consultation with the affected landowner prior to construction. An overview of the draft bore groundwater 'make-good process' is presented below in Figure 8.1. No bores outside the permanent project footprint with potential to be impacted by groundwater drawdown were identified

Delivery stage	Aspect	Mitigation and management measures
		■ Where required, the information included in the 'bore baseline report' includes but is not limited to: – Bore construction details – Bore equipment and condition survey – Bore supply assessment – bore operating capacity and peak usage information – Bore water level assessment –SWL and dynamic water level plus available drawdown measurements – Bore water quality assessment – analytes consistent with approved use of the bore – The Environmental Monitor will have oversight of implementation of the required bore assessments, as well as review and verify the results. ■ For the purpose of this EIS the term 'bore baseline report' refers to the bore investigation works to be conducted to assess the baseline (pre-construction and early works) conditions of a landholder bore, while the 'bore assessment' refers to the findings of the bore assessment ■ Should a landowner not accept the bore assessment (either whether there is an impairment in the first place, or the level of impairment), ARTC will: – Advise the landowner that they are entitled to obtain an assessment from a suitably qualified person (SQP) – Advise the landowner that ARTC will pay their reasonable costs – Provide ARTC's bore assessment to the landowner for review by the landowner's SQP – Advise landowners of their expectations as to the reasonable costs of obtaining a bore assessment.
	Sourcing of construction water	As part of ARTCs construction water planning process, construction water procurement studies have been undertaken and are ongoing. Potential water supply options include supplemented, unsupplemented and recycled sources. The use of new groundwater bores or licences for construction water is not a considered water source for the Project. If groundwater is to be sourced for construction water, trading or purchasing of existing allocated entitlements will be pursued through a trade agreement. Construction water sources will be finalised as the construction approach is refined during the detailed design stage of the Project (post-EIS) and are to be documented as part of the Construction Water Plan. Currently the hierarchy of water supply source preferences prioritises non-groundwater sources to minimise impacts to aquifers and water users. However, the use of existing sustainable groundwater allocated entitlements to supplement the construction demand for the Project may be considered if owners of registered bores have capacity under their water entitlement that they wish to sell to ARTC under private agreement. Therefore, the volumes extracted would be within the existing licensing limits and the extent of drawdown experienced would be localised and consistent with that which is currently permissible for each licenced bore. Sources of construction water will be finalised as the construction approach is refined during the detailed design and Project approvals and corridor acquisition stages of the Project (post-EIS) and will be dependent on: ■ Climatic conditions in the lead up to construction ■ Confirmation of water sources made available under private agreement ■ The current construction water sourcing strategy, as summarised in the (EIS Chapter 5: Project Description).

Delivery stage	Aspect	Mitigation and management measures
	Groundwater quality	■ Baseline groundwater monitoring data (levels and quality) is to recommence at Project monitoring bores during detailed design stage in accordance with the Baseline GMMP (Section 8.3) incorporating the monitoring bores installed during the 2023 campaign ■ Groundwater monitoring and sample collection is conducted in accordance with recognised groundwater sampling guidelines such as <i>Monitoring and Sampling Manual</i> (DES, 2018) and <i>Groundwater Sampling and Analysis – A Field Guide</i> (Sundaram et.al., 2009) ■ Collected data will be used to establish a groundwater quality baseline for the Project prior to the commencement of construction. The groundwater quality baseline dataset provides a foundation against which construction works stage impacts can be monitored and compared. Baseline groundwater monitoring data will be used to: – Establish location/bore specific impact thresholds in accordance with <i>Using monitoring data to assess groundwater quality and potential environmental impacts</i> (DES, 2021b) – Establish responses to impact threshold exceedances, including 'make good' agreements. These details will be incorporated into the Construction GMMP. ■ A Contaminated Land Management Plan will be developed and incorporated into the Construction Environmental Management Plan (CEMP). This Plan will document management controls for works on land that is known or suspected of being contaminated and outline the process to identify, document and manage contaminated sites ■ Where potential for contamination risk exists, groundwater monitoring and investigations will be undertaken up and downgradient prior to commencement of construction to confirm the presence/absence of groundwater contamination and inform the requirement for management controls.
Pre-construction and early works	Impacts to registered bores	■ There are 38 registered bores, that are not Project monitoring bores, within the Project footprint for the revised reference design. These bores, plus unregistered bores identified within the Project footprint (three unregistered bores currently identified), are likely to be decommissioned for the progression of the Project. Where a groundwater bore is expected to be decommissioned or have access to it impaired as a result of the Project, 'make good' measures shall be developed on a case-by-case bases and agreed in consultation with the affected landowner. Bores will be decommissioned in accordance with the <i>Minimum Construction Requirements for Water Bores in Australia</i> (Edition 4) (NUDLC, 2020) ■ Prior to construction groundwater modelling and monitoring shall be conducted upgradient and downgradient of any deep cuts, as well as cuts which intercept groundwater to determine potential for impact the groundwater in the vicinity of the cuts.
Construction	Water resources	■ The Construction GMMP will be implemented (refer above and Section 8.3) ■ Opportunities to re-use water during construction will be identified and implemented where feasible (EIS Chapter 5: Project Description).
	Sourcing of construction water	■ It is unlikely, however, should the Project access groundwater, it would be secured through private temporary water trade agreement, the licenced capacity of existing bores will not be exceeded. Flow and volume monitoring during extraction will be required for each bore, with extraction logs maintained.

Delivery stage	Aspect	Mitigation and management measures
	Groundwater Levels	■ Cut face treatments and seepage control will be designed in accordance with QR <i>Civil Engineering Standard QR-CTS-Part 35 – Stone and Concrete Slope Protection</i> (2010) as part of the detailed design stage. Bench drains at every seven-to-ten meter vertical intervals has been incorporated within the revised reference design ■ Groundwater level monitoring will be undertaken in accordance with the Construction GMMP to identify potential impacts to groundwater levels resulting from the Project ■ The construction GMMP will incorporate groundwater monitoring at 'reference bores' upgradient and downgradient of the modelled deep cuts, as well as cuts which intercept groundwater, shall be undertaken prior to, during and post construction, to determine if impacts have occurred as a result of the construction of cuts ■ The environmental monitor will have oversight of the implementation of the GMMP and will review and verify the results of monitoring if the environmental monitor considers it necessary.
	Groundwater quality	■ Where suspected contaminated soils or materials are identified, if encountered, these will be managed in accordance with the unexpected finds protocol/procedure documented in the Contaminated Land Management Plan of the CEMP ■ Opportunities to treat and re-use contaminated materials within the rail corridor will be assessed and subjected to a risk assessment ■ Vehicle and plant maintenance will be undertaken in designated laydown areas, on hardstand surfaces. This will minimise risk of contaminants from incidental spills or leaks (accidental discharge) from entering aquifers via infiltration or surface runoff ■ Refuelling will only occur at designated locations within the Project footprint and sited at suitable separation distances from sensitive receptors, including surface water features and drainage lines. These refuelling locations will be equipped with on-site chemical and hydrocarbon absorbent socks/booms and spill kits ■ Bulk storage areas for dangerous goods and hazardous materials will be located away from areas of social and environmental receptors such that offsite impacts or risks from any foreseeable hazard scenario will not exceed the dangerous dose for the defined land use zone (i.e. either sensitive, commercial/ community, or industrial, in accordance with the intent of the State Planning Policy) ■ A Hazardous Materials Management Plan will be prepared and implemented as a component of the CEMP. The Plan will be required to: – Identify the materials required to be stored and used in support of construction, including volumes of each – Identify the laydown areas that will be used for storage of hazardous materials and designated locations for storage of hazardous within the bounds of those laydown areas – Specify how dangerous goods and hazardous materials will be handled, stored and transported for the Project – Describe the response procedures in the event of an incident involving hazardous materials or dangerous goods – Establish the waste storage and disposal procedures for hazardous materials and dangerous goods. ■ Chemicals stored and handled as part of construction activities will be managed in accordance with: – The <i>Work Health and Safety Act 2011 Act</i> (Qld) and Regulation – <i>AS 2187.1:1998 Explosives—Storage, transport and use: Part 1: Storage</i> Standards Australia, 1998) – <i>AS 1940:2017 The storage and handling of flammable and combustible liquids</i> (Standards Australia, 2017b) – <i>AS 3780:2008 The storage and handling of corrosive substances</i> (Standards Australia, 2008) – The requirements of chemical safety data sheets.

Delivery stage	Aspect	Mitigation and management measures
		- Spill kits will be available at all work fronts and laydown areas in the event of a spill or leak. All vehicles and machinery will have dedicated spill kits. These refuelling locations will be equipped with on-site chemical and hydrocarbon absorbent socks/booms and spill kits - Mobile plant, drill rigs and equipment will be maintained in accordance with manufacturer requirements and inspected frequently to minimise breakdowns and decrease the risk of contamination - All excavated material which is suspected to contain sulphides will be stockpiled, lined and covered and managed to minimise rainfall infiltration and leaching. Where possible, treatment and onsite reuse is preferred to off-site disposal. A case-by-case assessment of the suitability of material for treatment and reuse will be required, in accordance with the earthwork's material management options and spoil management.
	Encountering PASS and/or ARD	- All excavated material which is suspected to contain sulphides (ARD and/or PASS) will be stockpiled, lined and covered and managed to minimise rainfall infiltration and leaching. Where possible, treatment and onsite reuse is preferred to off-site disposal. A case-by-case assessment of the suitability of material for treatment and reuse will be required, in accordance with the Project's spoil earthworks material management options - If ARD potential is identified through pre-construction investigations (refer above), during construction seepage water from the relevant deep cuts will be sampled at weekly intervals to monitor for the occurrence of acid rock oxidation. This monitoring will involve the on-site screening of the seepage water for pH (trending down) and EC (trending up) and comparison to the baseline groundwater results. Further laboratory analyses for the key analytes (i.e. pH, TDS, EC, TSS, alkalinity, and dissolved metals) will be required if pH and EC trends indicate the potential for oxidation occurring and will be used to validate the presence or absence of ARD potential to mitigate potential leachate to the environment - If ARD-contaminated discharge water/leachate is found to be generated from the deep cuts, this water may need to be impounded in ponds and neutralised via treatment with hydrated lime or dilution prior to disposal.
Operations	Impacts to registered bores	- An Operational GMMP will be developed as part of the secondary approvals process to specify the groundwater monitoring requirements, if any, over the initial operation years of the Project (Section 8.3). The need for monitoring during operation will be informed by groundwater observations and data collected during pre-construction activities and early works and construction works stages of the Project - The environmental monitor has general responsibility for environmental management post-EIS and will have oversight of the implementation of the GMMP and will review and verify the results of monitoring if the environmental monitor considers it necessary.
	Groundwater quality	- Before a train travels on the Inland Rail network, operators must make sure that the classes of dangerous goods, and the identification numbers of vehicles carrying dangerous goods, are recorded in the train consist documentation. Dangerous goods must be loaded, labelled, and marshalled in accordance with the <i>Australian Code for the Transport of Dangerous Goods by Road & Rail</i> (National Transport Commission, 2024) - Appropriate controls are to be in place to prevent environmental incidents including leaks/spills from refuelling activities and locomotive operations and to protect the environment in the event of an incident. All fuel and chemical spills will be dealt with in a manner consistent with relevant health and safety guidelines - Procedures for the management of hazardous chemical spills and leaks will be undertaken in accordance with ARTC's <i>Work Instruction: Chemicals</i> (WHS-WI-214) (2016) and <i>Procedure: Emergency Management</i> (RLS-PR-044) (2024).

Bore make-good process

Acronyms used

REIQ Real Estate Institute of Queensland

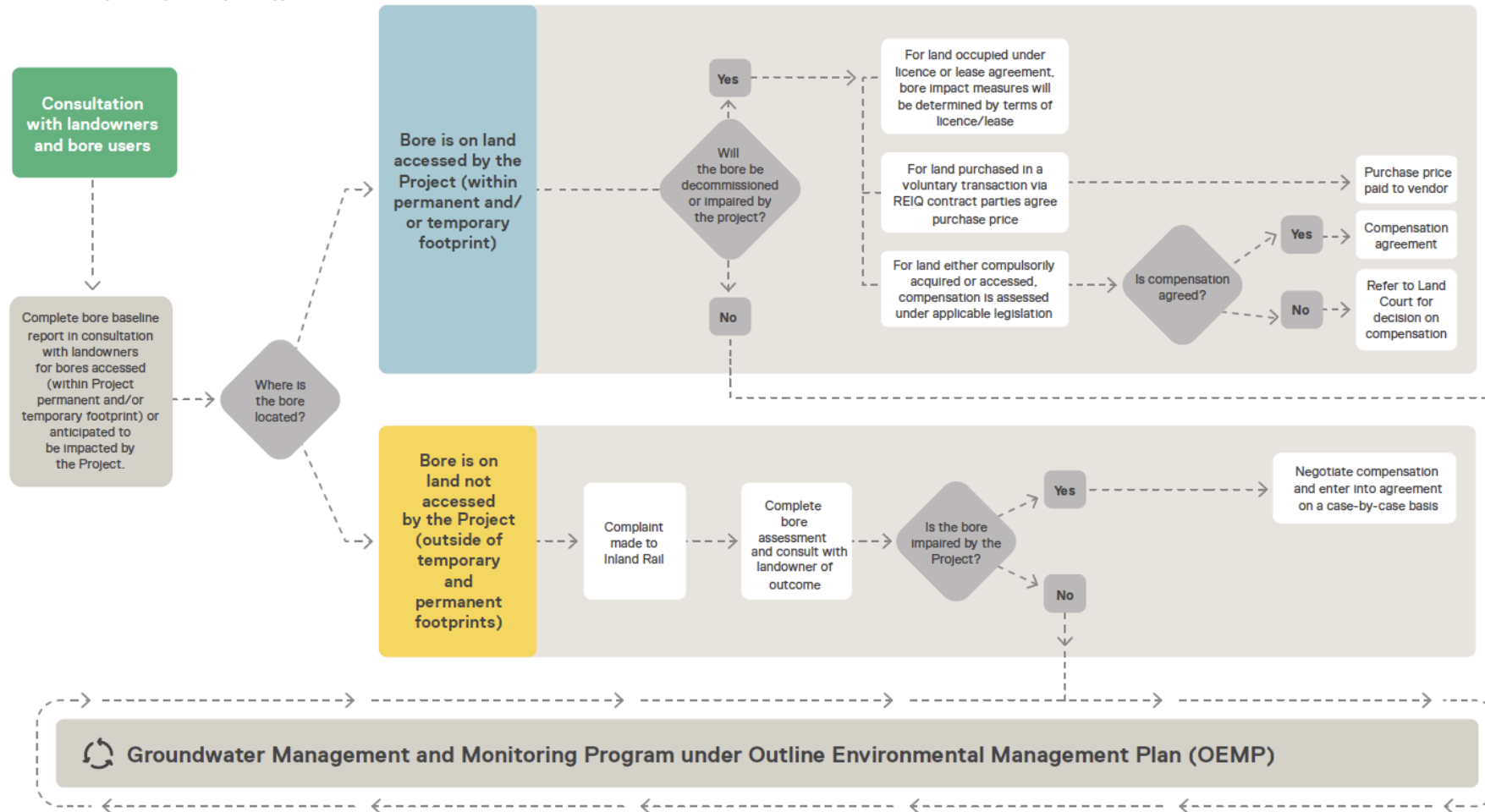


Figure 8.1 Proposed groundwater bore 'make-good' process

8.3 Groundwater management and monitoring program

The GMMP provides for an ongoing assessment of the potential groundwater impacts throughout the various stages of the Project. The GMMP incorporates principles of performance assessment and adaptive management—a structured, iterative process for decision making. The GMMP will be assessed and updated before the commencement of each Project stage (pre-construction activities and early works, detailed design, construction works, and operations) such that the GMMP for subsequent stages is informed by the outcomes of the previous stage.

The environmental monitor will have oversight of the implementation of the GMMP, responsible for the review and verification of the monitoring results, throughout construction and operation of the Project. The evolution of the GMMP over sequential Project stages is discussed below and shown on Figure 1.1 and Figure 8.2.

The GMMP will include:

- Description of the principal aquifers of interest, local use of groundwater, and the predicted impacts on groundwater
- Description of the groundwater monitoring program including monitoring locations, monitoring frequency and the parameters to be recorded/analysed
- Identification of the groundwater impact triggers and protocols for investigating and if required mitigating the impacts on groundwater
- Description of the process of continual review and improvement of the GMMP to ensure it continues to meet its objectives.

An indicative network of monitoring bores for the Baseline GMMP is summarised in Table 8.3.

8.3.1 Baseline groundwater management and monitoring program

The Baseline GMMP's primary objective is to develop a robust baseline dataset that all subsequent monitoring will be assessed against to identify potential impacts from the Project. Data collected during the baseline groundwater monitoring program has to date, and will continue to, account for natural (seasonal) and/or anthropogenic fluctuations of groundwater levels or quality prior to construction. This is most important for the shallow alluvial aquifers, WCM outcrop and MRV outcrop areas the Project traverses, as groundwater in these strata are the most likely to fluctuate over time and has the greatest potential to be impacted as a result of the Project.

The baseline dataset resultant from this GMMP will provide site specific information to support the assessment of potential project impacts including intra- and inter-project cumulative impacts. Early identification of groundwater quality and monitoring local conditions over time promotes adaptive management for changing conditions to mitigate additional impact from the Project.

The groundwater monitoring network is presented in Table 8.3, and reflects the revised reference design (see Field Investigations section).

As a result of the value engineering process and revised reference design changes, some bores installed during the feasibility design stage no longer target relevant design elements (i.e. location of deep cuts, pilings etc). Additional groundwater monitoring bores have been installed to augment the monitoring bore network and address the revised reference design. The monitoring bore network will be assessed as part of the detailed design stage of the Project and data gaps addressed prior to construction, if required.

The framework for groundwater level and quality monitoring, data management and reporting as part of the baseline monitoring program is presented below. Baseline groundwater monitoring to date has been conducted since 2018 and is discussed in detail in the Field Investigations section. Groundwater monitoring and sample collection has been conducted in accordance with groundwater sampling guidelines such as *Monitoring and Sampling Manual* (DES, 2018) and *Groundwater Sampling and Analysis— A Field Guide* (Sundaram, et.al., 2009); future monitoring events should also adopt these guidelines until updated versions are available.

The baseline groundwater monitoring data will be compiled to provide for a robust and repeatable data set that will promote early and confident warning and validation of potential and predicted impacts from the Project. The baseline dataset will be adequate to develop site-specific WQOs (either per monitoring bore or per hydrostratigraphic unit), as warranted, and inform the construction works stage GMMP.

8.3.1.1 Groundwater level monitoring

In bores with sufficient water column, groundwater levels are monitored using automated pressure transducers (level loggers), which are set to record measurements at hourly intervals. The logger data will be downloaded and manual, static groundwater level measurements collected from each bore as a component of the onsite groundwater monitoring event. The manual measurement acts as a quality control check for the pressure transducers.

Pressure transducer data is downloaded and corrected using the manual gauging data each bi-monthly monitoring event. The resultant transient groundwater level data allow for the identification of water level trends in the baseline data.

8.3.1.2 Groundwater quality monitoring

Groundwater quality samples are to be collected from all bores during every event. The analytes to be collected and assessed for each bore will be detailed in the GMMP and based on previous monitoring results, land use, Project design element, and Project stage. Field aquifer characteristics, including pH, EC, oxygen reduction potential, dissolved oxygen, turbidity, and temperature is monitoring and measured prior to sample collection.

The following laboratory analytes were adopted for all bores (where sufficient water column is available) each monitoring event and should be maintained for ongoing monitoring, for aquifer characterisation:

- pH, EC and total dissolved solids
- Major anions (i.e. HCO_3^- , Cl^- , F, and SO_4^{2-})
- Major cations (i.e. Ca^{2+} , Mg^{2+} , Na^+ , K^+)
- Dissolved and total metals (i.e. Al, As, B, Cd, Cr, Cu, Mn, Pb, Ni, Se, Mo, Ag, Zn, Fe and Hg)
- Nutrients (i.e. ammonia, nitrite, nitrate, TN and TP).

The following additional laboratory analytes were adopted for select bores and monitoring events to inform of existing concentrations based on land use, if any, and should be considered in the GMMP:

- Total recoverable hydrocarbons
- Benzene, toluene, ethylbenzene, xylenes and naphthalene
- Polycyclic aromatic hydrocarbons
- Polychlorinated biphenyl.

8.3.1.3 Data management and reporting

The following data and reporting requirements were implemented:

- All groundwater data are validated with suitable quality assurance and quality control protocols
- Monitoring data is reported in the form of a factual memorandum on a per monitoring event basis and will be reviewed and assessed at completion of baseline monitoring to identify trends and develop interim Project specific WQO.

8.3.2 Construction groundwater management and monitoring program

The Construction GMMP will be developed using a risk-based approach with monitoring and sampling requirements to be informed by the likelihood of construction activities to encounter/impact groundwater and the location of such activities, along with the outcomes of the Baseline GMMP and final Project design. Monitoring will be managed by the environmental manager responsible for implementation of the CEMP and overall environmental monitoring for the Project post-EIS. Groundwater monitoring for construction will include targeted locations where construction activities have potential to impact on groundwater quality and/or levels, as identified in Section 7.

Monitoring will be performed at locations (distance and depth/aquifer) up- and down-gradient of the site where construction activities are occurring and at reference bores outside the anticipated extent of impact. For example, where construction activities are surficial in nature, monitoring of deep aquifers would not be warranted. However, surficial construction tasks may require specific monitoring for analytes being used in that task (task-specific monitoring).

8.3.3 Operations groundwater management and monitoring program

The operations GMMP will be developed from the groundwater data and observations collected during previous Project stages and will include a framework for monitoring in response to an environmental spill or incident. The environmental manager will be responsible for implementation of the operations GMMP. Groundwater monitoring will continue into the operations stage of the Project to confirm the groundwater levels have recovered, where available, and/or to identify delayed impacts on groundwater, if any.

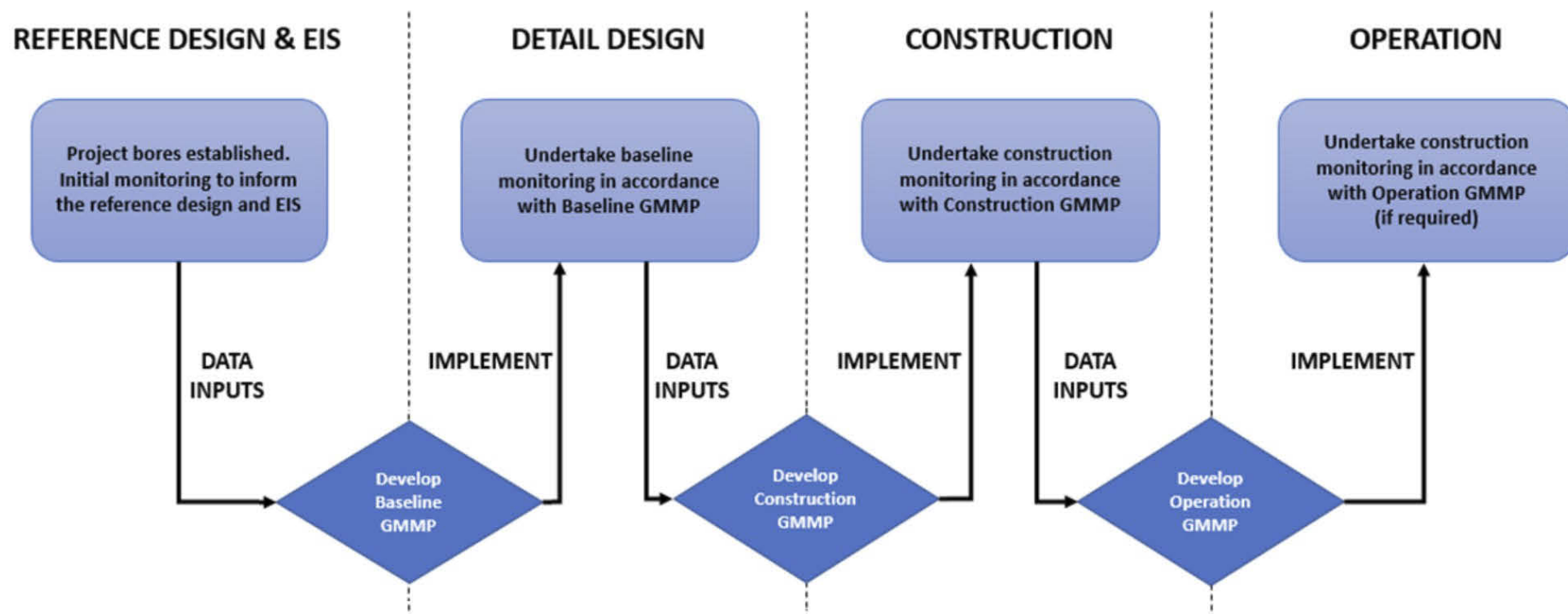


Figure 8.2 Development and implementation of the groundwater management and monitoring program over sequential Project stages

Table 8.3 Baseline Groundwater Management and Monitoring bore Network

Chainage (km)	Bore ID	Easting ¹	Northing ¹	Longitude ²	Latitude ²	Bridge or Cutting	Aquifer	Screen interval (m BGL)	Rationale	2023 Status
30.8 NS2B	270-01-BH2213	251109	6826531	-28.66448692	150.453287	Macintyre River	Alluvium	13.5 to 19.5	Baseline data for BRA aquifer and Macintyre River bridge structure	Existing bore
32.8 NS2B	270-01-BH2217	251620	6828602	-28.64590985	150.458962	NA	Alluvium	8.9 to 14.9	Baseline data for BRA aquifer	Existing bore
34.8 NS2B	270-01-BH2218	251072	6830485	-28.62882464	150.4537705	NA	Alluvium	8.8 to 14.8	Baseline data for BRA aquifer	Existing bore
52.8	310-01-BH2203	300144	6852564	-28.43815518	150.9592652	NA	WCM	16.0 to 25.0	Baseline data for WCM and revised reference design deep cut C04	Existing bore
55.0	310-BH2206	302299	6853323	-28.43163627	150.9813887	NA	WCM	16.7 to 25.7	Baseline data for WCM. Previously co-located with deep cut of the initial reference design	Existing bore
63.8	310-BH2309	309357	6857528	-28.39475019	151.0541129	C07 & C08	WCM	9.0 to 15.0	Baseline data for the WCM and revised reference design deep cuts C07 and C08	Existing bore
65.8	310-BH2210	311744	6857672	-28.39379682	151.078489	NA	WCM	21.0 to 30.0	Baseline data for the WCM	Existing bore
78.4	RN41640009	320750	6866250	-28.31766957	151.1716999		Marburg	23.0 to 24.0	Baseline data for Marburg subgroup—bi-annual level data available from DRDMW	Existing bore
87.4	310-BH2214	319068	6875070	-28.2378626	151.1559228	NA	WCM	14.0 to 20.0	Baseline data for the WCM	Existing bore
88.3	310-BH2215	318929	6875972	-28.22970539	151.1546468	NA	WCM	21.0 to 30.0	Baseline data for the WCM	Existing bore
94.0	310-BH2216	321182	6880902	-28.18553261	151.1783533	NA	WCM	12.5 to 18.5	Baseline data for the WCM	Existing bore

Chainage (km)	Bore ID	Easting ¹	Northing ¹	Longitude ²	Latitude ²	Bridge or Cutting	Aquifer	Screen interval (m BGL)	Rationale	2023 Status
139.9	310-BH2231	338076	6918598	-27.84756339	151.3555708	Condamine River and tributaries rail bridges	Alluvium	11.4 to 17.4	Baseline data for CA and Grasstree Creek bridge structure	Existing bore
144.0	RN42231089	338799	6922879	-27.8090197	151.3634905		Alluvium	XX – 23.0	Baseline data for CA — quarterly level data available from DRDMW	Existing bore
144.1	310-BH2233	340530	6922012	-27.81705053	151.3809418		Alluvium	9.5 to 12.5 and 18.5 to 24.45	Baseline data for CA and Condamine River bridge structure	Existing bore
144.5	310-BH2234	340696	6922345	-27.81406531	151.3826711		Alluvium	17 to 24.5		Existing bore
145.1	RN42230031	340326	6923742	-27.80141485	151.3791031		Alluvium	XX	Baseline data for CA— quarterly level data available from DRDMW	Existing bore
146.2	RN42231416	341201	6924116	-27.79814381	151.3880324		Alluvium	30.0 to 36.7	Baseline data for CA— quarterly level data available from DRDMW	Existing bore
150.0	310-BH2235	344710	6926073	-27.78089455	151.4238959		Alluvium	31.0 to 40.0	Baseline data for CA and Condamine River North Branch bridge structure.	Existing bore
186.7	310-BH2343	375835	6942386	-27.63690327	151.741418	C39	MRV	12.0 to 15.0	Baseline data for MRV	Existing bore
189.3	310-BH2344	377527	6944383	-27.61903361	151.7587688	C41	MRV	9 to 14.95	Baseline data for the MRV revised reference design deep cut C41	Existing bore
190.7	310-BH2345	377893	6945680	-27.60736042	151.7626089	NA	MRV	21.0 to 30.0	Baseline data for the MRV	Existing bore
195.3	310-BH2347	379008	6950198	-27.5666823	151.7743594	NA	MRV	17.0 to 20.0	Baseline data for the MRV	Existing bore
197.3	310-BH2248	378811	6952190	-27.5486853	151.7725642	NA	MRV	19.0 to 25.0	Baseline data for the MRV	Existing bore
197.0	RN42231135	379065	6951846	-27.55181287	151.7751018	NA	WCM	XX	Baseline data for WCM— bi-annual level data available from DRDMW	Existing bore
198.4	MW100	378853	6953243	-27.53919755	151.7730889	-	MRV	9.0 to 15.0	Baseline data for the MRV	New bore (2023)
193.8	MW101	378406	6948707	-27.58009845	151.7681058	-	MRV	12.5 to 18.5	Baseline data for the MRV	New bore (2023)
190.8	MW102	377845	6945843	-27.60589757	151.762133	-	MRV	15.5 to 21.5	Baseline data for the MRV	New bore (2023)

Chainage (km)	Bore ID	Easting ¹	Northing ¹	Longitude ²	Latitude ²	Bridge or Cutting	Aquifer	Screen interval (m BGL)	Rationale	2023 Status
185.7	MW103	375160	6941780	-27.64232318	151.7345082	-	MRV	4.0 to 10.0	Baseline data for the MRV	New bore (2023)
180	MW104	370856	6938120	-27.67495108	151.6904946	-	MRV	18.0 to 24.0	Baseline data for the MRV	New bore (2023)
176.4	MW105	367956	6936151	-27.69244077	151.6608788	-	MRV	23.0 to 29.0	Baseline data for the MRV	New bore (2023)
172.8	MW106	364981	6934723	-27.70503365	151.6305541	-	MRV	10.5 to 16.5	Baseline data for the MRV	New bore (2023)
129.7	MW107	331888	6912064	-27.90577212	151.2918195	-	WCM	6.0 to 12.0	Baseline data for the WCM	New bore (2023)
122.5	MW108	326591	6908284	-27.93920187	151.2374642	-	WCM	11.0 to 17.0	Baseline data for the WCM	New bore (2023)
116.5	MW109	324884	6902697	-27.98939005	151.2192935	-	EF / WCM	7.5 to 13.5	Baseline data for the Eurombah Formation and the WCM	New bore (2023)
103.7	MW110	323490	6890128	-28.10261319	151.2032397	-	WCM	9.0 to 15.0	Baseline data for the WCM	New bore (2023)
100.2	MW111	322102	6886748	-28.13292385	151.1886039	-	WCM	7.0 to 13.0	Baseline data for the WCM	New bore (2023)
76.5	MW112	319375	6864693	-28.33154128	151.1574328	-	Alluvium	3.0 to 9.0	Baseline data for CA	New bore (2023)
60.5	MW113	306436	6857106	-28.39814094	151.024236	-	WCM	13.5 to 19.5	Baseline data for the WCM	New bore (2023)
144.3	MW114	340545	6922128	-27.81601825	151.3811034	-	Alluvium	9.0 to 15.0	Baseline data for CA	New bore (2023)
128.3	MW115	330433	6912223	-27.90415337	151.2770635	-	WCM	4.0 to 10.0	Baseline data for the WCM	New bore (2023)
139.8	MW116	338125	6918508	-27.84839418	151.3560499	-	Alluvium	9.0 to 15.0	Baseline data for CA	New bore (2023)
197.6	MW118	378813	6952399	-27.54681176	151.7725992	-	MRV	19.0 to 25.0	Baseline data for the MRV	New bore (2023)
149.6	MW119	344962	6925457	-27.78649528	151.4263666	-	Alluvium	18.0 to 24.0	Baseline data for CA and Condamine River	New bore (2023)
144.5	MW120	340749	6922258	-27.8148694	151.3831913	-	Alluvium	13.0 to 19.0	Baseline data for CA and Condamine River	New bore (2023)

Chainage (km)	Bore ID	Easting ¹	Northing ¹	Longitude ²	Latitude ²	Bridge or Cutting	Aquifer	Screen interval (m BGL)	Rationale	2023 Status
166.6	MW121	359097	6933721	-27.71347351	151.5707721	-	MRV	17.5 to 23.5	Baseline data for the MRV	New bore (2023)
167.7	MW123	360207	6933484	-27.71572819	151.5820007	-	MRV	17.5 to 23.5	Baseline data for the MRV	New bore (2023)

Table notes:

1 Coordinates for existing bores surveyed in GDA94, coordinates for new bores (2023) surveyed in GDA20

2 MGA94 Z56

XX = unknown construction detail

'-' = detail not currently known

8.3.4 Summary

A summary of the monitoring approach proposed for each stage of the Project is presented in Table 8.4.

Table 8.4 Summary of groundwater management and monitoring program requirements

Proposed GMMP requirements	Baseline (pre-construction)	Construction	Operation
Groundwater level monitoring	- A Baseline GMMP be finalised for the resumption of monitoring - Pressure transducers/level loggers record measurements at hourly intervals - Pressure transducer data downloaded bimonthly - Manual measurements bi-monthly.	A Construction GMMP will be developed at the end of the baseline period. Groundwater level monitoring will be conducted at the locations, and frequency nominated in the Construction GMMP.	An Operational GMMP will be developed at the end of the construction period. Groundwater level monitoring will be conducted at the locations, and frequency nominated in the Operation GMMP.
Groundwater quality monitoring	- A Baseline GMMP be finalised for the resumption of monitoring - Bi-monthly sample collection and analysis for analytes as per Sections 3.4.2.2 and 8.3.1.	Groundwater quality monitoring will be conducted at the locations, and frequency nominated in the approved Construction GMMP.	Groundwater quality monitoring will be conducted at the locations, and frequency nominated in the approved Operation GMMP.
Reporting	- Factual memorandum on a per monitoring event basis. - Baseline Monitoring completion report.	To be confirmed.	To be confirmed.

8.3.4.1 Landowner bore make good

The groundwater 'make good' or mitigation framework for the Project considers two pathways for bores to be 'made good': bores located on land accessed by the Project and bores located on land not accessed by the Project.

Where a groundwater bore is expected to be decommissioned or have access/usage impaired as result of the Project, 'make good' measures will be agreed in consultation with the affected landowner. As predictive modelling indicates all groundwater drawdown impacts from the Project would not extend outside the Project footprint (Section 6.3.5), a bore can be impacted by the Project through its location within the footprint or severance of access to the bore due to the footprint. That is, any groundwater drawdown resultant from the Project is unlikely to impact on bores and groundwater users outside the Project footprint. Therefore, the 'make good' framework developed for the Project, Figure 8.1⁵, considers two pathways for make good: bores located on land accessed by the Project and bores on land not accessed by the Project.

To inform the 'make good' framework, ARTC sought advice from many stakeholders to promote a transparent, consistent, and collaborative approach. All landholders identified to have a registered bore within the Project footprint have been contacted and the consultation process started, where a landholder agreed. A bore survey was undertaken in between December 2021 and April 2022 to confirm the location of registered bores and to identify unregistered bores that may be impacted by the Project. Consultation with landowners will continue during detailed design stage.

⁵ Bore impairment may include:

- Damage to the bores, bore pumps or other related infrastructure proximal to the construction area
- Impairment of bore access due to location within or proximal to the construction area
- Decline in bore water quality
- Decline in water quality.

Bore baseline report

A bore baseline report will be prepared for bores which are subject to consultation with ARTC. The information to be included in a 'bore baseline report' includes but is not limited to:

- Bore construction details
- Bore equipment and condition survey
- Bore yield
- Bore supply assessment - bore operating capacity and peak usage information
- Bore water level assessment –SWL
- Bore water quality assessment – analytes consistent with approved use of the bore
- Licence status and conditions and authorised water use (purpose and volume) under the relevant Water Plan, if appropriate.

Following the preparation of a bore baseline report, 'make good' measures will depend on where the bore is located, either within or outside of land accessed by the Project.

Bores located on land accessed by the Project

For bores to be decommissioned or otherwise impaired by the Project location/footprint, the following will likely be relevant:

- Where such bores are located on land that has been compulsorily acquired (either on a permanent or temporary basis) or temporarily occupied: compensation will be payable or able to be claimed in accordance with the *Acquisition of Land Act 1967* (Qld). Compensation will be assessed on a case-by-case basis and will depend on the impact of the Project on the bore and the water supply. If agreement on compensation cannot be reached, the constructing authority will arrange a conference to resolve differences. If agreement is still not reached referral can be made to the Land Court for independent determination,
- Where the land the bore is located on has been purchased in a voluntary transaction by the constructing authority, the purchase price will be agreed between ARTC and parties and paid to parties under the contract; and
- For bores located on land occupied by the Project under licence or lease agreement, bore impairment measures will be determined by the terms of the licence/lease and such terms will make provision for 'make good' measures, which could likely include a monetary amount.

If a bore will not be decommissioned or impaired by the Project, groundwater monitoring will be undertaken and managed in accordance with the GMMP.

Bores not located on land accessed by the Project

Where a landholder bore is located outside the Project footprint (temporary and permanent footprints) and thus not anticipated to be impacted by the Project, a complaint would need to be made to Inland Rail regarding groundwater bore impairment. Any such bores will be subject to a bore assessment to confirm any impact. If a bore is assessed as impaired by the Project, an agreement and 'make good' measures with the landowner will be developed on a case-by-case basis. Otherwise, groundwater monitoring will be undertaken and managed in accordance with the GMMP.

Where there is a dispute, such disputes or related complaints will be managed in accordance with the proposed complaints management procedure.

If the landowner does not accept the bore assessment (either whether there is bore impairment in the first place, or the level of bore impairment), ARTC will:

- Provide ARTC's bore assessment to the landowner for review by the landowner's suitably qualified person
- Advise the landowner that they are entitled to obtain a bore assessment from a suitably qualified person
- Advise the landowner that ARTC will pay their reasonable costs for such bore assessment
- Advise landowners of their expectations as to the reasonable costs of obtaining a bore assessment.

For the purpose of this revised draft EIS the term 'bore baseline report' refers to the initial bore investigation works to be conducted to assess and report the baseline conditions (bore yield, capacity, use) of a landholder bore, while the 'bore assessment' refers to the detailed, downhole assessment to inform of any impaired capacity of a bore.

9 Impact assessment

Potential impacts to groundwater values associated with construction and operation of the Project are outlined in Table 9.1. These impacts have been subjected to significance assessment as per the methodology in Section 3.2.5.

The initial impact assessment assumes that the design considerations (or initial mitigation measures) factored into the revised reference design stage (Table 8.1) have been implemented.

Additional mitigation and management measures (Table 8.2) were then applied as appropriate to future stages of the Project to reduce the level of potential impact and derive a residual significance of impact.

The initial and residual significance of potential impacts are presented in Table 9.1 to demonstrate the effectiveness of mitigation measures.

The majority of potential impacts related to groundwater are considered temporary in nature and primarily associated with the construction works stage of the Project. The likelihood of a material impact on current groundwater conditions and users is considered to be low.

The revised reference design, proposed engineering controls and monitoring are generally considered to be adequate to mitigate potential impacts to groundwater. In the few locations where construction activities have the potential to intersect shallow groundwater, construction techniques will be developed and utilised so that any potential impacts are mitigated and managed through the adopted engineering controls.

Beyond the construction stage of the Project, the potential long-term impacts on groundwater are considered to be from:

- Changes to groundwater flow and levels due to embankment loading
- Changes to groundwater flow and levels due to groundwater drainage at deep cuttings
- Possible restricted access as a result of the Project to existing landowner bores.

Engineering controls that will be implemented through detailed design, in combination with the GMMP, are generally considered sufficient to mitigate potential impacts to groundwater EVs.

Table 9.1 presents the significance assessment with respect to the Project on groundwater resources.

Table 9.1 Significance assessment summary for groundwater

Aspect	Stage	Initial significance ¹			Residual significance ²		Comments
		Sensitivity	Magnitude	Significance	Magnitude	Significance	
Impacts to existing bores (registered and non-registered)	Pre-construction activities and early works and construction works	Moderate	Moderate	Moderate	Low	Low	Any existing landholder bores impacted by the Project will have 'make-good' measures agreed on a case-by-case basis.
	Operations		Moderate	Moderate	Low	Low	
Subsidence/consolidation due to groundwater extraction or dewatering and/or loading	Pre-construction activities and early works and construction works	Moderate	Low	Low	Low	Low	Modelling indicates groundwater drawdown will be isolated around deep cuts and wholly contained within the Project footprint. Resulting subsidence will be minor and isolated, if any, based on rock strength and SWL data.
	Operations		Low	Low	Low	Low	
Altered groundwater levels (increase or decrease) affecting groundwater users and GDEs (incl. impacts due to embankments and seepage to cuts)	Pre-construction activities and early works and construction works	Moderate	Low	Low	Low	Low	Modelling indicates groundwater drawdown will be isolated around deep cuts and wholly contained within the Project footprint. Resulting residual water levels will be minor and isolated, if any.
	Operations		Low	Low	Low	Low	
Altered groundwater flow regime	Pre-construction activities and early works and construction works	Moderate	Moderate	Moderate	Low	Low	Modelling indicates groundwater drawdown will be isolated around deep cuts and wholly contained within the Project footprint. Any resulting altered groundwater flow will be minor and isolated. Spacing of bridge piles will allow throughflow in the hydro stratigraphic units intersected by the piles, groundwater flow patterns will not be markedly influenced.
	Operations		Low	Low	Low	Low	
Contamination or altered water quality impacting vulnerable groundwater resources (spills or induced flow, borehole intersections. Upwards leakage along pile/soil interface)	Pre-construction activities and early works and construction works	Moderate	Moderate	Moderate	Low	Low	It is anticipated that any spill or leak would be small and isolated. Response to any uncontrolled releases would occur immediately in accordance with the Hazardous Materials Management Plan and/or CEMP.

Aspect	Stage	Initial significance ¹			Residual significance ²		Comments
		Sensitivity	Magnitude	Significance	Magnitude	Significance	
	Operations		Low	Low	Low	Low	Maintenance and emergency response teams will be equipped environmental response equipment to intercept spills and leaks and prevent such incidents from migrating to groundwater.
ASS impacting on EVs (i.e. GDEs)	Pre-construction activities and early works and construction works	Moderate	Moderate	Moderate	Low	Low	ASS exposure is mitigated as sulphide minerals are likely to have already been oxidised where deep cuts are proposed in the extremely weathered upper strata.
	Operations		Low	Low			
Vegetation removal and surface alteration affecting recharge/discharge, increasing associated salinity risks	Pre-construction activities and early works and construction works	Moderate	Moderate	Moderate	Low	Low	The area proposed to be cleared and graded is low and considered negligible in comparison to the total recharge surface area of the alluvial aquifers that underlay the Project. Sections overlying the BRA and CA are aligned to maximise the use of existing rail corridor.
	Operations		Low	Low	Low	Low	

Table notes:

- 1 Includes implementation of initial mitigation measures specified in Table 8.1.
- 2 Assessment of residual significance once the mitigation measures specified in Table 8.2 have been applied.

10 Cumulative impacts

10.1 Approach

It is a requirement of the Project that the potential cumulative impacts be considered. This section provides a discussion of potential cumulative impacts relating to groundwater.

The approach used to identify and assess potential construction stage cumulative impacts of the Project is as follows:

- A review of the potential impacts identified within the assessment
- A preliminary list of projects for consideration in the cumulative impact assessment was collated with timelines to demonstrate the temporal relationship between projects. This preliminary list of projects was compiled through consideration of the following:
 - Projects subject to assessment under the EP Act or *State Development and Public Works Act 1971* (Qld), with an Initial Advice Statement published by DES or Department of State Development, Infrastructure, Local Government and Planning
 - Projects listed in Goondiwindi Regional Council and Toowoomba Regional Council development application databases
 - Development within Priority Development Areas and State Development Areas
 - Economic Development Queensland development projects
 - Community Infrastructure Designation projects
 - Projects within the public register of environmental authorities
 - Department of Transport and Main Road infrastructure projects
 - Private infrastructure facilities
 - Development in accordance with Regional Planning Interests
 - The Inland Rail Projects immediately adjacent to the Project, being the North Star to NSW/QLD Border and Gowrie to Helidon Projects.
- The preliminary list of projects was assessed to identify those that meet one of the following criteria:
 - Projects that have been approved but where construction has not commenced
 - Projects that have commenced construction subsequent to issuance of the ToR for the Project, but have potential for overlap in construction activities with the Border to Gowrie Project
 - Projects that have been completed subsequent to issuance of the ToR for the Project
 - Are operational developments that have future plans for expansion.
- Projects that were excluded from further assessment were:
 - Existing projects, with no known plans for expansion. Such projects are typically considered part of the 'existing environment' and have been accounted for in the impact assessment of each specific matter.
 - Proposed projects that have not been developed to the point that details of their scale, size, location and core activities would be publicly available.
- Where there is a potential overlap in impacts (either spatially or temporally), a cumulative impact assessment was undertaken to determine the nature of the cumulative impact. Where possible, the assessment method was quantitative in nature however qualitative assessment has also been undertaken

- An assessment matrix method (further detailed in Section 10.2) has been used to determine the significance of cumulative impacts with respect to beneficial or detrimental effects
- Where cumulative impacts are deemed to be of 'medium' or 'high' significance, additional mitigation measures are proposed, beyond those already proposed by the relevant technical impact assessments.

10.2 Assessment matrix

The significance of cumulative impacts has been determined by using professional judgement to select the most appropriate relevance factor for each aspect in Table 10.1. The sum of the relevance factors determines the impact significance and consequence which are summarised in Table 10.2. For example, if an environmental value (such as groundwater) is considered to have a probability of impact of 2, duration of impact of 3, magnitude/intensity of impact of 1 and a sensitivity of receiving environment of 1 the significance of impact would be Medium ($2+3+1+1 = 7$).

Table 10.1 Assessment matrix

Aspect	Relevance factor		
	Low	Medium	High
Probability of impact	1	2	3
Duration of impact	1	2	3
Magnitude/Intensity of impact	1	2	3
Sensitivity of receiving environment	1	2	3

Table 10.2 Impact significance

Impact significance	Sum of relevant factors	Consequence
Low	1-6	Negative impacts need to be managed by standard environmental management practices. Monitoring to be part of general project monitoring program.
Medium	7-9	Mitigation measures likely to be necessary and specific management practices to be applied. Targeted monitoring program required, where appropriate.
High	10-12	Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Targeted monitoring program necessary, where appropriate.

10.3 Cumulative impact assessment

A number of projects have been identified as having potential to contribute to the cumulative impacts in combination with the Border to Gowrie Project. These projects are either currently operational, expected to undergo future expansion or are currently going through an approval process. A full list of projects, with a description of each, is presented in EIS Chapter 23: Cumulative Impacts. Projects and operations surrounding the groundwater impact assessment area were evaluated in terms of the potential of each to impact groundwater receptors of relevance to the Project.

Cumulative impacts to groundwater are most likely occur where multiple projects intersect and/or take groundwater from the same shallow aquifer units and can be more significant when construction timing overlaps. The resultant impacts to groundwater may be:

- Change in groundwater levels
- Reduction in groundwater quality, including from contamination.

Predictive groundwater modelling indicates that no registered bores located outside of the Project footprint are expected to experience groundwater drawdown as a consequence of Project activities. Therefore, due to the localised potential of groundwater impacts associated with the Border to Gowrie Project and the distance and nature of many of the surrounding projects considered, only six of the identified projects are considered to have potential to result in cumulative impacts to groundwater (summarised in Table 10.3). These projects are:

- InterLinkSQ
- Commodore Mine and Millmerran Power Station
- North Star to NSW/QLD Border Project (Inland Rail)
- Gowrie to Helidon Project (Inland Rail)
- Asterion Medicinal Cannabis Facility
- Wagners Intermodal Terminal.

A review of the coal seam gas projects, included within the Surat Cumulative Management Area, indicates that the predicted groundwater drawdown does not extend below the Project, as presented in [Queensland Globe \(information.qld.gov.au\)](https://www.qld.gov.au/information/globe).

An assessment of cumulative impacts that may arise from these projects in combination with the Project is presented in Table 10.4, with a summary of how potential cumulative impacts would be managed. This assessment has concluded that the construction works stage cumulative groundwater impacts of the Project are expected to be of low significance.

Table 10.3 Identified projects considered for Groundwater cumulative impacts

Projects	Location	Description	Construction dates
InterLinkSQ	13 km west of Toowoomba The northern limit of the Project is situated adjacent to the InterLinkSQ site	A 200 ha transport, logistics and business hub. Located on the narrow gauge regional rail network and interstate network. Located at the junction of the Gore, Warrego and New England Highways	First quarter 2022 to last quarter 2022 Assumed to continue development until Inland Rail is operational
Commodore Mine and Millmerran Power Station	Domville, Queensland Intersects the Project footprint, located primarily to the east	The Commodore Mine is an open cut coal mine which provides coal for the 850 megawatts (MW) Millmerran Power Station The Millmerran Power Station is a coal-fired power station that supplies enough electricity to power approximately 1.1 million homes	Operational Subject to annual maintenance shutdown and continual pit expansion. Also potential for coal reserves to be accessed beyond the current footprint
NS2B (Inland Rail)	Rail alignment from North Star, New South Wales to the NSW/QLD border Adjoins the Project at its southern limit	New 37 km rail corridor to connect North Star (NSW) to the QR South West Rail Line just over the NSW/QLD border	2021 to 2024
G2H (Inland Rail)	Rail alignment from Gowrie to Helidon, Queensland Adjoins the Project at its northern limit	New 26 km dual gauge track between Gowrie (north-west of Toowoomba) and Helidon (east of Toowoomba), extending through the Local Government Areas of Toowoomba and Lockyer Valley. The Project includes a 6.38 km tunnel to create an efficient route through the steep terrain of the Toowoomba Range	2024 to 2028
Asterion Medicinal Cannabis Facility	Wellcamp, Queensland Located adjacent the eastern construction footprint boundary of the Project. The facility will be located between the Project and the Toowoomba Wellcamp Airport	A high-tech medicinal cannabis cultivation, research and manufacturing facility. The project involves infrastructure construction spanning approximately 71.0 ha to produce 20,000 plants per day at full capacity. Medicinal-grade cannabis grown at the facility will be manufactured into a range of medicinal products, including single patient packs, cannabis oils, gels, salts and related products, destined solely for the medicinal market. This facility is anticipated to be the largest facility of its kind in the world.	2020 to 2021
Wagners Intermodal terminal	Wellcamp Airport, Queensland	Major freight terminal, designed to benefit the freight network and future Inland Rail. The terminal will be 24/7 facility, designed to operate 78,000 containers for almost 400 freight customers. Utilising approximately 150 locomotives and 1,500 wagons Unique features of Wagners Intermodal terminal are a 2.7 km frontage for 1,800 m freight trains, a daily-use fully licenced and bonded international air cargo terminal and reach up to 500,000 capacity by 2040.	On-going

Table 10.4 Assessment of groundwater cumulative impact

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
North Star to NSW/QLD Border Project	Change in groundwater levels	Probability of impact	Low (1)	5	Low	The potential for cumulative impacts to groundwater levels during construction is considered low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts to groundwater quality during construction to is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ■ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ■ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Gowrie to Helidon Project	Change in groundwater levels	Probability of impact	Low (1)	5	Low	The potential for cumulative impacts to groundwater levels during construction is considered low as there are no deep cuts within 10 km of the Project interface and potential for groundwater drawdown will be isolated in the vicinity of deep cuts which intersect groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts to groundwater quality during construction to is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ■ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ■ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Asterion Medicinal Cannabis Facility	Change in groundwater levels	Probability of impact	Low (1)	6	Low	It is unclear where the Asterion Medicinal Cannabis Facility will source irrigation water however the possibility of extraction of groundwater for irrigation use should be considered. The Asterion project is proposed to be developed in three stages with peak production unlikely to occur during the B2G construction works stage. The facility is proposed adjacent to Cut C39 with the potential to intercept groundwater. However, modelling indicates that groundwater drawdown resulting from excavation of deep cut C39 will be localised and temporary. Further take of water is managed by DRDMW under the provisions of groundwater entitlements process and within the licensing limits for each hydrostratigraphic units. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts during construction to groundwater quality is considered to be low due to the localised predicted impacts on groundwater. Therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ■ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ■ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Commodore Mine and Millmerran Power Station	Change in groundwater levels	Probability of impact	Low (1)	6	Low	There is potential for overlap of dewatering impacts on shallow aquifers intersected by Project cuttings and dewatering from the Commodore Mine open pit. Deep cut C25 is located adjacent to Commodore Mine but is considered unlikely to intercept groundwater and induce drawdown. Further, any potential drawdown due to the Project is anticipated to be localised and temporary during excavation works. The potential for cumulative impacts during construction to groundwater levels is considered to be low due to the localised predicted impacts on groundwater. Therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through the development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts during construction to groundwater quality is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ■ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ■ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Wagners Intermodal Terminal	Change in groundwater levels	Probability of impact	Low (1)	5	Low	The potential for cumulative impacts to groundwater levels is considered low as no deep cuts are proposed along the section of the alignment adjacent to the proposed Intermodal Terminal Site. Further, excavations for the Intermodal Terminal are unlikely to reach the depth of groundwater. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts to groundwater quality during construction to is considered to be low as any minor spills/leaks that occur are anticipated to be isolated and low volume. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ■ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ■ The development and implementation of a Hazardous Materials Management Plan, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.

Table notes:

Relevance factors between 1 and 3 were determined using professional judgement to select most appropriate relevance factor for each aspect and summing the relevance factors.

Sum of relevant factors definition:

- Low (1-6): Negative impacts need to be managed by standard environmental management practices. Monitoring to be part of general project monitoring program.
- Medium (7-9): Mitigation measure likely to be necessary and specific management practices to be applied. Targeted monitoring program required, where appropriate.
- High (10-12): Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Targeted monitoring program necessary, where appropriate

11 Conclusions

This report has been prepared to evaluate potential impacts of the Project on groundwater resources and addresses the ToR requirements additional requirements and requests for information from the Coordinator-General with respect to groundwater. This technical report has identified existing conditions of the impact assessment area in accordance with industry standard methodology and relevant legislation. Through an assessment of existing conditions, project activities with the potential to adversely impact on groundwater resources were identified.

Project activities, throughout the Project lifecycle, can potentially impact on groundwater resources via:

- Loss or damage to existing landowner bores or groundwater use from the bore (quality/yield degradation)
- Loss of access to landholder bores or the bore itself due to Project location
- Seepage and groundwater level drawdown at deep cuts
- Alteration of aquifer parameters and/or flow patterns
- Subsidence/settlement of compressible substrates
- Contamination/reduction of groundwater quality
- ARD
- Groundwater level mounding
- Alteration to groundwater recharge/discharge mechanisms.

Potential impacts related to groundwater for the Project are considered minor and temporary in nature, associated with the construction works stage of the Project. All potential impacts on groundwater resources are localised and not expected to extend outside the Project footprint and are manageable with the implementation of mitigation measures specified in Section 8.2.

In the few deep cut locations where construction activities have the potential to intersect groundwater, modelling has predicted the impacts to be localised within the Project footprint. Best practice engineered controls will be utilised at deep cut locations where groundwater is intercepted to minimise the extent and duration of disturbance to groundwater resources and ensuring structurally sound construction sites. As a conservative approach, the predictive modelling, both up and down gradient, shall be updated and undertaken during detailed design to confirm the inflows and drawdown and monitoring and management plans reviewed and updated accordingly as required.

Implementation of a GMMP that embraces adaptive management principles, as detailed in Section 8.3, will ensure that specific potential impacts identified for each stage of the Project can be managed based on specific activities, locations, and WQOs to protect groundwater resources and users.

The potential for cumulative impacts to groundwater levels and quality due to other projects occurring in the vicinity of the Project has been assessed. The likelihood of cumulative impacts to these aspects is considered to be low due to the largely localised and temporary nature of impacts to groundwater that may arise due to the Project.

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APPENDIX U

Groundwater Technical Report

Appendix A Registered bores within the Project footprint

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix A

Registered bores within the Project footprint

Registered bore RN	Bore depth(m)	Reported aquifer	Latitude	Longitude
11759	130	KUMBARILLA BEDS	-28.6143	150.4604
15050	ND	ND	-27.7624	151.4355
18780	ND	ND	-28.093	151.2014
18790	86	WALLOON COAL MEASURES	-27.9718	151.2283
26394	ND	ND	-27.5222	151.7971
30052	46	WALLOON COAL MEASURES	-27.55	151.7733
32163	21	MAIN RANGE VOLCANICS	-27.7143	151.588
35241	24.1	MAIN RANGE VOLCANICS	-27.5267	151.7875
44067	ND	ND	-27.5404	151.7731
48038	ND	ND	-27.6247	151.7555
48317	25.9	CONDAMINE RIVER ALLUVIUM	-27.7923	151.4105
48707	ND	ND	-28.3209	151.149
52509	20.1	MAIN RANGE VOLCANICS	-27.604	151.7644
52681	ND	ND	-27.7049	151.6288
55476	24.4	ND	-28.653	150.457
56586	30.2	CONDAMINE RIVER ALLUVIUM	-27.7819	151.4234
56880	29	HUTTON SANDSTONE	-28.3696	151.122
61628	42	MAIN RANGE VOLCANICS	-27.656	151.7097
64284	13.7	MAIN RANGE VOLCANICS	-27.4929	151.8419
64493	24	MAIN RANGE VOLCANICS	-27.7036	151.629
66261	16	MAIN RANGE VOLCANICS	-27.6462	151.7267
66652	13	MAIN RANGE VOLCANICS	-27.55	151.7733
71611	74.7	KUMBARILLA BEDS	-28.6152	150.5556
77068	87	KUMBARILLA BEDS	-28.6148	150.5528
77347	14.7	MACINTYRE BROOK ALLUVIUM	-28.5715	150.7534
77665	ND	ND	-28.6288	150.4538
77666	ND	ND	-28.6645	150.4533
77669	ND	ND	-28.2297	151.1546
77761	30.4	ND	-28.2379	151.1559
77767	15	ND	-28.461	150.9383
77771	29.2	ND	-28.5439	150.8377
77813	19.5	ND	-28.3982	151.0243
77815	9	ND	-28.3316	151.1574
77829	40	ND	-28.6491	150.458
83537	35	MAIN RANGE VOLCANICS	-27.4932	151.8459
94532	30	MAIN RANGE VOLCANICS	-27.6932	151.6689
107025	20	MAIN RANGE VOLCANICS	-27.6357	151.7423
119211	43	MAIN RANGE VOLCANICS	-27.6987	151.6384
172704	40	CONDAMINE RIVER ALLUVIUM	-27.7809	151.4239

Registered bore RN	Bore depth(m)	Reported aquifer	Latitude	Longitude
172705	23	CONDAMINE RIVER ALLUVIUM	-27.8141	151.3827
192202	15	ND	-28.0237	151.2158
192206	15	MAIN RANGE VOLCANICS	-27.619	151.7588
192209	15	MAIN RANGE VOLCANICS	-27.6369	151.7414
192210	30	MAIN RANGE VOLCANICS	-27.6074	151.7626
192244	24.5	CONDAMINE RIVER ALLUVIUM	-27.8171	151.3809
192741	23.5	MAIN RANGE VOLCANICS	-27.7134	151.5708
192743	24	MAIN RANGE VOLCANICS	-27.6749	151.6905
192747	15	MAIN RANGE VOLCANICS	-27.5392	151.7731
192748	25	MAIN RANGE VOLCANICS	-27.5468	151.7726
192749	18.5	MAIN RANGE VOLCANICS	-27.5801	151.7681
192750	16.5	ND	-27.705	151.6306
192751	21.5	MAIN RANGE VOLCANICS	-27.6059	151.7621
192752	10	ND	-27.6423	151.7345
192755	15	CONDAMINE RIVER ALLUVIUM	-27.816	151.3811
192758	13	CONDAMINE RIVER ALLUVIUM	-28.1328	151.1886
192762	15	CONDAMINE RIVER ALLUVIUM	-27.8484	151.3561
192781	12	ND	-27.9057	151.2918
41620041	28.8	KUMBARILLA BEDS	-28.6153	150.5665
42230034	26.8	CONDAMINE RIVER ALLUVIUM	-27.7919	151.4066
42230039	13	CONDAMINE RIVER ALLUVIUM	-27.7807	151.4234
42230040		CONDAMINE RIVER ALLUVIUM	-27.7807	151.4233
42230043	24.4	CONDAMINE RIVER ALLUVIUM	-27.7567	151.4616
42230986	ND	ND	-27.7808	151.4235
42231378	35	CONDAMINE RIVER ALLUVIUM	-27.7567	151.4616
42231415	25.4	CONDAMINE RIVER ALLUVIUM	-27.7896	151.4142
42231725	18	CONDAMINE RIVER ALLUVIUM	-27.7895	151.4154

Table note:

ND – No data available

APPENDIX U

Groundwater Technical Report

Appendix B Baseline groundwater monitoring events

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 3/1 Burma Road Pooraka SA 5095
Ph: 08 8162 5130 E: adelaide@alsglobal.com

BRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 48 Callemondah Drive Gladstone QLD 4680
Ph: 07 4978 7944 E: gladstone@alsglobal.com

☐ MACKAY 78 Harbour Road Mackay QLD 4740
 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 1/29 Sydney Road Mudgee NSW 2850
 Ph: 02 6372 6735 E: mudgee.mail@aisglobal.com

NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

□NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

☐ PERTH 10 Hod Way Malaga WA 6090
 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐ SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐ **TOWNSVILLE** 14-15 Desma Court Bohle QLD 4818
 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Golder Associates Pty Ltd		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Golder - Brisbane		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)		Custody Seal Intact? Yes No N/A	
PROJECT: Inland Rail (PII)		PROJECT NO: 1891791		Free ice / frozen ice bricks present upon receipt? Yes No N/A	
ORDER NUMBER:		PURCHASE ORDER NO.:		Random Sample Temperature on Receipt: °C	
PROJECT MANAGER: Mitch McGinnis		CONTACT PH:		Other comment:	
SAMPLER: Susantha / Rob		SAMPLER MOBILE: 0410023462		RELINQUISHED BY:	
COC Emailed to ALS? (YES / NO)		EDD FORMAT (or default):		DATE/TIME:	
Email Reports to (will default to PM if no other addresses are listed):		DATE/TIME:		DATE/TIME:	
Email Invoice to (will default to PM if no other addresses are listed): S.kumara@peli@golder.com.au		DATE/TIME:		DATE/TIME:	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:												
ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) When Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).						Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Anions / Cations Ca, Mg, Na, K, Cl, F, SO ₄ , Alkalinity, Hardness	EC, PH, TDS	Total / Dissolved As, B, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Fe, Ni, Pb, Se, V, Zn, Hg	Nutrients Nitrate, Nitrite, Ammonia	Reactive Phosphorus Total P, N, TKN	Sodium Adsorption Ratio	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	310-01-BH 2206	8/10/18 14:20	W	N, SP	4	✓	✓	✓	✓	✓	✓	
2	310-01-BH 2210	9/10/18 9:20	W	N, SP	4	✓	-	-	-	✓	✓	
					TOTAL	8						

Environmental Division
Brisbane
Work Order Reference
EB1824393



Telephone : + 61-7-3243 7222

HT

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = Vial Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 3/1 Burma Road Pooraka SA 5095
Ph. 08 8162 5130 E: adelaide@alsglobal.com

☐ **BRISBANE** 2 Byth Street Stafford QLD 4053
 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐ **GLADSTONE** 48 Callemondah Drive Gladstone QLD 4680
 Ph: 07 4978 7944 E: gladstone@alsglobal.com

DMACKAY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9500 E: samples.melbourne@alsglobal.com

☐ MUDGEES 1/29 Sydney Road Mudgee NSW 2850
 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

QNOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

PERTH 10 Rod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

□SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph. 02 8784 8555 E: samples.sydney@alsglobal.com

DTOWNSVILLE 14-15 Desma Court Bohle Qld 4818
Ph: 07 4796

☐ WOLLON
Ph: 02 4221

Environmental Division
Brisbane

Work Order Reference

EB1824567



Telephone : + 61-7-3243 7222

CLIENT: Golder Associates Pty Ltd		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date):		FOR LABORATORY	
OFFICE: Brisbane		(Standard TAT may be longer for some tests e.g.: Ultra Trace Organics)		Custody Seal Intact	
PROJECT: Inland Kail Package 11 PROJECT NO.: 1397791		ALS QUOTE NO.:		Free Ice / frozen ice receipt?	
ORDER NUMBER: PURCHASE ORDER NO.:		COUNTRY OF ORIGIN:		Random Sample Taken	
PROJECT MANAGER: Mitch Mc Ginnis CONTACT PH:		COC SEQUENCE NUMBER (Circle)		Other comment:	
SAMPLER: Rob Copper SAMPLER MOBILE: 0448 611 113		COC: 1 2 3 4 5 6 7			
COC Emailed to ALS? (YES / NO)		EDD FORMAT (or default):			
Email Reports to (will default to PM if no other addresses are listed): skumarapeli@golder.com.au		RELINQUISHED BY:		RECEIVED BY:	
Email Invoice to (will default to PM if no other addresses are listed):		DATE/TIME:		DATE/TIME:	
COMMENTS/REMARKS:				11/10/09 16:45	

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) When Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Anions/Cations Ca, Mg, Na, K, Cl F, SO ₄ , Alkalinity, Hardness PH, EC, TDS	Total/Dissolved As, Ba, Be, B, Cd	Cr, Co, Cu, Mn, Fe Ni, Pb, Se, V, Zn, Hg	Nutrients Nitrate, Nitrite, Ammonia Reactive Phosphorus Total P, N, TKN	Sodium Adsorption Ratio	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.		
1	310-01-BH2347	11/10/18 10:10	W	N, SP	4	✓	✓	✓	✓	✓			
2	GW 981	11/10/18 10:50	W	N, SP	4	✓	✓	✓	✓	✓			
3	310-01-BH234A	11/10/18 13:15	W	N, SP	4	✓	✓	✓	✓	✓			
					TOTAL	12							

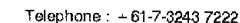
Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial; CS = Sulfuric Preserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Glass; HS = HCl Preserved Speciation bottle; AP = Airfreight Unpreserved Plastic; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.



LEW L L O N G

Work Order Reference
EB1826453



COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) When Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Anions / Cations Ca, Mg, Na, K, Cl, F, SO₄, Alkalinity, Hardness	EC, pH, TDS	Total / Dissolved As, B, Ba, Be, Cd, Cr, Co, Cu, Mn, Fe, Ni,	Pb, Se, V, Zn, Hg	Nutrients Nitrate, Nitrite Ammonia	Reactive Phosphorus	Total P-N, TKN	Sodium Adsorption Ratio	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	310-01-BH2235	29/10/18 13:15	W	N, SP	4	✓	✓	✓	✓	✓	✓	✓	✓	
2	310-01-BH2234	29/10/18 16:20	W	N, SP	4	✓	✓	✓	✓	✓	✓	✓	✓	
3	310-01-BH2233	30/10/18 10:00	W	N, SP	4	✓	✓	✓	✓	✓	✓	✓	✓	
4	310-01-BH2231	30/10/18 13:40	W	N, SP	4	✓	✓	✓	✓	✓	✓	✓	✓	
5	310-01-BH2209	31/10/18 7:15	W	N, SP	4	✓	✓	✓	✓	✓	✓	✓	✓	
					TOTAL	20								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial S = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.



CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 3/1 Burnside Road, Adelaide SA 5055
Ph: 08 8162 5130 E: adelaide@alsglobal.com

BRISBANE 2 Blyth Street, Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 48 Calleniondan Drive, Gladstone QLD 4680
Ph: 07 4978 7944 E: gladstone@alsglobal.com

MACKAY 76 Harbour Road, Mackay QLD 4740
Ph: 07 944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road, Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MURDOCH 1/29 Sydney Road, Murdoch NSW 2850
Ph: 02 6372 6735 E: murdoch@alsglobal.com

NEWCASTLE 5/585 Mainland Road, Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

NEWCASTLE 4/13 Geary Place, North Newcastle NSW 2511
Ph: 02 4423 2063 E: newcastle@alsglobal.com

PERTH 10 Hod Way, Maraga WA 6050
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road, Smithfield NSW 2154
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14 15 Desma Court, Bonnie QLD 4818
Ph: 07 4796 0600 E: townsville@alsglobal.com

WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: **Golder Associates Pty Ltd**

OFFICE: **Golder - Brisbane**

PROJECT: **Inland Rail (Pkg 11)**

PROJECT NO.: **1897791**

ORDER NUMBER:

PURCHASE ORDER NO.:

PROJECT MANAGER: **Mitch McGinnis**

CONTACT PH:

SAMPLER: **Hannah Groves / Ying Zhang**

SAMPLER MOBILE: **0405 046 250**

COC Emailed to ALS? (YES / **NO**)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): **skumarapeli@golder.com.au, hgroves@golder.com.au**

Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENTS:

(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

ALS QUOTE NO.:

COUNTRY OF ORIGIN:

☒ Standard TAT (List due date): **48 hrs**

☐ Non Standard or urgent TAT (List due date):

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt °C

Other comment

RELINQUISHED BY:

HANNAH GROVES

DATE/TIME:

04/02/19

RECEIVED BY:

KYLE

DATE/TIME:

4/2/19 14:15

RELINQUISHED BY:

DATE/TIME:

RECEIVED BY:

DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB: Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottle required)							Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Anions/Cations: Ca, Mg, Na, Cl, F, SO4 Alkalinity, Hardness	EC, pH, TDS	Total/Dissolved Metals: As, B, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Fe, Ni, Pb, Se, V, Zn, Hg	Nutrients: Nitrate, Nitrite, Ammonia	Reactive Phosphorus, Total P, Total N, TKN	Sodium Adsorption Ratio		Comments on likely contaminant levels, dilutions, or samples requiring specific GC analysis etc	
1	310-01-BH2215	30/01/19 7:33	W		4	✓	✓	✓	✓	✓	✓		SENT	
2	310-01-BH2248	01/02/19	W		4	✓	✓	✓	✓	✓	✓			
3	310-01-BH2343	01/02/19 11:06	W		4	✓	✓	✓	✓	✓	✓			
4	310-01-BH2345	01/02/19 9:46	W		4	✓	✓	✓	✓	✓	✓			
5	QA01	01/02/19 15:13	W		4	✓	✓	✓	✓	✓	✓			
													SENT	
TOTAL					20									

Environmental Division
Brisbane

Work Order Reference

EB1902654



Telephone: +61-7-3243 7222

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;

Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles

CERTIFICATE OF ANALYSIS

Work Order : **EB1824393**
Client : **GOLDER ASSOCIATES**
Contact : **MR MITCH McGINNIS**
Address : **P O BOX 1734**
MILTON QLD, AUSTRALIA 4064
Telephone : **+61 07 3721 5400**
Project : **1897791 Inland Rail (P11)**
Order number : **1897791**
C-O-C number : **----**
Sampler : **ROB, SUSANTHA KUMARAPELI**
Site : **----**
Quote number : **EN/002/18 National BQ**
No. of samples received : **2**
No. of samples analysed : **2**

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Andrew Epps
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3243 7222
Date Samples Received : 10-Oct-2018 12:00
Date Analysis Commenced : 10-Oct-2018
Issue Date : 17-Oct-2018 10:49



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH 2206	310-01-BH 2210	----	----	----
Client sampling date / time					08-Oct-2018 14:20	09-Oct-2018 09:20	----	----	----
Compound	CAS Number	LOR	Unit		EB1824393-001	EB1824393-002	-----	-----	-----
				Result	Result		----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.40	7.76	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		6.30	43.2	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		487	7820	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		326	4760	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L		54	692	----	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L		54	692	----	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L		13	108	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		115	1870	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		5	24	----	----	----
Magnesium	7439-95-4	1	mg/L		4	43	----	----	----
Sodium	7440-23-5	1	mg/L		78	1530	----	----	----
Potassium	7440-09-7	1	mg/L		4	14	----	----	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO ₃	----	1	mg/L		29	237	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	0.002	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		0.202	1.91	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.005	0.003	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.009	0.004	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.019	0.008	----	----	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH 2206	310-01-BH 2210	----	----	----
Client sampling date / time					08-Oct-2018 14:20	09-Oct-2018 09:20	----	----	----
Compound	CAS Number	LOR	Unit		EB1824393-001	EB1824393-002	-----	-----	-----
				Result	Result		----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Manganese	7439-96-5	0.001	mg/L		0.087	3.60	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	0.20	----	----	----
Iron	7439-89-6	0.05	mg/L		2.51	0.45	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	0.011	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	0.004	----	----	----
Barium	7440-39-3	0.001	mg/L		0.219	4.48	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	0.0004	----	----	----
Chromium	7440-47-3	0.001	mg/L		0.001	0.112	----	----	----
Copper	7440-50-8	0.001	mg/L		0.002	0.155	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.006	0.060	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.012	0.053	----	----	----
Lead	7439-92-1	0.001	mg/L		0.002	0.106	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.022	0.382	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.100	6.00	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	0.15	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	0.25	----	----	----
Iron	7439-89-6	0.05	mg/L		3.14	77.0	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	1.6	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.06	0.10	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.06	0.07	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH 2206	310-01-BH 2210	----	----	----
Client sampling date / time					08-Oct-2018 14:20	09-Oct-2018 09:20	----	----	----
Compound	CAS Number	LOR	Unit		EB1824393-001	EB1824393-002	-----	-----	-----
Result					Result	Result	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.06	0.07	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		2.0	2.0	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.1	2.1	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.10	0.78	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		4.59	68.8	----	----	----
Total Cations	----	0.01	meq/L		4.20	----	----	----	----
Total Cations	----	0.01	meq/L		----	71.6	----	----	----
Ionic Balance	----	0.01	%		4.44	----	----	----	----
Ionic Balance	----	0.01	%		----	2.01	----	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB1824567**
Client : **GOLDER ASSOCIATES**
Contact : **MR SUSANTHA KUMARAPALI**
Address : **P O BOX 1734**
MILTON QLD, AUSTRALIA 4064
Telephone : **+61 07 3721 5400**
Project : **1897791 Inland Rail Package 11**
Order number : **1897791**
C-O-C number :
Sampler : **ROBERT CUPPER**
Site : **----**
Quote number : **EN/002/18 National BQ**
No. of samples received : **3**
No. of samples analysed : **3**

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Andrew Epps
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3243 7222
Date Samples Received : 11-Oct-2018 16:45
Date Analysis Commenced : 12-Oct-2018
Issue Date : 17-Oct-2018 15:28



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

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Where moisture determination has been performed, results are reported on a dry weight basis.

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2347	GW 981	310-01-BH2344	----	----
Client sampling date / time					11-Oct-2018 10:10	11-Oct-2018 10:30	11-Oct-2018 13:15	----	----
Compound	CAS Number	LOR	Unit		EB1824567-001	EB1824567-002	EB1824567-003	-----	-----
				Result	Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.64	7.64	7.63	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1220	1220	1220	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		772	760	708	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		312	306	516	----	----
Total Alkalinity as CaCO3	----	1	mg/L		312	306	516	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		9	9	13	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		240	240	108	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		57	57	71	----	----
Magnesium	7439-95-4	1	mg/L		66	67	73	----	----
Sodium	7440-23-5	1	mg/L		67	68	63	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	2	----	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		414	418	478	----	----
^ Sodium Adsorption Ratio	----	0.01	-		1.43	1.45	1.25	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Barium	7440-39-3	0.001	mg/L		0.093	0.096	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L		0.002	0.002	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		0.003	0.003	0.003	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	0.007	0.006	----	----
Manganese	7439-96-5	0.001	mg/L		0.134	0.133	0.327	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2347	GW 981	310-01-BH2344	----	----
Client sampling date / time					11-Oct-2018 10:10	11-Oct-2018 10:30	11-Oct-2018 13:15	----	----
Compound	CAS Number	LOR	Unit		EB1824567-001	EB1824567-002	EB1824567-003	-----	-----
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L		0.08	0.08	0.08	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Barium	7440-39-3	0.001	mg/L		0.105	0.104	0.019	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		0.003	0.002	0.003	----	----
Copper	7440-50-8	0.001	mg/L		0.002	0.001	0.004	----	----
Cobalt	7440-48-4	0.001	mg/L		0.004	0.003	0.005	----	----
Nickel	7440-02-0	0.001	mg/L		0.005	0.004	0.019	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		0.008	0.006	0.008	----	----
Manganese	7439-96-5	0.001	mg/L		0.159	0.148	0.446	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L		0.73	0.37	4.58	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.3	0.3	0.2	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.04	0.03	0.04	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	0.08	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.80	0.92	5.24	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.80	0.92	5.32	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2347	GW 981	310-01-BH2344	----	----
Client sampling date / time					11-Oct-2018 10:10	11-Oct-2018 10:30	11-Oct-2018 13:15	----	----
Compound	CAS Number	LOR	Unit		EB1824567-001	EB1824567-002	EB1824567-003	-----	-----
				Result	Result	Result		----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.5	1.4	1.6	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.3	2.3	6.9	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	0.06	0.32	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	0.02	<0.01	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		13.2	13.1	13.6	----	----
Total Cations	----	0.01	meq/L		11.2	11.3	12.3	----	----
Ionic Balance	----	0.01	%		8.20	7.20	4.94	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB1824576**
Client : **GOLDER ASSOCIATES**
Contact : **MR MITCH MCGINNIS**
Address : **P O BOX 1734**
MILTON QLD, AUSTRALIA 4064
Telephone : **+61 07 3721 5400**
Project : **Inland Rail Pack II**
Order number : **Inland Rail Pack II**
C-O-C number : **----**
Sampler : **SUSANTHA KUMARAPELI**
Site : **----**
Quote number : **EN/002/18 National BQ**
No. of samples received : **2**
No. of samples analysed : **2**

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Andrew Epps
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3243 7222
Date Samples Received : 11-Oct-2018 11:40
Date Analysis Commenced : 12-Oct-2018
Issue Date : 17-Oct-2018 16:02



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2216	310-01-BH2203	----	----	----
Client sampling date / time					09-Oct-2018 13:50	10-Oct-2018 07:00	----	----	----
Compound	CAS Number	LOR	Unit		EB1824576-001	EB1824576-002	-----	-----	-----
				Result	Result		----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.33	7.14	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		6260	506	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		3880	966	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		12	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		419	166	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		431	166	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		76	4	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1790	61	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		141	13	----	----	----
Magnesium	7439-95-4	1	mg/L		85	4	----	----	----
Sodium	7440-23-5	1	mg/L		912	101	----	----	----
Potassium	7440-09-7	1	mg/L		8	3	----	----	----
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		702	49	----	----	----
^ Sodium Adsorption Ratio	----	0.01	-		15.0	6.28	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.003	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		0.260	0.267	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	0.002	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.008	0.005	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.686	0.565	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.005	0.007	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2216	310-01-BH2203	----	----	----
Client sampling date / time					09-Oct-2018 13:50	10-Oct-2018 07:00	----	----	----
Compound	CAS Number	LOR	Unit		EB1824576-001	EB1824576-002	-----	-----	-----
				Result	Result		----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.015	0.018	----	----	----
Boron	7440-42-8	0.05	mg/L		0.06	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L		3.41	7.34	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.003	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		0.277	0.318	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	0.002	----	----	----
Cobalt	7440-48-4	0.001	mg/L		0.008	0.006	----	----	----
Copper	7440-50-8	0.001	mg/L		0.002	0.003	----	----	----
Lead	7439-92-1	0.001	mg/L		0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		0.792	0.649	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.005	0.008	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		0.012	0.012	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L		5.19	8.56	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.08	0.09	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.01	0.03	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.9	2.4	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.08	0.08	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				310-01-BH2216	310-01-BH2203	----	----	----
Client sampling date / time				09-Oct-2018 13:50	10-Oct-2018 07:00	----	----	----
Compound	CAS Number	LOR	Unit	EB1824576-001	EB1824576-002	-----	-----	-----
Result				Result	Result	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	60.7	5.12	----	----	----
Total Cations	----	0.01	meq/L	53.9	5.45	----	----	----
Ionic Balance	----	0.01	%	5.92	3.10	----	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB1826453**
Client : **GOLDER ASSOCIATES**
Contact : MR MITCH McGINNIS
Address : P O BOX 1734
MILTON QLD, AUSTRALIA 4064
Telephone : +61 07 3721 5400
Project : 1897791
Order number : 1897791
C-O-C number : ----
Sampler : SUSANTHA
Site : Inland Rail (P11)
Quote number : EN/002/18 National BQ
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Andrew Epps
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8639
Date Samples Received : 01-Nov-2018 15:00
Date Analysis Commenced : 01-Nov-2018
Issue Date : 05-Nov-2018 14:56



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2235	310-01-BH2234	310-01-BH2233	310-01-BH2231	310-01-BH2309
Client sampling date / time					29-Oct-2018 13:15	29-Oct-2018 16:20	30-Oct-2018 10:00	30-Oct-2018 13:40	31-Oct-2018 07:15
Compound	CAS Number	LOR	Unit		EB1826453-001	EB1826453-002	EB1826453-003	EB1826453-004	EB1826453-005
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.81	7.91	7.79	7.65	6.99
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1020	582	635	1020	3560
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	----	1770
Total Dissolved Solids @180°C	----	10	mg/L		724	374	442	792	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	381	208	225	448	133	
Total Alkalinity as CaCO3	----	1	mg/L	381	208	225	448	133	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	6	7	8	22	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	113	56	66	68	1060	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	63	24	36	37	25	
Magnesium	7439-95-4	1	mg/L	31	15	18	28	24	
Sodium	7440-23-5	1	mg/L	118	80	74	164	640	
Potassium	7440-09-7	1	mg/L	2	1	1	2	4	
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L	285	122	164	208	161	
^ Sodium Adsorption Ratio	----	0.01	-	3.04	3.15	2.51	4.95	21.9	
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	0.002	0.002	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.367	0.079	0.153	0.215	0.706	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.015	0.006	0.006	0.012	0.032	
Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	<0.001	0.005	0.002	
Copper	7440-50-8	0.001	mg/L	0.005	<0.001	<0.001	0.005	0.001	
Manganese	7439-96-5	0.001	mg/L	2.14	0.553	0.371	0.510	0.718	
Nickel	7440-02-0	0.001	mg/L	0.017	0.005	0.004	0.010	0.022	

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2235	310-01-BH2234	310-01-BH2233	310-01-BH2231	310-01-BH2309
Client sampling date / time				29-Oct-2018 13:15	29-Oct-2018 16:20	30-Oct-2018 10:00	30-Oct-2018 13:40	31-Oct-2018 07:15	
Compound	CAS Number	LOR	Unit	EB1826453-001	EB1826453-002	EB1826453-003	EB1826453-004	EB1826453-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	<0.001	0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.024	<0.005	0.006	0.009	0.015	
Iron	7439-89-6	0.05	mg/L	3.80	0.15	0.58	2.99	3.72	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	0.002	0.003	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.361	0.092	0.170	0.220	0.704	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.018	0.007	0.007	0.014	0.035	
Chromium	7440-47-3	0.001	mg/L	0.003	0.002	<0.001	0.005	0.003	
Copper	7440-50-8	0.001	mg/L	0.006	0.001	<0.001	0.006	0.006	
Manganese	7439-96-5	0.001	mg/L	2.16	0.583	0.424	0.523	0.736	
Nickel	7440-02-0	0.001	mg/L	0.019	0.006	0.005	0.010	0.024	
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	<0.001	0.001	0.006	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.011	<0.005	<0.005	<0.005	0.010	
Iron	7439-89-6	0.05	mg/L	5.12	1.08	1.07	3.40	3.90	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.2	0.3	0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	<0.01	0.02	0.07	0.02	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.08	0.08	0.13	0.16	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2235	310-01-BH2234	310-01-BH2233	310-01-BH2231	310-01-BH2309
Client sampling date / time					29-Oct-2018 13:15	29-Oct-2018 16:20	30-Oct-2018 10:00	30-Oct-2018 13:40	31-Oct-2018 07:15
Compound	CAS Number	LOR	Unit		EB1826453-001	EB1826453-002	EB1826453-003	EB1826453-004	EB1826453-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.08	0.08	0.13	0.16	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		23.2	0.2	1.6	7.2	10.0
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		23.3	0.3	1.7	7.4	10.0
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.30	0.15	0.17	0.21	0.03
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.10	0.06	0.05	0.10	<0.01
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		10.9	5.86	6.50	11.0	33.0
Total Cations	----	0.01	meq/L		10.9	5.94	6.52	11.3	31.2
Ionic Balance	----	0.01	%		0.02	0.65	0.15	1.34	2.89

CERTIFICATE OF ANALYSIS

Work Order : **EB1826618**
Client : **GOLDER ASSOCIATES**
Contact : **MR MITCH MCGINNIS**
Address : **P O BOX 1734**
MILTON QLD, AUSTRALIA 4064
Telephone : **+61 07 3721 5400**
Project : **1897791 Inland Rail (P11)**
Order number : **1897791**
C-O-C number : **----**
Sampler : **SUSANTHA KUMARAPELI**
Site : **----**
Quote number : **EN/002/18 National BQ**
No. of samples received : **1**
No. of samples analysed : **1**

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Andrew Epps
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8639
Date Samples Received : 02-Nov-2018 13:22
Date Analysis Commenced : 03-Nov-2018
Issue Date : 08-Nov-2018 15:02



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for sample EB1826618-001(310-01-BH2201). However, the difference is within experimental variation of the methods.
- It is recognised that EK067G (Total Phosphorus) is less than EK071G (Reactive Phosphorus) for sample EB1826618_001. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	310-01-BH2201	----	----	----	----
Client sampling date / time				02-Nov-2018 11:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1826618-001	-----	-----	-----	-----
Result				----	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.64	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1160	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	711	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	388	----	----	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	388	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	10	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	149	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	24	----	----	----	----
Magnesium	7439-95-4	1	mg/L	4	----	----	----	----
Sodium	7440-23-5	1	mg/L	241	----	----	----	----
Potassium	7440-09-7	1	mg/L	4	----	----	----	----
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO ₃	----	1	mg/L	76	----	----	----	----
^ Sodium Adsorption Ratio	----	0.01	-	12.0	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	0.07	----	----	----	----
Barium	7440-39-3	0.001	mg/L	0.164	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	0.002	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.008	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2201	----	----	----	----
Client sampling date / time				02-Nov-2018 11:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1826618-001	-----	-----	-----	-----	-----
Result				----	----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	----
Iron	7439-89-6	0.05	mg/L	0.06	----	----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----	----
Boron	7440-42-8	0.05	mg/L	0.05	----	----	----	----	----
Barium	7440-39-3	0.001	mg/L	0.170	----	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	0.002	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.009	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	----
Iron	7439-89-6	0.05	mg/L	0.15	----	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	----	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.05	----	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.09	----	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.33	----	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.42	----	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2201	----	----	----	----
Client sampling date / time					02-Nov-2018 11:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB1826618-001	-----	-----	-----	-----
Result						----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.7	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.01	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		12.2	----	----	----	----
Total Cations	----	0.01	meq/L		12.1	----	----	----	----
Ionic Balance	----	0.01	%		0.21	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB1902654**
Client : **GOLDER ASSOCIATES**
Contact : **MR MITCH McGINNIS**
Address : **P O BOX 1734**
MILTON QLD, AUSTRALIA 4064
Telephone : **+61 07 3721 5400**
Project : **1897791 Inland Rail (Pkg 11)**
Order number :
C-O-C number :
Sampler : **HANNAH GROVES, Ying Zhang**
Site :
Quote number : **EN/002/18 National BQ**
No. of samples received : **5**
No. of samples analysed : **5**

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Andrew Epps
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8639
Date Samples Received : 04-Feb-2019 14:15
Date Analysis Commenced : 04-Feb-2019
Issue Date : 07-Feb-2019 09:05



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

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Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2215	310-01-BH2248	310-01-BH2343	310-01-BH2345	QA01
Client sampling date / time					30-Jan-2019 07:33	01-Feb-2019 00:00	01-Feb-2019 11:06	01-Feb-2019 09:46	01-Feb-2019 15:13
Compound	CAS Number	LOR	Unit		EB1902654-001	EB1902654-002	EB1902654-003	EB1902654-004	EB1902654-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.66	8.38	8.27	8.03	8.44
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		11900	762	558	1690	762
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		7180	457	337	1230	488
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	10	<1	<1	16
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		297	257	190	419	251
Total Alkalinity as CaCO3	----	1	mg/L		297	267	190	419	267
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		225	2	3	6	2
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		3850	88	65	323	88
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		99	18	32	126	19
Magnesium	7439-95-4	1	mg/L		166	17	30	90	16
Sodium	7440-23-5	1	mg/L		2140	138	38	78	128
Potassium	7440-09-7	1	mg/L		12	2	2	4	2
ED093F: SAR and Hardness Calculations									
Total Hardness as CaCO3	----	1	mg/L		931	115	203	685	113
^ Sodium Adsorption Ratio	----	0.01	-		30.5	5.60	1.16	1.30	5.23
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		0.06	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.284	0.133	0.009	0.024	0.131
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.012	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	0.003	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.002	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.906	0.024	0.068	0.109	0.020
Nickel	7440-02-0	0.001	mg/L		0.008	<0.001	0.002	0.002	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2215	310-01-BH2248	310-01-BH2343	310-01-BH2345	QA01
Client sampling date / time					30-Jan-2019 07:33	01-Feb-2019 00:00	01-Feb-2019 11:06	01-Feb-2019 09:46	01-Feb-2019 15:13
Compound	CAS Number	LOR	Unit		EB1902654-001	EB1902654-002	EB1902654-003	EB1902654-004	EB1902654-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.017	<0.005	0.006	0.005	0.005
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		0.08	0.06	<0.05	<0.05	0.06
Barium	7440-39-3	0.001	mg/L		0.282	0.163	0.016	0.054	0.170
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.014	<0.001	0.002	0.007	<0.001
Chromium	7440-47-3	0.001	mg/L		0.002	0.005	0.002	0.011	0.004
Copper	7440-50-8	0.001	mg/L		0.002	0.002	0.030	0.010	0.002
Manganese	7439-96-5	0.001	mg/L		0.971	0.036	0.101	0.279	0.037
Nickel	7440-02-0	0.001	mg/L		0.010	<0.001	0.007	0.029	0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	0.002	0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		0.013	0.011	0.014	0.027	0.010
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.2	0.1	<0.1	0.1	0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.02	0.07	<0.01	0.02	0.08
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	0.31	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.04	0.02	0.09	0.57	0.02
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.04	0.02	0.09	0.88	0.02
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.2	0.2	0.3	0.2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	310-01-BH2215	310-01-BH2248	310-01-BH2343	310-01-BH2345	QA01
Client sampling date / time					30-Jan-2019 07:33	01-Feb-2019 00:00	01-Feb-2019 11:06	01-Feb-2019 09:46	01-Feb-2019 15:13
Compound	CAS Number	LOR	Unit		EB1902654-001	EB1902654-002	EB1902654-003	EB1902654-004	EB1902654-005
				Result	Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	0.2	0.3	1.2	0.2
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.07	0.03	0.09	0.30	0.04
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.06	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		119	7.86	5.69	17.6	7.86
Total Cations	----	0.01	meq/L		112	8.35	5.77	17.2	7.88
Ionic Balance	----	0.01	%		3.13	3.04	0.68	1.20	0.16

QUALITY CONTROL REPORT

Work Order	: EB1824393	Page	: 1 of 9
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH McGINNIS	Contact	: Andrew Epps
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3721 5400	Telephone	: +61 7 3243 7222
Project	: 1897791 Inland Rail (P11)	Date Samples Received	: 10-Oct-2018
Order number	: 1897791	Date Analysis Commenced	: 10-Oct-2018
C-O-C number	: ----	Issue Date	: 17-Oct-2018
Sampler	: ROB, SUSANTHA KUMARAPALI		
Site	: ----		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 2		
No. of samples analysed	: 2		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER					Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 1975579)									
EB1824393-002	310-01-BH 2210	EA005-P: pH Value	----	0.01	pH Unit	7.76	7.82	0.770	0% - 20%
EB1824402-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.34	6.31	0.474	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1975577)									
EB1824393-002	310-01-BH 2210	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	7820	7840	0.386	0% - 20%
EB1824294-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	318	318	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1975561)									
EB1824294-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	194	186	4.39	0% - 50%
EB1824369-005	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	182	180	1.29	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 1975576)									
EB1824334-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	774	786	1.59	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	774	786	1.59	0% - 20%
EB1824294-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	142	135	4.52	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	136	3.82	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1975253)									
EB1824398-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	7	0.00	No Limit
EB1824135-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	9	9	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 1975256)									
EB1824398-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	59	58	0.00	0% - 20%
EB1824135-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	90	90	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1975687)									

EG020T: Total Metals by ICP-MS (QC Lot: 1975804)

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 Work Order : EB1824393
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (P11)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1975804) - continued									
EB1824366-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.014	0.013	0.00	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.022	0.022	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.70	0.68	2.20	0% - 50%
EB1824385-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.048	0.048	0.00	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	2 µg/L	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.303	0.292	3.67	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<5 µg/L	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.64	0.64	0.00	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	310 µg/L	0.30	3.40	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1975688)									
EB1824393-001	310-01-BH 2206	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB1824291-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1975867)									
EB1822040-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.0005	<0.0001	128	No Limit
EB1824294-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 1975575)									
EB1824393-002	310-01-BH 2210	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.6	1.6	0.00	0% - 50%
EB1824294-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit

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 Work Order : EB1824393
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (P11)



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1978048)									
EB1824107-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.05	50.8	No Limit
EB1824393-001	310-01-BH 2206	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.02	84.6	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1975254)									
EB1824398-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB1824135-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1978049)									
EB1824107-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.20	0.20	0.00	0% - 20%
EB1824393-001	310-01-BH 2206	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.06	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1975619)									
EB1824270-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
EB1824366-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.5	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1975618)									
EB1824270-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.47	0.47	0.00	0% - 20%
EB1824366-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.06	30.6	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1975255)									
EB1824135-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 1975579)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 1975577)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	101	91	107
				<1	12890 µS/cm	98.8	91	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1975561)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	103	88	112
				<10	2000 mg/L	100	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 1975576)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	114	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1975253)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	85	118
				<1	100 mg/L	99.0	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 1975256)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.9	90	115
				<1	1000 mg/L	98.0	90	115
ED093F: Dissolved Major Cations (QCLot: 1975687)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 1975686)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.8	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	98.4	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.1	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.0	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	86	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.5	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.2	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.9	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	108	88	114



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 1975686) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	94.9	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.9	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1975804)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.7	81	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	95.0	70	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.5	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	89	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	89	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	88	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.8	79	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	103	87	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	99.3	84	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.9	82	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82	118
EG035F: Dissolved Mercury by FIMS (QCLot: 1975688)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	118	84	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1975867)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.1	84	118
EK040P: Fluoride by PC Titrator (QCLot: 1975575)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	105	80	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1978048)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	111	86	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1975254)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.1	90	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1978049)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	89	115
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1975619)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	89.0	70	111
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1975618)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	98.8	77	109
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1975255)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	99.6	88	115



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1975253)							
EB1824393-001	310-01-BH 2206	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	101	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1975256)							
EB1824393-001	310-01-BH 2206	ED045G: Chloride	16887-00-6	400 mg/L	101	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1975686)							
EB1822040-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	107	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	99.6	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	99.8	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	99.1	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	98.7	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	96.7	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	94.8	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	101	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	104	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	100	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	89.5	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1975804)							
EB1824366-004	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	95.5	70	130
		EG020A-T: Beryllium	7440-41-7	0.1 mg/L	91.6	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	95.4	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	94.8	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	100	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	95.0	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	97.7	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	92.0	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	94.5	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.8	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	98.1	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.9	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1975688)							
EB1822040-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	105	70	130

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 Work Order : EB1824393
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (P11)



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1975867)							
EB1822040-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	87.6	70	130
EK040P: Fluoride by PC Titrator (QCLot: 1975575)							
EB1824294-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	86.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1978048)							
EB1824107-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	97.5	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1975254)							
EB1824393-001	310-01-BH 2206	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	109	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1978049)							
EB1824107-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	97.3	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1975619)							
EB1824270-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	103	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1975618)							
EB1824270-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	97.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1975255)							
EB1824393-001	310-01-BH 2206	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	106	70	130

QUALITY CONTROL REPORT

Work Order	: EB1824567	Page	: 1 of 11
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR SUSANTHA KUMARAPELI	Contact	: Andrew Epps
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3721 5400	Telephone	: +61 7 3243 7222
Project	: 1897791 Inland Rail Package 11	Date Samples Received	: 11-Oct-2018
Order number	: 1897791	Date Analysis Commenced	: 12-Oct-2018
C-O-C number	:	Issue Date	: 17-Oct-2018
Sampler	: ROBERT CUPPER		
Site	: ----		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 3		
No. of samples analysed	: 3		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 1977939)									
EB1824567-002	GW 981	EA005-P: pH Value	----	0.01	pH Unit	7.64	7.67	0.392	0% - 20%
EB1822067-004	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.85	7.81	0.511	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1977938)									
EB1824567-002	GW 981	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1220	1220	0.165	0% - 20%
EB1822067-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	693	695	0.291	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1980791)									
EB1824523-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	523	525	0.381	0% - 20%
EB1824538-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1460	1460	0.228	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1977940)									
EB1822067-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	235	233	0.577	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	235	233	0.577	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1977923)									
EB1824570-024	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.00	No Limit
EB1824540-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	11	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 1977921)									
EB1824317-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	289	290	0.00	0% - 20%
EB1824540-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	67	66	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1978039)									
EB1824400-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	10	10	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	36	36	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	548	543	0.879	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit

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 Work Order : EB1824567
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail Package 11



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 1978039) - continued									
EB1824400-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	13	12	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	20	20	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	151	152	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 1978043)									
ET1802556-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	19	18	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	49	48	2.21	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EB1824567-003	310-01-BH2344	ED093F: Calcium	7440-70-2	1	mg/L	71	72	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	73	73	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	63	64	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1978040)									
EB1824400-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.280	0.281	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.027	0.027	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.22	0.22	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.70	0.69	0.00	0% - 50%
EB1824400-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.017	0.018	0.00	0% - 50%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.083	0.085	2.55	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.730	0.723	0.863	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.008	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1978040) - continued									
EB1824400-010	Anonymous	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.11	0.11	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	10.0	10.0	0.439	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1978042)									
ET1802556-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.049	0.048	2.23	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.033	0.031	4.35	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.011	0.011	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.07	0.07	0.00	No Limit
EB1824567-003	310-01-BH2344	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.327	0.328	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.08	0.07	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1978194)									
EB1824503-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.001	0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1978194) - continued									
EB1824503-001	Anonymous	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit		
EB1824557-008	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.374	0.394	5.19	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.011	0.012	0.00	0% - 50%
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.026	0.027	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.20	0.18	9.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1978041)									
EB1824567-001	310-01-BH2347	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1978196)									
EB1824557-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB1824576-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 1977941)									
EB1822067-004	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1982232)									
EB1821488-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.90	1.94	1.82	0% - 50%
EB1824567-003	310-01-BH2344	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.03	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1977922)									
EB1824317-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.00	No Limit
EB1824540-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit

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 Work Order : EB1824567
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail Package 11



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1982231)									
EB1821488-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	10.3	10.1	1.44	0% - 20%
EB1824567-003	310-01-BH2344	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	5.32	5.38	1.16	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1978265)									
EB1824537-013	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.5	<0.5	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1978264)									
EB1824537-013	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.05	<0.05	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1977924)									
EB1824540-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.35	0.35	0.00	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 1977939)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 1977938)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	101	91	107
				<1	24800 µS/cm	98.9	91	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1980791)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	98.3	88	112
				<10	2000 mg/L	103	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 1977940)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	108	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1977923)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85	118
				<1	100 mg/L	96.2	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 1977921)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.4	90	115
				<1	1000 mg/L	98.5	90	115
ED093F: Dissolved Major Cations (QCLot: 1978039)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 1978043)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978040)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.6	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.5	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	88.9	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.4	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.8	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.2	86	112



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978040) - continued								
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	95.8	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.9	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.2	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.7	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.3	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.9	88	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	94.2	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.7	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.4	82	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978042)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.1	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.5	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	88.6	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.0	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.8	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.4	86	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	95.8	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.2	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.1	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.2	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	91.7	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.2	88	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	93.5	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	94.2	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.5	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1978194)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	88	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.4	81	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	98.0	70	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.1	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	104	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	104	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.9	89	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.5	88	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.2	79	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	104	87	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	97.8	84	114



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020T: Total Metals by ICP-MS (QCLot: 1978194) - continued								
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	82	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	82	118
EG035F: Dissolved Mercury by FIMS (QCLot: 1978041)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.1	84	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1978196)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.6	84	118
EK040P: Fluoride by PC Titrator (QCLot: 1977941)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	112	80	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1982232)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	108	86	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1977922)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.3	90	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1982231)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	89	115
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1978265)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	84.5	70	111
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1978264)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	88.8	77	109
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1977924)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	99.6	88	115

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1977923)							
EB1824568-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1977921)							
EB1824317-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	104	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978040)							
EB1824400-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	95.1	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	86.8	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978040) - continued							
EB1824400-002	Anonymous	EG020A-F: Barium	7440-39-3	0.5 mg/L	97.4	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	93.4	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	93.5	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	86.8	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	84.5	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	87.5	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	86.5	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	90.3	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	97.6	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	87.9	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	87.2	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978042)							
EB1824576-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	98.1	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	96.3	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	94.4	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	93.3	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	89.2	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	90.6	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.9	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	92.7	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	84.6	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	87.8	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	94.0	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	93.2	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	89.8	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1978194)							
EB1824506-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.5	70	130
		EG020A-T: Beryllium	7440-41-7	0.1 mg/L	96.3	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	96.6	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	94.7	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.8	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	97.0	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	98.1	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	95.8	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	95.9	70	130

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 Work Order : EB1824567
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail Package 11



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1978194) - continued							
EB1824506-001	Anonymous	EG020A-T: Nickel	7440-02-0	1 mg/L	93.2	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	101	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	94.1	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1978041)							
EB1824567-002	GW 981	EG035F: Mercury	7439-97-6	0.01 mg/L	81.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1978196)							
EB1824557-003	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	82.7	70	130
EK040P: Fluoride by PC Titrator (QCLot: 1977941)							
EB1822067-005	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1982232)							
EB1821488-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1977922)							
EB1824317-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	98.0	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1982231)							
EB1821488-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	88.1	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1978265)							
EB1824537-014	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	100.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1978264)							
EB1824537-014	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	109	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1977924)							
EB1824548-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	109	70	130

QUALITY CONTROL REPORT

Work Order	: EB1824576	Page	: 1 of 9
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH McGINNIS	Contact	: Andrew Epps
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3721 5400	Telephone	: +61 7 3243 7222
Project	: Inland Rail Pack II	Date Samples Received	: 11-Oct-2018
Order number	: Inland Rail Pack II	Date Analysis Commenced	: 12-Oct-2018
C-O-C number	: ----	Issue Date	: 17-Oct-2018
Sampler	: SUSANTHA KUMARAPELI		
Site	: ----		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 2		
No. of samples analysed	: 2		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 1979413)									
EB1818951-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.01	6.92	1.29	0% - 20%
EB1824543-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.38	7.28	1.36	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1979412)									
EB1818951-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1550	1550	0.390	0% - 20%
EB1824543-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1820	1810	0.446	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 1980791)									
EB1824523-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	523	525	0.381	0% - 20%
EB1824538-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1460	1460	0.228	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1979414)									
EB1824290-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	31	37	17.1	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	383	386	0.834	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	414	423	2.16	0% - 20%
EB1824595-018	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116	119	2.34	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	119	2.34	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1979589)									
EB1824663-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	82	80	1.73	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1979588)									
EB1823984-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 1978043)									
ET1802556-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	19	18	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 1978043) - continued									
ET1802556-004	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	49	48	2.21	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EB1824567-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	71	72	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	73	73	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	63	64	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1978042)									
ET1802556-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.049	0.048	2.23	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.033	0.031	4.35	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.011	0.011	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.07	0.07	0.00	No Limit
EB1824567-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.327	0.328	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.08	0.07	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1978194)									
EB1824503-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1978194) - continued									
EB1824503-001	Anonymous	EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EB1824557-008	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.374	0.394	5.19	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.011	0.012	0.00	0% - 50%
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.026	0.027	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.20	0.18	9.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1978041)									
EB1824567-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1978196)									
EB1824557-002	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB1824576-001	310-01-BHZ216	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1980235)									
EB1816606-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.00	No Limit
EB1822068-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	28.9	27.8	3.95	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1982232)									
EB1821488-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.90	1.94	1.82	0% - 50%
EB1824567-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.03	0.00	No Limit

Page : 5 of 9
 Work Order : EB1824576
 Client : GOLDER ASSOCIATES
 Project : Inland Rail Pack II



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1980234)									
EB1816606-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.77	2.77	0.00	0% - 20%
EB1822068-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	74.9	77.3	3.10	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 1982231)									
EB1821488-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	10.3	10.1	1.44	0% - 20%
EB1824567-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	5.32	5.38	1.16	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1980882)									
EB1824317-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.1	3.0	0.00	No Limit
EB1824576-001	310-01-BHZ216	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.9	1.8	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1980883)									
EB1824576-001	310-01-BHZ216	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.09	0.00	No Limit
ET1802564-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.86	2.86	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 1979586)									
EB1824670-003	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	20 µg/L	0.02	0.00	No Limit
EB1823984-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 1979413)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 1979412)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	100	91	107
				<1	12890 µS/cm	99.6	91	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 1980791)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	98.3	88	112
				<10	2000 mg/L	103	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 1979414)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	95.4	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1979589)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.9	85	118
				<1	100 mg/L	93.6	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 1979588)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.7	90	115
				<1	1000 mg/L	109	90	115
ED093F: Dissolved Major Cations (QCLot: 1978043)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978042)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.1	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.5	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	88.6	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.0	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.8	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.4	86	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	95.8	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.2	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.1	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.2	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	91.7	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.2	88	114



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978042) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	93.5	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	94.2	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.5	82	114
EG020T: Total Metals by ICP-MS (QCLot: 1978194)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	88	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.4	81	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	98.0	70	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.1	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	104	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	104	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.9	89	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.5	88	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.2	79	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	104	87	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	97.8	84	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	82	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	82	118
EG035F: Dissolved Mercury by FIMS (QCLot: 1978041)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.1	84	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1978196)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.6	84	118
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1980235)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	95.3	86	112
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1982232)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	108	86	112
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1980234)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	89	115
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1982231)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	89	115
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1980882)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.0	70	111
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1980883)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.3	77	109
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1979586)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	98.6	88	115



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1979589)							
EB1824576-002	310-01-BHZ203	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	118	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1979588)							
EB1824576-002	310-01-BHZ203	ED045G: Chloride	16887-00-6	400 mg/L	106	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1978042)							
EB1824576-001	310-01-BHZ216	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	98.1	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	96.3	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	94.4	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	93.3	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	89.2	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	90.6	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.9	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	92.7	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	84.6	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	87.8	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	94.0	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	93.2	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	89.8	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1978194)							
EB1824506-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.5	70	130
		EG020A-T: Beryllium	7440-41-7	0.1 mg/L	96.3	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	96.6	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	94.7	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.8	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	97.0	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	98.1	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	95.8	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	95.9	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	93.2	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	101	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	94.1	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1978041)							
EB1824567-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	81.8	70	130

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 Work Order : EB1824576
 Client : GOLDER ASSOCIATES
 Project : Inland Rail Pack II



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1978196)							
EB1824557-003	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	82.7	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1980235)							
EB1818951-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	104	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1982232)							
EB1821488-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	# Not Determined	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1980234)							
EB1818951-005	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	# Not Determined	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 1982231)							
EB1821488-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	88.1	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1980882)							
EB1824576-002	310-01-BHZ203	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	89.7	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1980883)							
EB1824576-002	310-01-BHZ203	EK067G: Total Phosphorus as P	----	1 mg/L	94.5	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 1979586)							
EB1824576-002	310-01-BHZ203	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	116	70	130

QUALITY CONTROL REPORT

Work Order	: EB1826453	Page	: 1 of 10
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH McGINNIS	Contact	: Andrew Epps
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3721 5400	Telephone	: +61 7 3552 8639
Project	: 1897791	Date Samples Received	: 01-Nov-2018
Order number	: 1897791	Date Analysis Commenced	: 01-Nov-2018
C-O-C number	: ----	Issue Date	: 05-Nov-2018
Sampler	: SUSANTHA		
Site	: Inland Rail (P11)		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 5		
No. of samples analysed	: 5		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2015212)									
EB1826453-001	310-01-BH2235	EA005-P: pH Value	----	0.01	pH Unit	7.81	7.80	0.128	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2015213)									
EB1826453-001	310-01-BH2235	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1020	1020	0.498	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2015717)									
EB1826453-001	310-01-BH2235	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	724	774	6.76	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2015211)									
EB1826453-001	310-01-BH2235	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	381	380	0.278	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	381	380	0.278	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2015251)									
EB1826477-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	305	307	0.534	0% - 20%
EB1826453-001	310-01-BH2235	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	4	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2015252)									
EB1826477-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	463	461	0.486	0% - 20%
EB1826453-001	310-01-BH2235	ED045G: Chloride	16887-00-6	1	mg/L	113	114	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2015721)									
EB1826406-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	9	10	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	28	28	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EB1826295-015	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	381	382	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	258	256	0.443	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2030	1990	1.90	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 2015721) - continued									
EB1826295-015	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2016854)									
EB1826266-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	66	67	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	9	9	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	34	34	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.00	No Limit
EB1826426-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	18	19	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	117	118	1.61	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2015722)									
EB1826295-015	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.154	0.148	3.69	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.295	0.293	0.604	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.54	0.52	3.20	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.78	0.76	2.59	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2016855)									
EB1826266-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.61	1.62	0.160	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2016855) - continued									
EB1826266-001	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	0.08	0.08	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.79	1.83	2.02	0% - 20%
EB1826426-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.028	0.028	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.09	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2015714)									
EB1826414-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.1 µg/L	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	2 µg/L	0.002	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.074	0.074	0.00	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	2 µg/L	0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	24 µg/L	0.021	14.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	2 µg/L	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<5 µg/L	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<10 µg/L	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<10 µg/L	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	130 µg/L	0.14	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	320 µg/L	0.24	31.6	No Limit
EB1826295-015	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0004	<0.0001	114	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.175	0.172	2.17	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2015714) - continued									
EB1826295-015	Anonymous	EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.339	0.322	5.24	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	<0.005	21.2	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.54	0.52	4.50	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.48	1.42	4.44	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 2016856)									
ET1802746-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB1826426-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2015712)									
EB1826295-015	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2015210)									
EB1826453-001	310-01-BH2235	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2015264)									
EB1826453-001	310-01-BH2235	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.12	25.0	0% - 50%
EB1826477-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.09	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2015253)									
EB1826477-004	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB1826453-001	310-01-BH2235	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2015265)									
EB1826453-001	310-01-BH2235	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.08	0.08	0.00	No Limit
EB1826477-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2015244)									
EB1826453-001	310-01-BH2235	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	23.2	24.3	4.75	0% - 20%
EB1826477-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	10.8	10.7	0.00	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2015243)									
EB1826453-001	310-01-BH2235	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.30	0.30	0.00	0% - 20%
EB1826477-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.67	0.66	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2015250)									
EB1826453-001	310-01-BH2235	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.10	0.10	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 2015212)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2015213)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	100	91	107
				<1	12890 µS/cm	99.3	91	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2015717)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	103	88	112
				<10	2000 mg/L	101	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 2015211)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	93.4	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2015251)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	85	118
				<1	100 mg/L	102	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 2015252)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	107	90	115
				<1	1000 mg/L	104	90	115
ED093F: Dissolved Major Cations (QCLot: 2015721)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 2016854)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015722)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.0	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.2	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	88.8	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.1	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	109	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.8	86	112



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015722) - continued								
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	108	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.0	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.5	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.8	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.8	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	111	88	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	94.9	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.0	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.7	82	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 2016855)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.3	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.4	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	97.0	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.6	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.2	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.4	86	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	99.0	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.0	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.6	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.2	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.7	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	101	88	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	94.4	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.5	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.9	82	114
EG020T: Total Metals by ICP-MS (QCLot: 2015714)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.0	88	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	85.8	81	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	95.6	70	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.6	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	89	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	103	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	105	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.5	89	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.8	88	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.2	79	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	113	87	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	94.4	84	114



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2015714) - continued								
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.4	82	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.6	82	118
EG035F: Dissolved Mercury by FIMS (QCLot: 2015723)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.2	84	118
EG035F: Dissolved Mercury by FIMS (QCLot: 2016856)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.1	84	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2015712)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	84.9	84	118
EK040P: Fluoride by PC Titrator (QCLot: 2015210)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	106	80	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2015264)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	97.0	86	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2015253)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.9	90	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2015265)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.7	89	115
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2015244)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	99.9	70	111
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2015243)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.8	77	109
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2015250)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	92.6	88	115

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2015251)							
EB1826453-002	310-01-BH2234	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	108	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2015252)							
EB1826453-002	310-01-BH2234	ED045G: Chloride	16887-00-6	400 mg/L	108	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015722)							
EB1826467-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	99.6	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2015722) - continued							
EB1826467-001	Anonymous	EG020A-F: Beryllium	7440-41-7	0.1 mg/L	94.0	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	90.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	94.8	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	109	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	94.8	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	107	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	94.3	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	94.7	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	99.7	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	102	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	99.8	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	98.5	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2016855)							
EB1826266-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	102	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	99.8	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	96.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	93.6	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	96.1	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	97.8	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	82.9	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	96.8	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	96.5	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	97.2	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	72.0	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	96.2	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	100	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	92.0	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2015714)							
EB1826406-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	102	70	130
		EG020A-T: Beryllium	7440-41-7	0.1 mg/L	88.7	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	105	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	102	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	91.6	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	90.8	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	92.8	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	92.8	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	88.9	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	91.1	70	130

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 Work Order : EB1826453
 Client : GOLDER ASSOCIATES
 Project : 1897791



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2015714) - continued							
EB1826406-001	Anonymous	EG020A-T: Vanadium	7440-62-2	1 mg/L	96.6	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2016856)							
EB1826426-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	90.5	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2015712)							
EB1826414-001	Anonymous	EG035T: Mercury	7439-97-6	0.05 mg/L	84.3	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2015210)							
EB1826453-002	310-01-BH2234	EK040P: Fluoride	16984-48-8	5 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2015264)							
EB1826453-002	310-01-BH2234	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	82.0	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2015253)							
EB1826453-002	310-01-BH2234	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	101	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2015265)							
EB1826453-002	310-01-BH2234	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	100	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2015244)							
EB1826453-002	310-01-BH2234	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2015243)							
EB1826453-002	310-01-BH2234	EK067G: Total Phosphorus as P	----	1 mg/L	112	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2015250)							
EB1826453-002	310-01-BH2234	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	101	70	130

QUALITY CONTROL REPORT

Work Order	: EB1826618	Page	: 1 of 9
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH McGINNIS	Contact	: Andrew Epps
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3721 5400	Telephone	: +61 7 3552 8639
Project	: 1897791 Inland Rail (P11)	Date Samples Received	: 02-Nov-2018
Order number	: 1897791	Date Analysis Commenced	: 03-Nov-2018
C-O-C number	: ----	Issue Date	: 08-Nov-2018
Sampler	: SUSANTHA KUMARAPELI		
Site	: ----		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2021950)									
EB1826629-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.53	8.53	0.00	0% - 20%
EB1826536-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.92	7.90	0.253	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2021949)									
EB1826629-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1970	1970	0.208	0% - 20%
EB1826536-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	942	945	0.319	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2021027)									
EB1826587-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	488	493	1.02	0% - 20%
EB1826249-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	195	182	6.71	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 2021951)									
EB1826629-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	31	30	0.00	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	619	617	0.294	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	650	647	0.404	0% - 20%
EB1826536-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	348	334	4.05	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	348	334	4.05	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2017782)									
EB1826618-001	310-01-BH2201	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	10	0.00	No Limit
EB1826592-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2017778)									
EB1826618-001	310-01-BH2201	ED045G: Chloride	16887-00-6	1	mg/L	149	150	0.698	0% - 20%
EB1826592-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9	10	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2017823)									

EG020T: Total Metals by ICP-MS (QC Lot: 2017897)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2017897) - continued									
EB1826474-006	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.056	0.056	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.008	<0.005	38.5	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.91	0.93	2.32	0% - 50%
EB1826500-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.034	0.036	3.99	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.277	0.290	4.44	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2017824)									
EB1826601-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2017899)									
EB1826468-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2021948)									
EB1826629-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EB1826536-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2024088)									
EB1826618-001	310-01-BH2201	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.05	<0.01	137	No Limit

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 Work Order : EB1826618
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (P11)



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2017779)									
EB1826618-001	310-01-BH2201	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.09	0.09	0.00	No Limit
EB1826592-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2024087)									
EB1826618-001	310-01-BH2201	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.42	0.43	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2020177)									
EB1825383-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.2	3.3	0.00	No Limit
EB1826605-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.6	5.2	12.2	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2020176)									
EB1825383-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	31.2	31.1	0.260	0% - 20%
EB1826605-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.90	0.91	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2017781)									
EB1826618-001	310-01-BH2201	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
EB1826592-005	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2021950)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2021949)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	98.0	91	107
				<1	12890 µS/cm	99.5	91	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2021027)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	98.4	88	112
				<10	2000 mg/L	103	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 2021951)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	97.6	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2017782)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	85	118
				<1	100 mg/L	93.6	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 2017778)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	90	115
				<1	1000 mg/L	103	90	115
ED093F: Dissolved Major Cations (QCLot: 2017823)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2017821)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.7	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.6	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	97.1	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.4	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.6	86	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.6	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.9	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	97.6	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	106	88	114



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 2017821) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	93.9	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.7	81	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.7	82	114
EG020T: Total Metals by ICP-MS (QCLot: 2017897)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	88	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	86.6	81	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	94.9	70	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.0	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	89	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	97.8	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	104	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.6	89	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.6	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.2	88	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.0	79	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	87	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	97.8	84	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.4	82	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82	118
EG035F: Dissolved Mercury by FIMS (QCLot: 2017824)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.5	84	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2017899)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.6	84	118
EK040P: Fluoride by PC Titrator (QCLot: 2021948)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	104	80	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2024088)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	98.9	86	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2017779)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	90.7	90	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2024087)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.7	89	115
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2020177)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	77.4	70	111
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2020176)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	88.5	77	109
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2017781)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.7	88	115



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2017782)							
EB1826592-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	126	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2017778)							
EB1826592-006	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	91.1	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2017821)							
EB1826563-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	103	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	101	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	102	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	97.7	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	94.1	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	99.8	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	97.8	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	95.4	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	97.7	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	101	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	106	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	97.3	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	94.4	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2017897)							
EB1826474-007	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.7	70	130
		EG020A-T: Beryllium	7440-41-7	0.1 mg/L	89.8	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	95.8	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	93.4	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.3	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	89.9	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.4	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	93.4	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	91.5	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.3	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	95.2	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.1	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2017824)							
EB1826618-001	310-01-BH2201	EG035F: Mercury	7439-97-6	0.01 mg/L	89.2	70	130

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 Work Order : EB1826618
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (P11)



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2017899)							
EB1826496-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	80.3	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2021948)							
EB1826536-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2024088)							
EB1826876-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	78.5	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2017779)							
EB1826592-006	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	111	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2024087)							
EB1826876-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	8 mg/L	93.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2020177)							
EB1826574-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	116	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2020176)							
EB1826574-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	108	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2017781)							
EB1826592-006	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	121	70	130

QUALITY CONTROL REPORT

Work Order	: EB1902654	Page	: 1 of 8
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH McGINNIS	Contact	: Andrew Epps
Address	: P O BOX 1734 MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3721 5400	Telephone	: +61 7 3552 8639
Project	: 1897791 Inland Rail (Pkg 11)	Date Samples Received	: 04-Feb-2019
Order number	:	Date Analysis Commenced	: 04-Feb-2019
C-O-C number	: ----	Issue Date	: 07-Feb-2019
Sampler	: HANNAH GROVES, Ying Zhang		
Site	: ----		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 5		
No. of samples analysed	: 5		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2168679)									
EB1902635-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.42	7.48	0.805	0% - 20%
EB1902654-004	310-01-BH2345	EA005-P: pH Value	----	0.01	pH Unit	8.03	8.01	0.249	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2168678)									
EB1902635-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	204	199	2.48	0% - 20%
EB1902654-004	310-01-BH2345	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1690	1680	0.541	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2169056)									
EB1902563-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	126	133	5.92	0% - 50%
ED037P: Alkalinity by PC Titrator (QC Lot: 2168677)									
EB1902635-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	111	1.24	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	112	111	1.24	0% - 20%
EB1902654-004	310-01-BH2345	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	419	417	0.474	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	419	417	0.474	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2168688)									
EB1902654-001	310-01-BH2215	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	225	221	1.72	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2168687)									
EB1902654-001	310-01-BH2215	ED045G: Chloride	16887-00-6	1	mg/L	3850	3880	0.553	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2169039)									
EB1902654-001	310-01-BH2215	ED093F: Calcium	7440-70-2	1	mg/L	99	100	1.01	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	166	172	3.58	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2140	2160	1.20	0% - 20%

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 Work Order : EB1902654
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (Pkg 11)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 2169039) - continued									
EB1902654-001	310-01-BH2215	ED093F: Potassium	7440-09-7	1	mg/L	12	13	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2169041)									
EB1902654-001	310-01-BH2215	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.284	0.288	1.48	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.906	0.907	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.017	0.018	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2168689)									
EB1902643-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.030	0.030	0.00	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.024	0.025	6.46	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.38	0.38	0.00	No Limit
EB1902654-005	QA01	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.170	0.170	0.00	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.037	0.036	0.00	0% - 20%

Page : 4 of 8
 Work Order : EB1902654
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (Pkg 11)



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 2168689) - continued									
EB1902654-005	QA01	EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.010	0.009	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2169040)									
EB1902654-001	310-01-BH2215	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2168690)									
EB1902643-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2168680)									
EB1902635-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EB1902654-004	310-01-BH2345	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2168683)									
EB1902654-001	310-01-BH2215	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.06	92.4	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2168686)									
EB1902654-001	310-01-BH2215	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2168684)									
EB1902654-001	310-01-BH2215	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.05	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2169186)									
EB1902427-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.3	2.6	11.1	0% - 20%
EB1902357-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	8.1	8.0	0.00	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2169187)									
EB1902427-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.54	0.55	3.14	0% - 20%
EB1902357-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.29	1.36	5.66	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2168685)									
EB1902654-001	310-01-BH2215	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.06	0.06	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 2168679)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	99.7	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2168678)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	101	91	107
				<1	12890 µS/cm	97.9	91	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2169056)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	100	88	112
				<10	2000 mg/L	100	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 2168677)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.6	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2168688)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85	118
				<1	100 mg/L	93.4	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 2168687)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.8	90	115
				<1	1000 mg/L	100	90	115
ED093F: Dissolved Major Cations (QCLot: 2169039)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2169041)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.1	88	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.2	81	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	99.7	70	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.7	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.0	87	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.4	86	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	103	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	104	89	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	89	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.1	89	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.1	83	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	100	88	114



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EG020F: Dissolved Metals by ICP-MS (QCLot: 2169041) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	94.4	87	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	84.5	81	125
EG020T: Total Metals by ICP-MS (QCLot: 2168689)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	88	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.6	81	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.5 mg/L	98.0	70	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.7	88	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.4	89	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	89	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	110	88	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.9	89	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	88	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	88	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.5	79	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	108	87	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	96.3	84	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	94.3	82	128
EG035F: Dissolved Mercury by FIMS (QCLot: 2169040)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.4	84	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2168690)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.3	84	118
EK040P: Fluoride by PC Titrator (QCLot: 2168680)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	100	80	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2168683)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	92.3	86	112
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2168686)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	103	90	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2168684)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	93.2	89	115
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2169186)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	89.4	70	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2169187)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	94.8	79	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2168685)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	90.9	88	115

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2168688)							
EB1902654-002	310-01-BH2248	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	96.9	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2168687)							
EB1902654-002	310-01-BH2248	ED045G: Chloride	16887-00-6	400 mg/L	105	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2169041)							
EB1902654-002	310-01-BH2248	EG020A-F: Arsenic	7440-38-2	0.1 mg/L	97.5	70	130
		EG020A-F: Beryllium	7440-41-7	0.1 mg/L	91.6	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	103	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	95.6	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	91.2	70	130
		EG020A-F: Cobalt	7440-48-4	0.1 mg/L	94.1	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.4	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	100	70	130
		EG020A-F: Manganese	7439-96-5	0.1 mg/L	92.6	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	90.8	70	130
		EG020A-F: Selenium	7782-49-2	0.1 mg/L	95.8	70	130
		EG020A-F: Vanadium	7440-62-2	0.1 mg/L	93.9	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	95.5	70	130
EG020A-F: Boron	7440-42-8	0.5 mg/L	85.7	70	130		
EG020T: Total Metals by ICP-MS (QCLot: 2168689)							
EB1902643-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	98.2	70	130
		EG020A-T: Beryllium	7440-41-7	0.1 mg/L	91.6	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	95.9	70	130
		EG020A-T: Cadmium	7440-43-9	0.5 mg/L	95.3	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	92.5	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	93.3	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	89.7	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	89.4	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	91.1	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	92.0	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	97.2	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2169040)							
EB1902654-002	310-01-BH2248	EG035F: Mercury	7439-97-6	0.01 mg/L	89.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2168690)							

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 Work Order : EB1902654
 Client : GOLDER ASSOCIATES
 Project : 1897791 Inland Rail (Pkg 11)



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2168690) - continued							
EB1902643-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	# 67.0	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2168680)							
EB1902635-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	97.2	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2168683)							
EB1902654-002	310-01-BH2248	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	98.4	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2168686)							
EB1902654-002	310-01-BH2248	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	97.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2168684)							
EB1902654-002	310-01-BH2248	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	90.8	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2169186)							
EB1902357-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	121	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2169187)							
EB1902357-005	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	97.6	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2168685)							
EB1902654-002	310-01-BH2248	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	93.7	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1824393	Page	: 1 of 10
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH MCGINNIS	Telephone	: +61 7 3243 7222
Project	: 1897791 Inland Rail (P11)	Date Samples Received	: 10-Oct-2018
Site	: ----	Issue Date	: 17-Oct-2018
Sampler	: ROB, SUSANTHA KUMARAPELI	No. of samples received	: 2
Order number	: 1897791	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	EB1822040--002	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural 310-01-BH 2206	----	----	----	11-Oct-2018	08-Oct-2018	3
Clear Plastic Bottle - Natural 310-01-BH 2210	----	----	----	11-Oct-2018	09-Oct-2018	2

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH 2206	08-Oct-2018	----	----	----	11-Oct-2018	08-Oct-2018	✖
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH 2210	09-Oct-2018	----	----	----	11-Oct-2018	09-Oct-2018	✖
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH 2206	08-Oct-2018	----	----	----	11-Oct-2018	05-Nov-2018	✔
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH 2210	09-Oct-2018	----	----	----	11-Oct-2018	06-Nov-2018	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) 310-01-BH 2206	08-Oct-2018	----	----	----	12-Oct-2018	15-Oct-2018	✓
Clear Plastic Bottle - Natural (EA015H) 310-01-BH 2210	09-Oct-2018	----	----	----	12-Oct-2018	16-Oct-2018	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH 2206	08-Oct-2018	----	----	----	11-Oct-2018	22-Oct-2018	✓
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH 2210	09-Oct-2018	----	----	----	11-Oct-2018	23-Oct-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) 310-01-BH 2206	08-Oct-2018	----	----	----	10-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Natural (ED041G) 310-01-BH 2210	09-Oct-2018	----	----	----	10-Oct-2018	06-Nov-2018	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) 310-01-BH 2206	08-Oct-2018	----	----	----	10-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Natural (ED045G) 310-01-BH 2210	09-Oct-2018	----	----	----	10-Oct-2018	06-Nov-2018	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH 2206	08-Oct-2018	----	----	----	15-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH 2210	09-Oct-2018	----	----	----	15-Oct-2018	06-Nov-2018	✓
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH 2206	08-Oct-2018	----	----	----	15-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH 2210	09-Oct-2018	----	----	----	15-Oct-2018	06-Nov-2018	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH 2206	08-Oct-2018	----	----	----	15-Oct-2018	06-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH 2210	09-Oct-2018	----	----	----	15-Oct-2018	07-Apr-2019	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH 2206	08-Oct-2018	12-Oct-2018	06-Apr-2019	✓	12-Oct-2018	06-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH 2210	09-Oct-2018	12-Oct-2018	07-Apr-2019	✓	12-Oct-2018	07-Apr-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH 2206	08-Oct-2018	----	----	----	15-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH 2210	09-Oct-2018	----	----	----	15-Oct-2018	06-Nov-2018	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH 2206	08-Oct-2018	----	----	----	15-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH 2210	09-Oct-2018	----	----	----	15-Oct-2018	06-Nov-2018	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) 310-01-BH 2206	08-Oct-2018	----	----	----	11-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Natural (EK040P) 310-01-BH 2210	09-Oct-2018	----	----	----	11-Oct-2018	06-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH 2206	08-Oct-2018	----	----	----	12-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH 2210	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) 310-01-BH 2206	08-Oct-2018	----	----	----	10-Oct-2018	10-Oct-2018	✓
Clear Plastic Bottle - Natural (EK057G) 310-01-BH 2210	09-Oct-2018	----	----	----	10-Oct-2018	11-Oct-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH 2206	08-Oct-2018	----	----	----	12-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH 2210	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH 2206	08-Oct-2018	11-Oct-2018	05-Nov-2018	✓	11-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH 2210	09-Oct-2018	11-Oct-2018	06-Nov-2018	✓	11-Oct-2018	06-Nov-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH 2206	08-Oct-2018	11-Oct-2018	05-Nov-2018	✓	11-Oct-2018	05-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH 2210	09-Oct-2018	11-Oct-2018	06-Nov-2018	✓	11-Oct-2018	06-Nov-2018	✓



Matrix: **WATER** Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) 310-01-BH 2206	08-Oct-2018	----	----	----	10-Oct-2018	10-Oct-2018	✔
Clear Plastic Bottle - Natural (EK071G) 310-01-BH 2210	09-Oct-2018	----	----	----	10-Oct-2018	11-Oct-2018	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	11	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	3	33.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions

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Work Order : EB1824393
Client : GOLDER ASSOCIATES
Project : 1897791 Inland Rail (P11)



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1824567	Page	: 1 of 9
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR SUSANTHA KUMARAPELI	Telephone	: +61 7 3243 7222
Project	: 1897791 Inland Rail Package 11	Date Samples Received	: 11-Oct-2018
Site	: ----	Issue Date	: 17-Oct-2018
Sampler	: ROBERT CUPPER	No. of samples received	: 3
Order number	: 1897791	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1824568--002	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	EB1824400--002	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	EB1824576--001	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK055G: Ammonia as N by Discrete Analyser	EB1821488--004	Anonymous	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural 310-01-BH2347, 310-01-BH2344	GW 981,	----	----	----	12-Oct-2018	11-Oct-2018	1

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P)								
310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	11-Oct-2018	✖



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	15-Oct-2018	18-Oct-2018	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	25-Oct-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓
ED093F: SAR and Hardness Calculations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	09-Apr-2019	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	15-Oct-2018	09-Apr-2019	✓	15-Oct-2018	09-Apr-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	16-Oct-2018	08-Nov-2018	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	08-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	15-Oct-2018	08-Nov-2018	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	13-Oct-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	15-Oct-2018	08-Nov-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	12-Oct-2018	08-Nov-2018	✓	12-Oct-2018	08-Nov-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	12-Oct-2018	08-Nov-2018	✓	12-Oct-2018	08-Nov-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2347, 310-01-BH2344	GW 981,	11-Oct-2018	----	----	----	12-Oct-2018	13-Oct-2018	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	1	6	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	35	11.43	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	38	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	6	16.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Work Order : EB1824567
Client : GOLDER ASSOCIATES
Project : 1897791 Inland Rail Package 11



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1824576	Page	: 1 of 9
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH MCGINNIS	Telephone	: +61 7 3243 7222
Project	: Inland Rail Pack II	Date Samples Received	: 11-Oct-2018
Site	: ----	Issue Date	: 17-Oct-2018
Sampler	: SUSANTHA KUMARAPALI	No. of samples received	: 2
Order number	: Inland Rail Pack II	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	EB1824576--001	310-01-BHZ216	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK055G: Ammonia as N by Discrete Analyser	EB1821488--004	Anonymous	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EB1818951--005	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural 310-01-BHZ216	----	----	----	15-Oct-2018	09-Oct-2018	6
Clear Plastic Bottle - Natural 310-01-BHZ203	----	----	----	15-Oct-2018	10-Oct-2018	5
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural 310-01-BHZ216	----	----	----	12-Oct-2018	11-Oct-2018	1

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Container / Client Sample ID(s)							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) 310-01-BHZ216	09-Oct-2018	----	----	----	15-Oct-2018	09-Oct-2018	✘
Clear Plastic Bottle - Natural (EA005-P) 310-01-BHZ203	10-Oct-2018	----	----	----	15-Oct-2018	10-Oct-2018	✘
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) 310-01-BHZ216	09-Oct-2018	----	----	----	15-Oct-2018	06-Nov-2018	✔
Clear Plastic Bottle - Natural (EA010-P) 310-01-BHZ203	10-Oct-2018	----	----	----	15-Oct-2018	07-Nov-2018	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) 310-01-BHZ216	09-Oct-2018	----	----	----	15-Oct-2018	16-Oct-2018	✔
Clear Plastic Bottle - Natural (EA015H) 310-01-BHZ203	10-Oct-2018	----	----	----	15-Oct-2018	17-Oct-2018	✔
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) 310-01-BHZ216	09-Oct-2018	----	----	----	15-Oct-2018	23-Oct-2018	✔
Clear Plastic Bottle - Natural (ED037-P) 310-01-BHZ203	10-Oct-2018	----	----	----	15-Oct-2018	24-Oct-2018	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✔
Clear Plastic Bottle - Natural (ED041G) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	07-Nov-2018	✔
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✔
Clear Plastic Bottle - Natural (ED045G) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	07-Nov-2018	✔
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	07-Nov-2018	✔
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	07-Nov-2018	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	07-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	08-Apr-2019	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BHZ216	09-Oct-2018	15-Oct-2018	07-Apr-2019	✓	15-Oct-2018	07-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BHZ203	10-Oct-2018	15-Oct-2018	08-Apr-2019	✓	15-Oct-2018	08-Apr-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	06-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	07-Nov-2018	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BHZ216	09-Oct-2018	----	----	----	16-Oct-2018	06-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BHZ203	10-Oct-2018	----	----	----	16-Oct-2018	07-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BHZ216	09-Oct-2018	----	----	----	13-Oct-2018	06-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BHZ203	10-Oct-2018	----	----	----	15-Oct-2018	07-Nov-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BHZ216	09-Oct-2018	----	----	----	13-Oct-2018	06-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BHZ203	10-Oct-2018	----	----	----	15-Oct-2018	07-Nov-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BHZ216	09-Oct-2018	15-Oct-2018	06-Nov-2018	✓	15-Oct-2018	06-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BHZ203	10-Oct-2018	15-Oct-2018	07-Nov-2018	✓	15-Oct-2018	07-Nov-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BHZ216	09-Oct-2018	15-Oct-2018	06-Nov-2018	✓	15-Oct-2018	06-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BHZ203	10-Oct-2018	15-Oct-2018	07-Nov-2018	✓	15-Oct-2018	07-Nov-2018	✓



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) 310-01-BHZ216	09-Oct-2018	----	----	----	12-Oct-2018	11-Oct-2018	✘
Clear Plastic Bottle - Natural (EK071G) 310-01-BHZ203	10-Oct-2018	----	----	----	12-Oct-2018	12-Oct-2018	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1826453	Page	: 1 of 11
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH MCGINNIS	Telephone	: +61 7 3552 8639
Project	: 1897791	Date Samples Received	: 01-Nov-2018
Site	: Inland Rail (P11)	Issue Date	: 05-Nov-2018
Sampler	: SUSANTHA	No. of samples received	: 5
Order number	: 1897791	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural 310-01-BH2235, 310-01-BH2234	----	----	----	02-Nov-2018	29-Oct-2018	4
Clear Plastic Bottle - Natural 310-01-BH2233, 310-01-BH2231	----	----	----	02-Nov-2018	30-Oct-2018	3
Clear Plastic Bottle - Natural 310-01-BH2309	----	----	----	02-Nov-2018	31-Oct-2018	2
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural 310-01-BH2235, 310-01-BH2234	----	----	----	01-Nov-2018	31-Oct-2018	1
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural 310-01-BH2235, 310-01-BH2234	----	----	----	01-Nov-2018	31-Oct-2018	1

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	02-Nov-2018	29-Oct-2018	✘
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH2233,	310-01-BH2231	30-Oct-2018	----	----	----	02-Nov-2018	30-Oct-2018	✘
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH2309		31-Oct-2018	----	----	----	02-Nov-2018	31-Oct-2018	✘
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	02-Nov-2018	26-Nov-2018	✔
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2233,	310-01-BH2231	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✔
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2309		31-Oct-2018	----	----	----	02-Nov-2018	28-Nov-2018	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	02-Nov-2018	05-Nov-2018	✓
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2233,	310-01-BH2231	30-Oct-2018	----	----	----	02-Nov-2018	06-Nov-2018	✓
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2309		31-Oct-2018	----	----	----	02-Nov-2018	07-Nov-2018	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	02-Nov-2018	12-Nov-2018	✓
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2233,	310-01-BH2231	30-Oct-2018	----	----	----	02-Nov-2018	13-Nov-2018	✓
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2309		31-Oct-2018	----	----	----	02-Nov-2018	14-Nov-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	01-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2233,	310-01-BH2231	30-Oct-2018	----	----	----	01-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2309		31-Oct-2018	----	----	----	01-Nov-2018	28-Nov-2018	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	01-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2233,	310-01-BH2231	30-Oct-2018	----	----	----	01-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2309		31-Oct-2018	----	----	----	01-Nov-2018	28-Nov-2018	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) 310-01-BH2235,	310-01-BH2234	29-Oct-2018	----	----	----	03-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) 310-01-BH2231		30-Oct-2018	----	----	----	03-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2233		30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2309		31-Oct-2018	----	----	----	03-Nov-2018	28-Nov-2018	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: SAR and Hardness Calculations								
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	03-Nov-2018	26-Nov-2018	✓	
Clear Plastic Bottle - Filtered; Lab-acidified (ED093F) 310-01-BH2231	30-Oct-2018	----	----	----	03-Nov-2018	27-Nov-2018	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2233	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2309	31-Oct-2018	----	----	----	03-Nov-2018	28-Nov-2018	✓	
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	03-Nov-2018	27-Apr-2019	✓	
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) 310-01-BH2231	30-Oct-2018	----	----	----	03-Nov-2018	28-Apr-2019	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH2233	30-Oct-2018	----	----	----	02-Nov-2018	28-Apr-2019	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH2309	31-Oct-2018	----	----	----	03-Nov-2018	29-Apr-2019	✓	
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH2233	30-Oct-2018	02-Nov-2018	28-Apr-2019	✓	02-Nov-2018	28-Apr-2019	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH2309	31-Oct-2018	02-Nov-2018	29-Apr-2019	✓	02-Nov-2018	29-Apr-2019	✓	
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	02-Nov-2018	27-Apr-2019	✓	02-Nov-2018	27-Apr-2019	✓	
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T) 310-01-BH2231	30-Oct-2018	02-Nov-2018	28-Apr-2019	✓	02-Nov-2018	28-Apr-2019	✓	
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	05-Nov-2018	26-Nov-2018	✓	
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) 310-01-BH2231	30-Oct-2018	----	----	----	05-Nov-2018	27-Nov-2018	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH2233	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH2309	31-Oct-2018	----	----	----	05-Nov-2018	28-Nov-2018	✓	



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH2233	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH2309	31-Oct-2018	----	----	----	02-Nov-2018	28-Nov-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	02-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T) 310-01-BH2231	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	02-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	----	----	----	02-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2309	31-Oct-2018	----	----	----	02-Nov-2018	28-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	01-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	----	----	----	01-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2309	31-Oct-2018	----	----	----	01-Nov-2018	28-Nov-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	01-Nov-2018	31-Oct-2018	✗
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	----	----	----	01-Nov-2018	01-Nov-2018	✓
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2309	31-Oct-2018	----	----	----	01-Nov-2018	02-Nov-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	01-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	----	----	----	01-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2309	31-Oct-2018	----	----	----	01-Nov-2018	28-Nov-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	01-Nov-2018	26-Nov-2018	✓	01-Nov-2018	26-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	01-Nov-2018	27-Nov-2018	✓	01-Nov-2018	27-Nov-2018	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2309	31-Oct-2018	01-Nov-2018	28-Nov-2018	✓	01-Nov-2018	28-Nov-2018	✓

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 Work Order : EB1826453
 Client : GOLDER ASSOCIATES
 Project : 1897791



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	01-Nov-2018	26-Nov-2018	✓	01-Nov-2018	26-Nov-2018	✓	
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	01-Nov-2018	27-Nov-2018	✓	01-Nov-2018	27-Nov-2018	✓	
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2309	31-Oct-2018	01-Nov-2018	28-Nov-2018	✓	01-Nov-2018	28-Nov-2018	✓	
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2235, 310-01-BH2234	29-Oct-2018	----	----	----	01-Nov-2018	31-Oct-2018	✗	
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2233, 310-01-BH2231	30-Oct-2018	----	----	----	01-Nov-2018	01-Nov-2018	✓	
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2309	31-Oct-2018	----	----	----	01-Nov-2018	02-Nov-2018	✓	



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	19	15.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	27	14.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions

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Work Order : EB1826453
Client : GOLDER ASSOCIATES
Project : 1897791



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1826618	Page	: 1 of 8
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH MCGINNIS	Telephone	: +61 7 3552 8639
Project	: 1897791 Inland Rail (P11)	Date Samples Received	: 02-Nov-2018
Site	: ----	Issue Date	: 08-Nov-2018
Sampler	: SUSANTHA KUMARAPALI	No. of samples received	: 1
Order number	: 1897791	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural 310-01-BH2201	----	----	----	07-Nov-2018	02-Nov-2018	5

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH2201	02-Nov-2018	----	----	----	07-Nov-2018	02-Nov-2018	✖
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2201	02-Nov-2018	----	----	----	07-Nov-2018	30-Nov-2018	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2201	02-Nov-2018	----	----	----	06-Nov-2018	09-Nov-2018	✔
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2201	02-Nov-2018	----	----	----	07-Nov-2018	16-Nov-2018	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	30-Nov-2018	✔
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	30-Nov-2018	✔
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	30-Nov-2018	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: SAR and Hardness Calculations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	30-Nov-2018	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	01-May-2019	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH2201	02-Nov-2018	06-Nov-2018	01-May-2019	✓	06-Nov-2018	01-May-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH2201	02-Nov-2018	----	----	----	05-Nov-2018	30-Nov-2018	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH2201	02-Nov-2018	----	----	----	06-Nov-2018	30-Nov-2018	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2201	02-Nov-2018	----	----	----	07-Nov-2018	30-Nov-2018	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2201	02-Nov-2018	----	----	----	07-Nov-2018	30-Nov-2018	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	04-Nov-2018	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2201	02-Nov-2018	----	----	----	07-Nov-2018	30-Nov-2018	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2201	02-Nov-2018	06-Nov-2018	30-Nov-2018	✓	06-Nov-2018	30-Nov-2018	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2201	02-Nov-2018	06-Nov-2018	30-Nov-2018	✓	06-Nov-2018	30-Nov-2018	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2201	02-Nov-2018	----	----	----	03-Nov-2018	04-Nov-2018	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	4	25.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	11	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	7	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	10	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	11	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	10	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions

Page : 8 of 8
Work Order : EB1826618
Client : GOLDER ASSOCIATES
Project : 1897791 Inland Rail (P11)



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB1902654	Page	: 1 of 10
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR MITCH MCGINNIS	Telephone	: +61 7 3552 8639
Project	: 1897791 Inland Rail (Pkg 11)	Date Samples Received	: 04-Feb-2019
Site	: ----	Issue Date	: 07-Feb-2019
Sampler	: HANNAH GROVES, Ying Zhang	No. of samples received	: 5
Order number	:	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Duplicates. Method Blanks. Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG035T: Total Recoverable Mercury by FIMS	EB1902643--002	Anonymous	Mercury	7439-97-6	67.0 %	70-130%	Recovery less than lower data quality objective

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
310-01-BH2248,	310-01-BH2343,	----	----	----	05-Feb-2019	01-Feb-2019	4
310-01-BH2345,	QA01						
Clear Plastic Bottle - Natural							
310-01-BH2215		----	----	----	05-Feb-2019	30-Jan-2019	6
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
310-01-BH2248,	310-01-BH2343,	----	----	----	04-Feb-2019	03-Feb-2019	1
310-01-BH2345,	QA01						
Clear Plastic Bottle - Natural							
310-01-BH2215		----	----	----	04-Feb-2019	01-Feb-2019	3
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural							
310-01-BH2248,	310-01-BH2343,	----	----	----	04-Feb-2019	03-Feb-2019	1
310-01-BH2345,	QA01						
Clear Plastic Bottle - Natural							
310-01-BH2215		----	----	----	04-Feb-2019	01-Feb-2019	3

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	01-Feb-2019	✗
Clear Plastic Bottle - Natural (EA005-P) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	30-Jan-2019	✗
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Natural (EA010-P) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	27-Feb-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	08-Feb-2019	✓
Clear Plastic Bottle - Natural (EA015H) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	06-Feb-2019	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	15-Feb-2019	✓
Clear Plastic Bottle - Natural (ED037-P) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	13-Feb-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Natural (ED041G) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	27-Feb-2019	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Natural (ED045G) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	27-Feb-2019	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	27-Feb-2019	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: SAR and Hardness Calculations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	27-Feb-2019	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	31-Jul-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	29-Jul-2019	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	04-Feb-2019	31-Jul-2019	✓	04-Feb-2019	31-Jul-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) 310-01-BH2215		30-Jan-2019	04-Feb-2019	29-Jul-2019	✓	04-Feb-2019	29-Jul-2019	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	27-Feb-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	27-Feb-2019	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	05-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Natural (EK040P) 310-01-BH2215		30-Jan-2019	----	----	----	05-Feb-2019	27-Feb-2019	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	01-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	27-Feb-2019	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	03-Feb-2019	✘
Clear Plastic Bottle - Natural (EK057G) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	01-Feb-2019	✘
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	01-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	27-Feb-2019	✔
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	05-Feb-2019	01-Mar-2019	✔	05-Feb-2019	01-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) 310-01-BH2215		30-Jan-2019	05-Feb-2019	27-Feb-2019	✔	05-Feb-2019	27-Feb-2019	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	05-Feb-2019	01-Mar-2019	✔	05-Feb-2019	01-Mar-2019	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) 310-01-BH2215		30-Jan-2019	05-Feb-2019	27-Feb-2019	✔	05-Feb-2019	27-Feb-2019	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2248, 310-01-BH2345,	310-01-BH2343, QA01	01-Feb-2019	----	----	----	04-Feb-2019	03-Feb-2019	✘
Clear Plastic Bottle - Natural (EK071G) 310-01-BH2215		30-Jan-2019	----	----	----	04-Feb-2019	01-Feb-2019	✘



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	8	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	10	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	5	40.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	12	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	5	40.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	8	25.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions

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Work Order : EB1902654
Client : GOLDER ASSOCIATES
Project : 1897791 Inland Rail (Pkg 11)



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St. Stafford 4053. (Corner of Byth & Shand Streets). Phone: 07 3243 7222

HT

Environmental Division
Brisbane

Work Order Reference
EB2016369



Telephone + 61-7-3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date): 5 days TAT from samples reception		LABORATORY USE ONLY	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)		Date of receipt:	
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20		COC SEQUENCE NUMBER (Circle)	
ORDER NUMBER: 60553814_3100.V01-B2G Variation				COC: ① 2 3 4 5 6 7	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289		OF: 1 ② 3 4 5 6 7	
SAMPLER: B.Hammond & S. Barron		SAMPLER MOBILE: 0409 198 409		RELINQUISHED BY: B. Hammond	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):		RECEIVED BY: CHIRIS PERRY	
Email Reports to: krystle.nichols@aecom.com		DATE/TIME: 19-June-2020		DATE/TIME: 19/6/20 1710	
Email Invoice to krystle.nichols@aecom.com				RELINQUISHED BY:	
				DATE/TIME:	
				RECEIVED BY:	
				DATE/TIME:	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottle required).											Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA006) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-08A) Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005P) pH/pCT	(EA010P) Electrical Conductivity (pCT)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS MGT BRISBANE FOR ANALYSIS	
1	BH2201-200616	16-June-2020 09:16	W	1P, 2N, 1S	4	/	/	/	/	/	/	/	/	/	/	/		
2	BH2206-200616	18:20			4	/	/	/	/	/	/	/	/	/	/	/		
3	BH2203-200616	15:30			4	/	/	/	/	/	/	/	/	/	/	/		
4	BH2214-200616	16:30			4	/	/	/	/	/	/	/	/	/	/	/		
5	BH2215-200616	17:00			4	/	/	/	/	/	/	/	/	/	/	/		
6	BH2216-200619	19-June-2020 07:28			4	/	/	/	/	/	/	/	/	/	/	/		
7	BH2229-200619	08:45			4	/	/	/	/	/	/	/	/	/	/	/		
8	BH2343-200619	10:48			4	/	/	/	/	/	/	/	/	/	/	/		
9	BH2344-200619	11:09			4	/	/	/	/	/	/	/	/	/	/	/		
10	BH2345-200619	12:11			4	/	/	/	/	/	/	/	/	/	/	/		
11	BH2248-200619	13:00			4	/	/	/	/	/	/	/	/	/	/	/		
12	BH2347-200619	13:41			4	/	/	/	/	/	/	/	/	/	/	/		
TOTAL																		

Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE
PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS | MGT BRISBANE FOR ANALYSIS



Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St. Stafford 4053. (Corner of Byth & Shand Streets). Phone: 07 3243 7222

FOR LABORATORY USE ONLY (c)(6)			
Is this a human sample?	Yes	No	NA
Is this from a subscription or a previously collected sample?	Yes	No	NA
Is this sample from a research facility?	Yes	No	NA
Other comments:			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

[illegible]

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2016369**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: Brisbane	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 4
Order number	: 60553814_3100.V01-B2GVariation	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: B HAMMOND, S BARRON		

Dates

Date Samples Received	: 19-Jun-2020 17:10	Issue Date	: 19-Jun-2020
Client Requested Due Date	: 26-Jun-2020	Scheduled Reporting Date	: 26-Jun-2020

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 1.4, 21°C - Ice present
Receipt Detail	: MEDIUM ESKIES	No. of samples received / analysed	: 21 / 21

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please be advised that for samples "QC01_200619"(ALS ID#13), "QC02_200619"(ALS ID#14), "QC07_200616"(ALS ID#20) and "QC08_200619"(ALS ID#21), as no unpreserved volume was provided, the requested "NT-8A" suite could not be allocated. ALS has assigned Total Nitrogen, Total Phosphorus, TKN, NOx and Ammonia analysis for these samples. If you have any further questions, please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.
- Please be advised that for sample "BH2617_200617"(ALS ID#19), where the "W-03" NEPM metals have been requested, Total metals have been assigned based on the unfiltered container received. If you wish to discuss this further please contact Client Services at ALSEnviro.Brisbane@alsglobal.com
- Please be advised that for sample "BH2229_200619"(ALS ID#7), only the Nitrate(EK058G), Nitrite(EK057G) and Reactive Phosphorus(EK071G) analysis could be assigned from the unpreserved container due to low(approximately 30mL) unpreserved volume received and short holding time concerns. All other tests from the unpreserved portion of the sample have not been assigned. If you wish to discuss this further, please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2016369-001	16-Jun-2020 09:16	BH2201_200616	✓	✓	✓	✓	✓	✓	✓
EB2016369-002	16-Jun-2020 13:20	BH2206_200616	✓	✓	✓	✓	✓	✓	✓
EB2016369-003	16-Jun-2020 15:30	BH2203_200616	✓	✓	✓	✓	✓	✓	✓
EB2016369-004	16-Jun-2020 16:30	BH2214_200616	✓	✓	✓	✓	✓	✓	✓
EB2016369-005	16-Jun-2020 17:00	BH2215_200616	✓	✓	✓	✓	✓	✓	✓
EB2016369-006	19-Jun-2020 07:28	BH2216_200619	✓	✓	✓	✓	✓	✓	✓
EB2016369-007	19-Jun-2020 08:45	BH2229_200619				✓	✓	✓	✓
EB2016369-008	19-Jun-2020 10:48	BH2343_200619	✓	✓	✓	✓	✓	✓	✓
EB2016369-009	19-Jun-2020 11:09	BH2344_200619	✓	✓	✓	✓	✓	✓	✓
EB2016369-010	19-Jun-2020 12:11	BH2345_200619	✓	✓	✓	✓	✓	✓	✓
EB2016369-011	19-Jun-2020 13:00	BH2248_200619	✓	✓	✓	✓	✓	✓	✓
EB2016369-012	19-Jun-2020 13:41	BH2247_200619	✓	✓	✓	✓	✓	✓	✓
EB2016369-015	19-Jun-2020 00:00	QC03_200619				✓	✓	✓	✓
EB2016369-016	19-Jun-2020 00:00	QC04_200619				✓	✓	✓	✓
EB2016369-017	19-Jun-2020 00:00	QC05_200619	✓	✓	✓				
EB2016369-018	19-Jun-2020 00:00	QC06_200619	✓	✓	✓				
EB2016369-019	17-Jun-2020 11:45	BH2617_200617							✓
EB2016369-020	16-Jun-2020 00:00	QC07_200616				✓	✓	✓	✓
EB2016369-021	19-Jun-2020 00:00	QC08_200619				✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P + WATER - NT-11 Total Nitrogen and Total Phosphorus
EB2016369-001	16-Jun-2020 09:16	BH2201_200616	✓		✓	✓	✓
EB2016369-002	16-Jun-2020 13:20	BH2206_200616	✓		✓	✓	✓
EB2016369-003	16-Jun-2020 15:30	BH2203_200616	✓		✓	✓	✓
EB2016369-004	16-Jun-2020 16:30	BH2214_200616	✓		✓	✓	✓
EB2016369-005	16-Jun-2020 17:00	BH2215_200616	✓		✓	✓	✓



			WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P + WATER - NT-11 Total Nitrogen and Total Phosphorus	
EB2016369-006	19-Jun-2020 07:28	BH2216_200619	✓		✓	✓	✓	
EB2016369-007	19-Jun-2020 08:45	BH2229_200619			✓		✓	
EB2016369-008	19-Jun-2020 10:48	BH2343_200619	✓		✓	✓	✓	
EB2016369-009	19-Jun-2020 11:09	BH2344_200619	✓		✓	✓	✓	
EB2016369-010	19-Jun-2020 12:11	BH2345_200619	✓		✓	✓	✓	
EB2016369-011	19-Jun-2020 13:00	BH2248_200619	✓		✓	✓	✓	
EB2016369-012	19-Jun-2020 13:41	BH2247_200619	✓		✓	✓	✓	
EB2016369-013	19-Jun-2020 00:00	QC01_200619		✓				✓
EB2016369-014	19-Jun-2020 00:00	QC02_200619		✓				✓
EB2016369-017	19-Jun-2020 00:00	QC05_200619	✓		✓	✓		
EB2016369-018	19-Jun-2020 00:00	QC06_200619	✓		✓	✓		
EB2016369-020	16-Jun-2020 00:00	QC07_200616		✓				✓
EB2016369-021	19-Jun-2020 00:00	QC08_200619		✓				✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
	BH2201_200616	Clear Plastic Bottle - Natural	----	16-Jun-2020	19-Jun-2020	✗	----	----
	BH2203_200616	Clear Plastic Bottle - Natural	----	16-Jun-2020	19-Jun-2020	✗	----	----
	BH2206_200616	Clear Plastic Bottle - Natural	----	16-Jun-2020	19-Jun-2020	✗	----	----
	BH2214_200616	Clear Plastic Bottle - Natural	----	16-Jun-2020	19-Jun-2020	✗	----	----
	BH2215_200616	Clear Plastic Bottle - Natural	----	16-Jun-2020	19-Jun-2020	✗	----	----
EK057G: Nitrite as N by Discrete Analyser								
	BH2201_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2203_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2206_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2214_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2215_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
EK071G: Reactive Phosphorus as P-By Discrete Analyser								
	BH2201_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2203_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2206_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2214_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----
	BH2215_200616	Clear Plastic Bottle - Natural	----	18-Jun-2020	19-Jun-2020	✗	----	----

ACCOUNTS PAYABLE

Email AP_CustomerService.ANZ@aecom.com

- *AU Certificate of Analysis - NATA (COA)	Email	krystle.nichols@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	krystle.nichols@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	krystle.nichols@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	krystle.nichols@aecom.com
- A4 - AU Tax Invoice (INV)	Email	krystle.nichols@aecom.com
- Chain of Custody (CoC) (COC)	Email	krystle.nichols@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	krystle.nichols@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	krystle.nichols@aecom.com

CERTIFICATE OF ANALYSIS

Work Order : **EB2016369**
Client : **AECOM Australia Pty Ltd**
Contact : **KRYSTLE NICHOLS**
Address :
 Brisbane
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Variation**
C-O-C number : **----**
Sampler : **B HAMMOND, S BARRON**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **21**
No. of samples analysed : **21**

Page : 1 of 16
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61 7 3552 8616
Date Samples Received : 19-Jun-2020 17:10
Date Analysis Commenced : 20-Jun-2020
Issue Date : 25-Jun-2020 12:55



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK061G (Total Kjeldahl Nitrogen as N): Sample EB2016369_005 (BH2215_200616) was diluted due to matrix interference. LOR adjusted accordingly.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic Balance out of acceptable limits for some samples due to analytes not quantified in this report.
- EG035T (Total Mercury): Sample EB2016354-001 shows poor matrix spike recovery due to matrix interference. Confirmed by dilution, re-extraction and re-analysis.
- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for sample BH2201_200616 (EB2016369-001). This was confirmed by re-digestion and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2201_200616	BH2206_200616	BH2203_200616	BH2214_200616	BH2215_200616
Client sampling date / time					16-Jun-2020 09:16	16-Jun-2020 13:20	16-Jun-2020 15:30	16-Jun-2020 16:30	16-Jun-2020 17:00
Compound	CAS Number	LOR	Unit		EB2016369-001	EB2016369-002	EB2016369-003	EB2016369-004	EB2016369-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.81	6.78	6.71	7.13	7.01
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		12.1	6.34	5.51	35.5	32.3
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1150	435	441	11300	16000
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		744	341	1470	6740	9960
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		70	26	69	721	1570
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		365	87	194	498	424
Total Alkalinity as CaCO3	----	1	mg/L		365	87	194	498	424
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		10	3	<1	209	267
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		153	82	38	3520	5380
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		20	4	16	81	148
Magnesium	7439-95-4	1	mg/L		5	4	7	126	292
Sodium	7440-23-5	1	mg/L		233	75	105	2190	2940
Potassium	7440-09-7	1	mg/L		4	4	4	10	17
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.002	0.003	<0.001	0.001
Boron	7440-42-8	0.05	mg/L		0.05	<0.05	<0.05	0.07	0.06
Barium	7440-39-3	0.001	mg/L		0.156	0.214	0.551	0.056	0.120
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	0.0002	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	0.011	0.003	0.011
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	0.006	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.027	0.002	0.005	0.003	0.001
Manganese	7439-96-5	0.001	mg/L		<0.001	0.055	0.884	0.180	0.723
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	0.035	0.003	0.008

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2201_200616	BH2206_200616	BH2203_200616	BH2214_200616	BH2215_200616
Client sampling date / time				16-Jun-2020 09:16	16-Jun-2020 13:20	16-Jun-2020 15:30	16-Jun-2020 16:30	16-Jun-2020 17:00	
Compound	CAS Number	LOR	Unit	EB2016369-001	EB2016369-002	EB2016369-003	EB2016369-004	EB2016369-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.016	0.028	0.013	0.019	
Iron	7439-89-6	0.05	mg/L	<0.05	4.47	21.0	<0.05	0.96	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	0.003	<0.001	0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	0.06	0.06	
Barium	7440-39-3	0.001	mg/L	0.197	0.276	0.474	0.059	0.103	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.004	<0.001	0.012	0.009	0.012	
Chromium	7440-47-3	0.001	mg/L	0.006	<0.001	0.004	0.002	<0.001	
Copper	7440-50-8	0.001	mg/L	0.015	0.002	0.002	0.004	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.005	0.075	0.826	0.326	0.713	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.049	0.004	0.005	
Lead	7439-92-1	0.001	mg/L	0.002	0.003	0.002	0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.008	<0.005	0.026	0.013	0.006	
Iron	7439-89-6	0.05	mg/L	2.24	5.58	25.1	0.64	1.28	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.2	0.3	0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.05	0.04	0.07	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.01	<0.01	<0.01	0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	1.44	<0.01	<0.01	0.97	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2201_200616	BH2206_200616	BH2203_200616	BH2214_200616	BH2215_200616
Client sampling date / time					16-Jun-2020 09:16	16-Jun-2020 13:20	16-Jun-2020 15:30	16-Jun-2020 16:30	16-Jun-2020 17:00
Compound	CAS Number	LOR	Unit		EB2016369-001	EB2016369-002	EB2016369-003	EB2016369-004	EB2016369-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		1.45	<0.01	<0.01	0.98	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	1.8	45.6	1.3	<0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.8	1.8	45.6	2.3	<0.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.10	0.05	0.10	0.22	0.15
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.04	0.01	0.05	0.09	0.04
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		11.8	4.11	4.95	114	166
∅ Total Cations	----	0.01	meq/L		11.6	3.89	6.04	110	160
∅ Ionic Balance	----	0.01	%		0.72	2.75	9.97	1.64	1.86



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2216_200619	BH2229_200619	BH2343_200619	BH2344_200619	BH2345_200619
Client sampling date / time					19-Jun-2020 07:28	19-Jun-2020 08:45	19-Jun-2020 10:48	19-Jun-2020 11:09	19-Jun-2020 12:11
Compound	CAS Number	LOR	Unit		EB2016369-006	EB2016369-007	EB2016369-008	EB2016369-009	EB2016369-010
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.67	----	7.70	8.14	7.63
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		16.0	----	0.96	2.02	1.17
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		4720	----	731	1140	2230
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2600	----	425	656	1370
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		464	214	312	425	1050
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		401	----	280	415	627
Total Alkalinity as CaCO3	----	1	mg/L		401	----	280	415	627
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		131	----	2	2	6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1170	----	64	111	414
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		87	46	49	78	178
Magnesium	7439-95-4	1	mg/L		60	24	46	56	147
Sodium	7440-23-5	1	mg/L		794	392	39	96	87
Potassium	7440-09-7	1	mg/L		6	2	2	2	5
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.003	0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		0.20	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.064	0.520	0.012	<0.001	0.022
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.002	0.008	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	0.001	0.001	0.001	0.001
Manganese	7439-96-5	0.001	mg/L		0.322	1.05	0.056	0.076	0.088
Nickel	7440-02-0	0.001	mg/L		0.002	0.005	0.002	0.005	0.003

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2216_200619	BH2229_200619	BH2343_200619	BH2344_200619	BH2345_200619
Client sampling date / time				19-Jun-2020 07:28	19-Jun-2020 08:45	19-Jun-2020 10:48	19-Jun-2020 11:09	19-Jun-2020 12:11	
Compound	CAS Number	LOR	Unit	EB2016369-006	EB2016369-007	EB2016369-008	EB2016369-009	EB2016369-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.006	<0.005	0.005	0.006	
Iron	7439-89-6	0.05	mg/L	0.23	0.88	<0.05	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.003	0.005	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.22	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.063	0.706	0.018	0.020	0.022	
Beryllium	7440-41-7	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	0.046	0.003	0.003	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.003	0.077	0.003	0.003	<0.001	
Copper	7440-50-8	0.001	mg/L	<0.001	0.140	0.002	0.004	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.395	1.34	0.141	0.202	0.081	
Nickel	7440-02-0	0.001	mg/L	0.002	0.056	0.007	0.019	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	0.029	<0.001	0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.08	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.100	0.009	0.016	<0.005	
Iron	7439-89-6	0.05	mg/L	1.38	39.8	1.73	3.37	0.37	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	----	0.1	0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.03	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.05	<0.01	0.01	1.32	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2216_200619	BH2229_200619	BH2343_200619	BH2344_200619	BH2345_200619
Client sampling date / time					19-Jun-2020 07:28	19-Jun-2020 08:45	19-Jun-2020 10:48	19-Jun-2020 11:09	19-Jun-2020 12:11
Compound	CAS Number	LOR	Unit		EB2016369-006	EB2016369-007	EB2016369-008	EB2016369-009	EB2016369-010
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	0.05	<0.01	0.01	1.35
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.6	0.4	0.8	0.7
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	0.6	0.4	0.8	2.0
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	0.35	0.13	0.39	0.11
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	0.01	<0.01	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		43.7	----	7.44	11.5	24.3
∅ Total Cations	----	0.01	meq/L		44.0	----	7.98	12.7	24.9
∅ Ionic Balance	----	0.01	%		0.26	----	3.48	5.22	1.14



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2248_200619	BH2247_200619	QC01_200619	QC02_200619	QC03_200619
Client sampling date / time					19-Jun-2020 13:00	19-Jun-2020 13:41	19-Jun-2020 00:00	19-Jun-2020 00:00	19-Jun-2020 00:00
Compound	CAS Number	LOR	Unit		EB2016369-011	EB2016369-012	EB2016369-013	EB2016369-014	EB2016369-015
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.25	7.87	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		5.37	1.44	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		764	1210	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		450	693	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		106	463	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		244	270	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		244	270	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1	5	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		92	232	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		16	60	----	----	----
Magnesium	7439-95-4	1	mg/L		16	76	----	----	----
Sodium	7440-23-5	1	mg/L		127	71	----	----	----
Potassium	7440-09-7	1	mg/L		1	<1	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	<0.05
Barium	7440-39-3	0.001	mg/L		0.108	0.100	----	----	0.012
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	<0.001
Copper	7440-50-8	0.001	mg/L		0.001	0.001	----	----	0.001
Manganese	7439-96-5	0.001	mg/L		0.022	0.188	----	----	0.056
Nickel	7440-02-0	0.001	mg/L		<0.001	0.002	----	----	0.002

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2248_200619	BH2247_200619	QC01_200619	QC02_200619	QC03_200619
Client sampling date / time				19-Jun-2020 13:00	19-Jun-2020 13:41	19-Jun-2020 00:00	19-Jun-2020 00:00	19-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EB2016369-011	EB2016369-012	EB2016369-013	EB2016369-014	EB2016369-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	<0.005	
Iron	7439-89-6	0.05	mg/L	<0.05	0.42	----	----	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	<0.05	
Barium	7440-39-3	0.001	mg/L	0.118	0.106	----	----	0.020	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	----	----	0.004	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	0.004	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	0.003	
Manganese	7439-96-5	0.001	mg/L	0.027	0.212	----	----	0.163	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.005	----	----	0.010	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.008	----	----	0.012	
Iron	7439-89-6	0.05	mg/L	0.32	0.66	----	----	2.53	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	0.3	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.04	0.05	0.05	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.24	<0.01	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH2248_200619	BH2247_200619	QC01_200619	QC02_200619	QC03_200619
Client sampling date / time					19-Jun-2020 13:00	19-Jun-2020 13:41	19-Jun-2020 00:00	19-Jun-2020 00:00	19-Jun-2020 00:00
Compound	CAS Number	LOR	Unit		EB2016369-011	EB2016369-012	EB2016369-013	EB2016369-014	EB2016369-015
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.24	<0.01	<0.01	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.7	0.4	0.4	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	0.7	0.4	0.4	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.05	0.07	0.06	0.06	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	0.02	----	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		7.49	12.0	----	----	----
∅ Total Cations	----	0.01	meq/L		7.66	12.3	----	----	----
∅ Ionic Balance	----	0.01	%		1.15	1.21	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC04_200619	QC05_200619	QC06_200619	BH2617_200617	QC07_200616
Client sampling date / time					19-Jun-2020 00:00	19-Jun-2020 00:00	19-Jun-2020 00:00	17-Jun-2020 11:45	16-Jun-2020 00:00
Compound	CAS Number	LOR	Unit		EB2016369-016	EB2016369-017	EB2016369-018	EB2016369-019	EB2016369-020
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	8.13	8.10	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		----	2.11	2.09	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	1130	1140	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	651	635	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		----	434	424	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	424	461	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	424	461	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	2	2	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	111	111	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	78	76	----	----
Magnesium	7439-95-4	1	mg/L		----	58	57	----	----
Sodium	7440-23-5	1	mg/L		----	101	99	----	----
Potassium	7440-09-7	1	mg/L		----	2	2	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	<0.05
Barium	7440-39-3	0.001	mg/L		0.012	----	----	----	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	<0.001
Copper	7440-50-8	0.001	mg/L		0.002	----	----	----	<0.001
Manganese	7439-96-5	0.001	mg/L		0.055	----	----	----	<0.001
Nickel	7440-02-0	0.001	mg/L		0.002	----	----	----	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC04_200619	QC05_200619	QC06_200619	BH2617_200617	QC07_200616
Client sampling date / time				19-Jun-2020 00:00	19-Jun-2020 00:00	19-Jun-2020 00:00	17-Jun-2020 11:45	16-Jun-2020 00:00	
Compound	CAS Number	LOR	Unit	EB2016369-016	EB2016369-017	EB2016369-018	EB2016369-019	EB2016369-020	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	<0.005	
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	0.006	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	0.07	<0.05	
Barium	7440-39-3	0.001	mg/L	0.018	----	----	0.256	<0.001	
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	0.0003	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.003	----	----	0.012	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.003	----	----	0.027	<0.001	
Copper	7440-50-8	0.001	mg/L	0.003	----	----	0.078	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.152	----	----	0.887	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.009	----	----	0.016	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	0.016	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	0.08	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.100	----	----	0.098	<0.005	
Iron	7439-89-6	0.05	mg/L	2.13	----	----	----	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	----	0.1	0.1	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	----	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	----	<0.01	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	----	<0.1	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				QC04_200619	QC05_200619	QC06_200619	BH2617_200617	QC07_200616
Client sampling date / time				19-Jun-2020 00:00	19-Jun-2020 00:00	19-Jun-2020 00:00	17-Jun-2020 11:45	16-Jun-2020 00:00
Compound	CAS Number	LOR	Unit	EB2016369-016	EB2016369-017	EB2016369-018	EB2016369-019	EB2016369-020
				Result	Result	Result	Result	Result
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser - Continued								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	----	<0.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	----	<0.01
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	----	11.6	12.4	----	----
∅ Total Cations	----	0.01	meq/L	----	13.1	12.8	----	----
∅ Ionic Balance	----	0.01	%	----	5.92	1.81	----	----

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		QC08_200619		----	----	----	----
Client sampling date / time				19-Jun-2020 00:00		----	----	----	----
Compound	CAS Number	LOR	Unit	EB2016369-021		-----	-----	-----	-----
				Result		----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001		----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05		----	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001		----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001		----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001		----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001		----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001		----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001		----	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001		----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001		----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001		----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01		----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01		----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005		----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05		----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001		----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05		----	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001		----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001		----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001		----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001		----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001		----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001		----	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001		----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001		----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001		----	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01		----	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01		----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005		----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05		----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001		----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC08_200619	----	----	----	----
Client sampling date / time				19-Jun-2020 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2016369-021	-----	-----	-----	-----	-----
Result				----	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS - Continued									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	----	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	----	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	<0.01	----	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: EB2016369	Page	: 1 of 12
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	:	Address	: 2 Byth Street Stafford QLD Australia 4053
	Brisbane		
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 19-Jun-2020
Order number	: 60553814_3100.V01-B2GVariation	Date Analysis Commenced	: 20-Jun-2020
C-O-C number	: ----	Issue Date	: 25-Jun-2020
Sampler	: B HAMMOND, S BARRON		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 21		
No. of samples analysed	: 21		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3092065)									
EB2016369-008	BH2343_200619	EA005-P: pH Value	----	0.01	pH Unit	7.70	7.72	0.259	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3092064)									
EB2016369-008	BH2343_200619	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	731	732	0.137	0% - 20%
EB2016148-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	126	127	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3094585)									
EB2016121-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1970	1980	0.456	0% - 20%
EB2016369-008	BH2343_200619	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	425	403	5.15	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3092063)									
EB2016369-008	BH2343_200619	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	33	34	4.09	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	33	34	4.09	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3091586)									
EB2016369-001	BH2201_200616	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	10	0.00	0% - 50%
EB2016369-011	BH2248_200619	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3095061)									
EB2016199-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	340	342	0.730	0% - 20%
EB2016235-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	720	728	1.01	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3091582)									
EB2016369-001	BH2201_200616	ED045G: Chloride	16887-00-6	1	mg/L	153	154	0.652	0% - 20%
EB2016333-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	244	246	1.07	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 3091588)									
EB2016369-011	BH2248_200619	ED045G: Chloride	16887-00-6	1	mg/L	92	92	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3095062)									
EB2016199-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2620	2640	0.600	0% - 20%
EB2016235-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1410	1420	0.571	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3091526)									
EB2016071-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	15	15	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	8	8	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	10	10	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.00	No Limit
EB2016369-001	BH2201_200616	ED093F: Calcium	7440-70-2	1	mg/L	20	20	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	233	236	1.16	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3091528)									
EB2016369-012	BH2247_200619	ED093F: Calcium	7440-70-2	1	mg/L	60	59	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	76	75	1.32	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	71	71	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ET2002489-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	113	120	6.16	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	117	125	6.96	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	774	834	7.46	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	40	42	6.82	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3091525)									
EB2016369-008	BH2343_200619	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.056	0.056	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EB2016071-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3091525) - continued									
EB2016071-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.028	0.029	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.09	0.10	11.1	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3092219)									
EB2016259-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.114	0.118	3.94	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.008	<0.005	37.6	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	4.69	4.84	3.20	0% - 20%
EB2016259-010	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.004	0.003	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.007	0.006	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3092219) - continued									
EB2016259-010	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.011	0.010	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.60	0.61	3.17	0% - 50%
EG020T: Total Metals by ICP-MS (QC Lot: 3092220)									
EB2016369-002	BH2206_200616	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.276	0.247	10.9	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.075	0.075	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	5.58	5.57	0.212	0% - 20%
EB2016369-011	BH2248_200619	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.118	0.113	3.95	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.027	0.027	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.32	0.36	13.8	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3091527)									
EB2016369-011	BH2248_200619	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB2016369-001	BH2201_200616	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3092217)									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3092217) - continued									
EB2016300-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB2016369-009	BH2344_200619	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3092066)									
EB2016369-008	BH2343_200619	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
EB2016148-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3095037)									
EB2016369-009	BH2344_200619	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB2016369-001	BH2201_200616	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3091585)									
EB2016369-001	BH2201_200616	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	0.00	No Limit
EB2016369-011	BH2248_200619	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3095038)									
EB2016369-009	BH2344_200619	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.00	No Limit
EB2016369-001	BH2201_200616	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.45	1.44	0.879	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3092359)									
EB2016161-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.5	1.6	6.74	0% - 50%
EB2016369-008	BH2343_200619	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3092358)									
EB2016161-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.27	0.28	0.00	0% - 20%
EB2016369-008	BH2343_200619	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.13	0.14	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3091584)									
EB2016369-001	BH2201_200616	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.04	0.04	0.00	No Limit
EB2016333-004	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3091587)									
EB2016369-011	BH2248_200619	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 3092065)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 3092064)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	99.4	91.0	107
				<1	12890 µS/cm	97.8	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3094585)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	102	88.0	112
				<10	293 mg/L	103	88.0	112
				<10	2000 mg/L	98.7	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 3092063)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	95.8	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3091586)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.0	118
				<1	100 mg/L	93.2	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3095061)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	85.0	118
				<1	100 mg/L	103	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 3091582)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.3	90.0	115
				<1	1000 mg/L	104	90.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 3091588)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.5	90.0	115
				<1	1000 mg/L	100	90.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 3095062)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	90.0	115
				<1	1000 mg/L	104	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3091526)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.4	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.5	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.7	70.0	130
ED093F: Dissolved Major Cations (QCLot: 3091528)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.1	70.0	130



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED093F: Dissolved Major Cations (QCLot: 3091528) - continued								
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.5	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3091525)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.8	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.2	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.7	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	99.9	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.2	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.7	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.2	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.5	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.1	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.4	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.0	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.8	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3092219)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.9	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	103	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.4	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.8	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	108	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.6	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	106	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.8	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.6	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	110	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	106	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.9	82.0	118
EG020T: Total Metals by ICP-MS (QCLot: 3092220)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.4	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.7	81.0	119



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EG020T: Total Metals by ICP-MS (QCLot: 3092220) - continued								
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.7	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.7	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.2	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	103	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.8	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.1	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.8	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.5	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	106	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.8	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.8	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.6	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3091527)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.4	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3092217)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.4	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3092066)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	102	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3095037)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	105	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3091585)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.2	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3095038)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	91.8	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3092359)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	80.5	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3092358)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	94.3	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3091584)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.0	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3091587)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	99.0	81.7	117

Matrix Spike (MS) Report



The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3091586)							
EB2016369-009	BH2344_200619	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	101	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3095061)							
EB2016199-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3091582)							
EB2016333-003	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3091588)							
EB2016369-009	BH2344_200619	ED045G: Chloride	16887-00-6	400 mg/L	105	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3095062)							
EB2016199-004	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3091525)							
EB2016071-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	96.5	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	108	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	97.8	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	97.7	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	99.9	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	107	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	97.4	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	98.4	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	97.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	98.8	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	101	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	99.5	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3092219)							
EB2016259-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	95.4	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	81.2	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	97.6	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	89.4	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	93.4	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	77.9	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	78.9	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	89.0	70.0	130

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3092219) - continued							
EB2016259-002	Anonymous	EG020A-T: Nickel	7440-02-0	1 mg/L	98.8	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	93.8	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	98.2	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3092220)							
EB2016369-003	BH2203_200616	EG020A-T: Arsenic	7440-38-2	1 mg/L	98.6	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	99.3	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	77.5	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	91.9	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	89.6	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	92.1	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	75.4	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	81.9	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	87.5	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.5	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	94.2	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.5	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3091527)							
EB2016369-002	BH2206_200616	EG035F: Mercury	7439-97-6	0.01 mg/L	76.3	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3092217)							
EB2016354-001	Anonymous	EG035T: Mercury	7439-97-6	0.2 mg/L	80.6	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3092066)							
EB2016163-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	104	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3095037)							
EB2016354-001	Anonymous	EK055G: Ammonia as N	7664-41-7	2 mg/L	93.1	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3091585)							
EB2016369-009	BH2344_200619	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	85.0	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3095038)							
EB2016354-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	85.5	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3092359)							
EB2016161-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.1	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3092358)							
EB2016161-004	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	100	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3091584)							
EB2016333-003	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	101	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3091587)							



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3091587) - continued							
EB2016369-009	BH2344_200619	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	96.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2016369	Page	: 1 of 13
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 19-Jun-2020
Site	: ----	Issue Date	: 25-Jun-2020
Sampler	: B HAMMOND, S BARRON	No. of samples received	: 21
Order number	: 60553814_3100.V01-B2GVariation	No. of samples analysed	: 21

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EB2016199--004	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB2016199--004	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB2016333--003	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	----	----	----	22-Jun-2020	16-Jun-2020	6
Clear Plastic Bottle - Natural							
BH2216_200619, BH2344_200619, BH2248_200619, QC05_200619,	BH2343_200619, BH2345_200619, BH2247_200619, QC06_200619	----	----	----	22-Jun-2020	19-Jun-2020	3
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	----	----	----	20-Jun-2020	18-Jun-2020	2
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural							
BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	----	----	----	20-Jun-2020	18-Jun-2020	2

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					



Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) - Continued					
pH by PC Titrator	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	22-Jun-2020	16-Jun-2020	✘
Clear Plastic Bottle - Natural (EA005-P) BH2216_200619, BH2344_200619, BH2248_200619, QC05_200619,	BH2343_200619, BH2345_200619, BH2247_200619, QC06_200619	19-Jun-2020	----	----	22-Jun-2020	19-Jun-2020	✘
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	22-Jun-2020	14-Jul-2020	✔
Clear Plastic Bottle - Natural (EA010-P) BH2216_200619, BH2344_200619, BH2248_200619, QC05_200619,	BH2343_200619, BH2345_200619, BH2247_200619, QC06_200619	19-Jun-2020	----	----	22-Jun-2020	17-Jul-2020	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	23-Jun-2020	23-Jun-2020	✓
Clear Plastic Bottle - Natural (EA015H) BH2216_200619, BH2344_200619, BH2248_200619, QC05_200619,	BH2343_200619, BH2345_200619, BH2247_200619, QC06_200619	19-Jun-2020	----	----	----	23-Jun-2020	26-Jun-2020	✓
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC05_200619,	QC06_200619	19-Jun-2020	----	----	----	22-Jun-2020	26-Jun-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	22-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619	BH2229_200619, BH2344_200619, BH2248_200619,	19-Jun-2020	----	----	----	22-Jun-2020	17-Jul-2020	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	22-Jun-2020	30-Jun-2020	✓
Clear Plastic Bottle - Natural (ED037-P) BH2216_200619, BH2344_200619, BH2248_200619, QC05_200619,	BH2343_200619, BH2345_200619, BH2247_200619, QC06_200619	19-Jun-2020	----	----	----	22-Jun-2020	03-Jul-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	20-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Natural (ED041G) BH2216_200619, BH2344_200619, BH2248_200619,	BH2343_200619, BH2345_200619, BH2247_200619	19-Jun-2020	----	----	----	20-Jun-2020	17-Jul-2020	✓
Clear Plastic Bottle - Natural (ED041G) QC05_200619,	QC06_200619	19-Jun-2020	----	----	----	23-Jun-2020	17-Jul-2020	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	20-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Natural (ED045G) BH2216_200619, BH2344_200619, BH2248_200619,	BH2343_200619, BH2345_200619, BH2247_200619	19-Jun-2020	----	----	----	20-Jun-2020	17-Jul-2020	✓
Clear Plastic Bottle - Natural (ED045G) QC05_200619,	QC06_200619	19-Jun-2020	----	----	----	23-Jun-2020	17-Jul-2020	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC05_200619,	QC06_200619	19-Jun-2020	----	----	----	22-Jun-2020	26-Jun-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	22-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619	BH2229_200619, BH2344_200619, BH2248_200619,	19-Jun-2020	----	----	----	22-Jun-2020	17-Jul-2020	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	----	----	----	22-Jun-2020	13-Dec-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC04_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC03_200619, QC08_200619	19-Jun-2020	----	----	----	22-Jun-2020	16-Dec-2020	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	22-Jun-2020	13-Dec-2020	✓	22-Jun-2020	13-Dec-2020	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2617_200617		17-Jun-2020	22-Jun-2020	14-Dec-2020	✓	22-Jun-2020	14-Dec-2020	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC04_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC03_200619, QC08_200619	19-Jun-2020	22-Jun-2020	16-Dec-2020	✓	22-Jun-2020	16-Dec-2020	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	----	----	----	22-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC04_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC03_200619, QC08_200619	19-Jun-2020	----	----	----	22-Jun-2020	17-Jul-2020	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	----	----	----	22-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2617_200617		17-Jun-2020	----	----	----	22-Jun-2020	15-Jul-2020	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC04_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC03_200619, QC08_200619	19-Jun-2020	----	----	----	22-Jun-2020	17-Jul-2020	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	22-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Natural (EK040P) BH2216_200619, BH2344_200619, BH2248_200619, QC05_200619,	BH2343_200619, BH2345_200619, BH2247_200619, QC06_200619	19-Jun-2020	----	----	----	22-Jun-2020	17-Jul-2020	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	----	----	----	23-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC02_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC01_200619, QC08_200619	19-Jun-2020	----	----	----	23-Jun-2020	17-Jul-2020	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	20-Jun-2020	18-Jun-2020	✗
Clear Plastic Bottle - Natural (EK057G) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619	BH2229_200619, BH2344_200619, BH2248_200619,	19-Jun-2020	----	----	----	20-Jun-2020	21-Jun-2020	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	----	----	----	23-Jun-2020	14-Jul-2020	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC02_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC01_200619, QC08_200619	19-Jun-2020	----	----	----	23-Jun-2020	17-Jul-2020	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	23-Jun-2020	14-Jul-2020	✔	23-Jun-2020	14-Jul-2020	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC02_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC01_200619, QC08_200619	19-Jun-2020	23-Jun-2020	17-Jul-2020	✔	23-Jun-2020	17-Jul-2020	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2201_200616, BH2203_200616, BH2215_200616,	BH2206_200616, BH2214_200616, QC07_200616	16-Jun-2020	23-Jun-2020	14-Jul-2020	✔	23-Jun-2020	14-Jul-2020	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619, QC02_200619,	BH2229_200619, BH2344_200619, BH2248_200619, QC01_200619, QC08_200619	19-Jun-2020	23-Jun-2020	17-Jul-2020	✔	23-Jun-2020	17-Jul-2020	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2201_200616, BH2203_200616, BH2215_200616	BH2206_200616, BH2214_200616,	16-Jun-2020	----	----	----	20-Jun-2020	18-Jun-2020	✖
Clear Plastic Bottle - Natural (EK071G) BH2216_200619, BH2343_200619, BH2345_200619, BH2247_200619	BH2229_200619, BH2344_200619, BH2248_200619,	19-Jun-2020	----	----	----	20-Jun-2020	21-Jun-2020	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	5	43	11.63	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	27	14.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	1	19	5.26	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	6	43	13.95	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	16	18.75	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	43	6.98	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	43	6.98	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Page : 13 of 13
Work Order : EB2016369
Client : AECOM Australia Pty Ltd
Project : INLAND RAIL



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)

CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St. Stafford 4053. (Corner of Byth & Shand Streets). Phone: 07 3243 7222

 $4/3$

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date): 5 days TAT from samples reception		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)		Security/See Inhibit	
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20		COC SEQUENCE NUMBER (Circle)	
ORDER NUMBER: 60553814_3100.V01-B2G Variation				COC: <u>1</u> 2 3 4 5 6 7	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289		OF: <u>1</u> 2 3 4 5 6 7	
SAMPLER: B.Burke & S. Barron		SAMPLER MOBILE: 0490 494 804 04393814-100		RECEIVED BY: <u>B. Burke</u>	
COC emailed to ALS? Circle (YES <u>NO</u>)		EDD FORMAT (or default):		DATE/TIME: 26/12/21 15:15	
Email Reports to: krystle.nichols@aecom.com				DATE/TIME: 26/12/21 15:11	
Email Invoice to krystle.nichols@aecom.com				DATE/TIME:	

[illegible]

Environmental Division
Brisbane

Work Order Reference

Work Order Reference
EB2105448



Telephone : + 61-7-3243 7222

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2105448**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 3
Order number	: 60553814_3100.V01-BG2 Variatio	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: B. BURKE & S. BARRON		

Dates

Date Samples Received	: 26-Feb-2021 15:11	Issue Date	: 26-Feb-2021
Client Requested Due Date	: 04-Mar-2021	Scheduled Reporting Date	: 04-Mar-2021

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 13.4°C - Ice present
Receipt Detail	: Medium Esky	No. of samples received / analysed	: 9 / 9

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2105448-001	23-Feb-2021 00:00	BH2203_210223	✓	✓	✓	✓	✓	✓	✓
EB2105448-002	23-Feb-2021 00:00	BH2206_210223	✓	✓	✓	✓	✓	✓	✓
EB2105448-003	24-Feb-2021 00:00	BH2216_210224	✓	✓	✓	✓	✓	✓	✓
EB2105448-004	24-Feb-2021 00:00	QC100_210224	✓	✓	✓	✓	✓	✓	✓
EB2105448-005	25-Feb-2021 00:00	QC300_210225	✓	✓	✓	✓	✓	✓	✓
EB2105448-006	22-Feb-2021 00:00	QC400_210222	✓	✓	✓	✓	✓	✓	✓
EB2105448-007	25-Feb-2021 00:00	BH2343_210225	✓	✓	✓	✓	✓	✓	✓
EB2105448-008	26-Feb-2021 00:00	BH2345_210226	✓	✓	✓	✓	✓	✓	✓
EB2105448-009	26-Feb-2021 00:00	BH2347_210226	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +
EB2105448-001	23-Feb-2021 00:00	BH2203_210223	✓	✓	✓	✓	✓
EB2105448-002	23-Feb-2021 00:00	BH2206_210223	✓	✓	✓	✓	✓
EB2105448-003	24-Feb-2021 00:00	BH2216_210224	✓	✓	✓	✓	✓
EB2105448-004	24-Feb-2021 00:00	QC100_210224	✓	✓	✓	✓	✓
EB2105448-005	25-Feb-2021 00:00	QC300_210225	✓	✓	✓	✓	✓
EB2105448-006	22-Feb-2021 00:00	QC400_210222	✓	✓	✓	✓	✓
EB2105448-007	25-Feb-2021 00:00	BH2343_210225	✓	✓	✓	✓	✓
EB2105448-008	26-Feb-2021 00:00	BH2345_210226	✓	✓	✓	✓	✓
EB2105448-009	26-Feb-2021 00:00	BH2347_210226	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Issue Date : 26-Feb-2021
Page : 3 of 3
Work Order : EB2105448 Amendment 0
Client : AECOM Australia Pty Ltd



Method		Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
Client Sample ID(s)	Container						
EA005-P: pH by PC Titrator							
BH2203_210223	Clear Plastic Bottle - Natural	----	23-Feb-2021	26-Feb-2021	✗	----	----
BH2206_210223	Clear Plastic Bottle - Natural	----	23-Feb-2021	26-Feb-2021	✗	----	----
BH2216_210224	Clear Plastic Bottle - Natural	----	24-Feb-2021	26-Feb-2021	✗	----	----
BH2343_210225	Clear Plastic Bottle - Natural	----	25-Feb-2021	26-Feb-2021	✗	----	----
QC100_210224	Clear Plastic Bottle - Natural	----	24-Feb-2021	26-Feb-2021	✗	----	----
QC300_210225	Clear Plastic Bottle - Natural	----	25-Feb-2021	26-Feb-2021	✗	----	----
QC400_210222	Clear Plastic Bottle - Natural	----	22-Feb-2021	26-Feb-2021	✗	----	----
EK057G: Nitrite as N by Discrete Analyser							
BH2203_210223	Clear Plastic Bottle - Natural	----	25-Feb-2021	26-Feb-2021	✗	----	----
BH2206_210223	Clear Plastic Bottle - Natural	----	25-Feb-2021	26-Feb-2021	✗	----	----
QC400_210222	Clear Plastic Bottle - Natural	----	24-Feb-2021	26-Feb-2021	✗	----	----
EK071G: Reactive Phosphorus as P-By Discrete Analyser							
BH2203_210223	Clear Plastic Bottle - Natural	----	25-Feb-2021	26-Feb-2021	✗	----	----
BH2206_210223	Clear Plastic Bottle - Natural	----	25-Feb-2021	26-Feb-2021	✗	----	----
QC400_210222	Clear Plastic Bottle - Natural	----	24-Feb-2021	26-Feb-2021	✗	----	----

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email

AP_CustomerService.ANZ@aecom.com

KRYSTLE NICHOLS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

CERTIFICATE OF ANALYSIS

Work Order : **EB2105448**
Client : **AECOM Australia Pty Ltd**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-BG2 Variatio**
C-O-C number : **----**
Sampler : **B. BURKE & S. BARRON**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **9**
No. of samples analysed : **9**

Page : **1 of 8**
Laboratory : **Environmental Division Brisbane**
Contact : **Carsten Emrich**
Address : **2 Byth Street Stafford QLD Australia 4053**
Telephone : **+61 7 3552 8616**
Date Samples Received : **26-Feb-2021 15:11**
Date Analysis Commenced : **26-Feb-2021**
Issue Date : **05-Mar-2021 10:19**



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ED041G (Sulfate (Turbidimetric) as SO₄ 2-): Some samples were diluted due to matrix interference. LOR adjusted accordingly.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the method.
- EG020-F (Dissolved Metals by ICP-MS) were found to be higher than EG020-T (Total Metals by ICP-MS) for sample BH2203_210223 (EB2105448-001). This was confirmed by re-digestion and re-analysis.
- EG035T (Total Mercury): Positive mercury results have been confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2203_210223	BH2206_210223	BH2216_210224	QC100_210224	QC300_210225
Sampling date / time				23-Feb-2021 00:00	23-Feb-2021 00:00	24-Feb-2021 00:00	24-Feb-2021 00:00	25-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105448-001	EB2105448-002	EB2105448-003	EB2105448-004	EB2105448-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.85	6.93	7.67	7.66	6.10
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	5.91	5.90	16.7	17.1	0.12
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	410	439	7900	7930	<1
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	1590	290	4760	4820	<10
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	44	33	1060	1060	<1
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	188	68	503	506	2
Total Alkalinity as CaCO3	----	1	mg/L	188	68	503	506	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	4	154	154	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	35	96	2480	2470	<1
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	11	5	201	203	<1
Magnesium	7439-95-4	1	mg/L	4	5	135	134	<1
Sodium	7440-23-5	1	mg/L	90	78	1250	1280	<1
Potassium	7440-09-7	1	mg/L	3	4	9	9	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.003	0.002	0.002	0.002	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.17	0.18	<0.05
Barium	7440-39-3	0.001	mg/L	0.322	0.219	0.139	0.141	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.005	<0.001	0.004	0.004	<0.001
Chromium	7440-47-3	0.001	mg/L	0.011	0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.456	0.052	0.656	0.654	<0.001
Nickel	7440-02-0	0.001	mg/L	0.006	0.002	0.003	0.003	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2203_210223	BH2206_210223	BH2216_210224	QC100_210224	QC300_210225
Sampling date / time				23-Feb-2021 00:00	23-Feb-2021 00:00	24-Feb-2021 00:00	24-Feb-2021 00:00	25-Feb-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2105448-001	EB2105448-002	EB2105448-003	EB2105448-004	EB2105448-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.199	0.009	0.006	0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	12.9	4.71	0.37	0.36	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.005	0.003	0.003	0.003	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.16	0.16	<0.05	
Barium	7440-39-3	0.001	mg/L	0.712	0.248	0.153	0.150	<0.001	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.010	<0.001	0.006	0.004	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.026	0.002	0.002	0.002	<0.001	
Copper	7440-50-8	0.001	mg/L	0.008	0.002	0.002	0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.866	0.059	0.749	0.752	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.010	0.002	0.004	0.005	<0.001	
Lead	7439-92-1	0.001	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.024	0.008	0.008	0.008	<0.005	
Iron	7439-89-6	0.05	mg/L	27.2	5.58	1.22	1.24	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.1	0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.14	0.03	0.07	0.07	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.02	0.02	<0.01	0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2203_210223	BH2206_210223	BH2216_210224	QC100_210224	QC300_210225
Sampling date / time					23-Feb-2021 00:00	23-Feb-2021 00:00	24-Feb-2021 00:00	24-Feb-2021 00:00	25-Feb-2021 00:00
Compound	CAS Number	LOR	Unit		EB2105448-001	EB2105448-002	EB2105448-003	EB2105448-004	EB2105448-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.02	0.02	<0.01	0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		131	0.8	0.3	0.2	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		131	0.8	0.3	0.2	<0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.15	0.02	0.04	0.02	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		4.74	4.15	83.2	83.0	0.04
∅ Total Cations	----	0.01	meq/L		4.87	4.16	75.7	77.1	<0.01
∅ Ionic Balance	----	0.01	%		1.31	0.07	4.70	3.70	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_210222	BH2343_210225	BH2345_210226	BH2347_210226	----
Sampling date / time					22-Feb-2021 00:00	25-Feb-2021 00:00	26-Feb-2021 00:00	26-Feb-2021 00:00	----
Compound	CAS Number	LOR	Unit		EB2105448-006	EB2105448-007	EB2105448-008	EB2105448-009	-----
				Result	Result	Result	Result	Result	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.82	7.70	7.56	8.06	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		0.12	1.01	1.16	1.48	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		<1	701	2040	1200	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		<10	409	1420	815	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	295	907	457	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	292	598	300	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	292	598	300	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	3	6	5	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	61	406	252	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	49	152	61	----
Magnesium	7439-95-4	1	mg/L		<1	42	128	74	----
Sodium	7440-23-5	1	mg/L		<1	40	80	73	----
Potassium	7440-09-7	1	mg/L		<1	2	4	<1	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L		<0.001	0.010	0.023	0.098	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		<0.001	0.049	0.002	0.161	----
Nickel	7440-02-0	0.001	mg/L		<0.001	0.002	<0.001	0.003	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_210222	BH2343_210225	BH2345_210226	BH2347_210226	----
Sampling date / time				22-Feb-2021 00:00	25-Feb-2021 00:00	26-Feb-2021 00:00	26-Feb-2021 00:00	-----	
Compound	CAS Number	LOR	Unit	EB2105448-006	EB2105448-007	EB2105448-008	EB2105448-009	-----	
				Result	Result	Result	Result	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.009	0.008	0.008	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	0.33	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----	
Barium	7440-39-3	0.001	mg/L	<0.001	0.015	0.027	0.108	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	<0.001	0.001	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	0.003	0.001	0.003	----	
Copper	7440-50-8	0.001	mg/L	<0.001	0.003	0.002	0.003	----	
Manganese	7439-96-5	0.001	mg/L	<0.001	0.154	0.036	0.186	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.007	0.003	0.006	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.013	0.007	0.011	----	
Iron	7439-89-6	0.05	mg/L	<0.05	1.60	0.89	0.65	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0001	<0.0001	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.2	0.3	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01	0.08	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.02	0.02	1.27	<0.01	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_210222	BH2343_210225	BH2345_210226	BH2347_210226	----
Sampling date / time					22-Feb-2021 00:00	25-Feb-2021 00:00	26-Feb-2021 00:00	26-Feb-2021 00:00	----
Compound	CAS Number	LOR	Unit		EB2105448-006	EB2105448-007	EB2105448-008	EB2105448-009	-----
				Result	Result	Result	Result	Result	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.02	0.02	1.27	<0.01	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	0.1	0.2	0.7	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	0.1	1.5	0.7	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	0.07	0.08	0.08	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	0.02	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		<0.01	7.62	23.5	13.2	----
ø Total Cations	----	0.01	meq/L		<0.01	7.69	21.7	12.3	----
ø Ionic Balance	----	0.01	%		----	0.49	4.03	3.52	----

QUALITY CONTROL REPORT

Work Order	: EB2105448	Page	: 1 of 11
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 26-Feb-2021
Order number	: 60553814_3100.V01-BG2 Variatio	Date Analysis Commenced	: 26-Feb-2021
C-O-C number	: ----	Issue Date	: 05-Mar-2021
Sampler	: B. BURKE & S. BARRON		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 9		
No. of samples analysed	: 9		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 3536052)									
EB2105448-003	BH2216_210224	EA005-P: pH Value	----	0.01	pH Unit	7.67	7.66	0.130	0% - 20%
EB2105386-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.22	7.16	0.834	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3536049)									
EB2105448-003	BH2216_210224	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	7900	7920	0.260	0% - 20%
EB2105386-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	232	233	0.430	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3535653)									
EB2105180-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2300	2320	0.936	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3535674)									
EB2105276-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3360	3350	0.253	0% - 20%
EB2105430-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2770	2740	0.968	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3535675)									
EB2105448-007	BH2343_210225	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	409	417	1.94	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3536048)									
EB2105111-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	30	32	5.13	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	30	32	5.13	0% - 20%
EB2105448-003	BH2216_210224	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	503	505	0.375	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	503	505	0.375	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3535560)									
EB2105448-001	BH2203_210223	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	<5	0.00	No Limit
EB2105448-004	QC100_210224	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	154	154	0.00	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 3535561)									
EB2105448-001	BH2203_210223	ED045G: Chloride	16887-00-6	1	mg/L	35	35	0.00	0% - 20%
EB2105448-004	QC100_210224	ED045G: Chloride	16887-00-6	1	mg/L	2470	2490	0.752	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3537918)									
EB2105414-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	8	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	19	20	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EB2105422-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	156	155	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	154	155	0.969	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3560	3640	1.98	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	22	23	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3537922)									
EB2105448-008	BH2345_210226	ED093F: Calcium	7440-70-2	1	mg/L	152	154	1.18	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	128	127	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	80	82	1.93	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3537917)									
EB2105411-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.205	0.207	0.611	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	0.012	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.52	0.53	2.43	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.32	0.32	0.00	No Limit
EB2105414-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3537917) - continued									
EB2105414-006	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.071	0.070	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.49	1.48	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3537921)									
EB2105448-007	BH2343_210225	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.049	0.049	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3537746)									
EB2105414-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.015	0.017	8.81	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.003	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.020	0.020	0.00	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.23	0.22	0.00	No Limit
EB2105433-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3537746) - continued									
EB2105433-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.509	0.498	2.16	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.034	0.034	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.021	0.021	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.61	0.61	0.00	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.65	1.66	0.00	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 3537919)									
EB2105420-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB2105448-007	BH2343_210225	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3537853)									
EB2105427-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB2105448-007	BH2343_210225	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3537855)									
EB2105276-011	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ET2100989-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3536050)									
EB2105448-003	BH2216_210224	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
EB2105386-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3537841)									
EB2105424-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.11	1.11	0.00	0% - 20%
EB2105448-007	BH2343_210225	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3535559)									
EB2105448-001	BH2203_210223	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB2105448-004	QC100_210224	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3537842)									
EB2105424-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	14.2	13.8	2.86	0% - 20%
EB2105448-007	BH2343_210225	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3539016)									
EB2105042-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EB2105416-008	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit

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 Work Order : EB2105448
 Client : AECOM Australia Pty Ltd
 Project : INLAND RAIL



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3539015)									
EB2105042-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EB2105416-008	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3535562)									
EB2105448-001	BH2203_210223	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.00	No Limit
EB2105448-004	QC100_210224	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 3536052)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 3536049)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	100	91.0	107
				<1	12890 µS/cm	100	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3535653)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	103	88.0	112
				<10	293 mg/L	105	88.0	112
				<10	2000 mg/L	102	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3535674)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	102	88.0	112
				<10	293 mg/L	106	88.0	112
				<10	2000 mg/L	100	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3535675)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	101	88.0	112
				<10	293 mg/L	104	88.0	112
				<10	2000 mg/L	101	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 3536048)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	101	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3535560)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	85.0	118
				<1	100 mg/L	97.6	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 3535561)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.4	90.0	115
				<1	1000 mg/L	107	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3537918)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.2	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	70.0	130
ED093F: Dissolved Major Cations (QCLot: 3537922)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	70.0	130



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED093F: Dissolved Major Cations (QCLot: 3537922) - continued								
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3537917)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.4	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.0	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.8	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.0	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	99.3	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.7	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.6	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.9	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.8	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.3	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.6	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	105	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.6	82.0	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 3537921)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.3	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100.0	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	99.5	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.1	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.9	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.9	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	97.3	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.3	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.4	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3537746)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.7	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	88.0	111



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020T: Total Metals by ICP-MS (QCLot: 3537746) - continued								
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	110	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	100	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	112	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.4	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	109	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3537919)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3537853)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.8	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3537855)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.0	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3536050)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	102	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3537841)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	101	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3535559)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	102	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3537842)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	91.6	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3539016)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	82.2	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3539015)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	97.0	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3535562)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	112	81.7	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3535560)							
EB2105390-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	105	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3535561)							
EB2105390-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	113	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3537917)							
EB2105411-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	98.5	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	80.5	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	97.7	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.0	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	89.7	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	88.6	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	84.2	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	89.6	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	91.5	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	87.5	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	94.2	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	89.1	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3537921)							
EB2105448-008	BH2345_210226	EG020A-F: Arsenic	7440-38-2	1 mg/L	95.9	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	97.5	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	93.7	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.8	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.5	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	91.3	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	88.5	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.3	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	90.7	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	92.6	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	93.0	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	95.0	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3537746)							
EB2105414-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	102	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	95.0	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	102	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	99.5	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.3	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	94.7	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	94.6	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	103	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3537746) - continued							
EB2105414-002	Anonymous	EG020A-T: Manganese	7439-96-5	1 mg/L	103	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	96.8	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	101	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	107	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3537919)							
EB2105420-003	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	101	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3537853)							
EB2105427-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	87.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3537855)							
EB2105276-012	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	80.4	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3536050)							
EB2105386-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3537841)							
EB2105424-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	94.7	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3535559)							
EB2105390-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	96.7	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3537842)							
EB2105424-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3539016)							
EB2105042-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.2	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3539015)							
EB2105042-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	96.1	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3535562)							
EB2105390-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	108	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2105448	Page	: 1 of 12
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 26-Feb-2021
Site	: ----	Issue Date	: 05-Mar-2021
Sampler	: B. BURKE & S. BARRON	No. of samples received	: 9
Order number	: 60553814_3100.V01-BG2 Variatio	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EB2105424--002	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural QC400_210222	----	----	----	02-Mar-2021	22-Feb-2021	8
Clear Plastic Bottle - Natural BH2203_210223,	BH2206_210223	----	----	02-Mar-2021	23-Feb-2021	7
Clear Plastic Bottle - Natural BH2216_210224,	QC100_210224	----	----	02-Mar-2021	24-Feb-2021	6
Clear Plastic Bottle - Natural QC300_210225,	BH2343_210225	----	----	02-Mar-2021	25-Feb-2021	5
Clear Plastic Bottle - Natural BH2345_210226,	BH2347_210226	----	----	02-Mar-2021	26-Feb-2021	4
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural QC400_210222	----	----	----	26-Feb-2021	24-Feb-2021	2
Clear Plastic Bottle - Natural BH2203_210223,	BH2206_210223	----	----	26-Feb-2021	25-Feb-2021	1
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural QC400_210222	----	----	----	26-Feb-2021	24-Feb-2021	2
Clear Plastic Bottle - Natural BH2203_210223,	BH2206_210223	----	----	26-Feb-2021	25-Feb-2021	1

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) QC400_210222	22-Feb-2021	----	----	----	02-Mar-2021	22-Feb-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	02-Mar-2021	23-Feb-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	02-Mar-2021	24-Feb-2021	✘
Clear Plastic Bottle - Natural (EA005-P) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	02-Mar-2021	25-Feb-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	02-Mar-2021	26-Feb-2021	✘
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) QC400_210222	22-Feb-2021	----	----	----	02-Mar-2021	22-Mar-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	02-Mar-2021	23-Mar-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	02-Mar-2021	24-Mar-2021	✔
Clear Plastic Bottle - Natural (EA010-P) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	02-Mar-2021	25-Mar-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	02-Mar-2021	26-Mar-2021	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) QC400_210222	22-Feb-2021	----	----	----	27-Feb-2021	01-Mar-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	01-Mar-2021	02-Mar-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	01-Mar-2021	03-Mar-2021	✔
Clear Plastic Bottle - Natural (EA015H) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	01-Mar-2021	04-Mar-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	01-Mar-2021	05-Mar-2021	✔
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) QC400_210222	22-Feb-2021	----	----	----	01-Mar-2021	22-Mar-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	01-Mar-2021	23-Mar-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	01-Mar-2021	24-Mar-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	01-Mar-2021	25-Mar-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	01-Mar-2021	26-Mar-2021	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) QC400_210222	22-Feb-2021	----	----	----	02-Mar-2021	08-Mar-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	02-Mar-2021	09-Mar-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	02-Mar-2021	10-Mar-2021	✓
Clear Plastic Bottle - Natural (ED037-P) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	02-Mar-2021	11-Mar-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	02-Mar-2021	12-Mar-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) QC400_210222	22-Feb-2021	----	----	----	26-Feb-2021	22-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	26-Feb-2021	23-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	26-Feb-2021	24-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	26-Feb-2021	25-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	26-Feb-2021	26-Mar-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) QC400_210222	22-Feb-2021	----	----	----	26-Feb-2021	22-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	26-Feb-2021	23-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	26-Feb-2021	24-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	26-Feb-2021	25-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	26-Feb-2021	26-Mar-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) QC400_210222	22-Feb-2021	----	----	----	01-Mar-2021	22-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	01-Mar-2021	23-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	01-Mar-2021	24-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	01-Mar-2021	25-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	01-Mar-2021	26-Mar-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) QC400_210222		22-Feb-2021	----	----	----	01-Mar-2021	21-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2203_210223,	BH2206_210223	23-Feb-2021	----	----	----	01-Mar-2021	22-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2216_210224,	QC100_210224	24-Feb-2021	----	----	----	01-Mar-2021	23-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) QC300_210225,	BH2343_210225	25-Feb-2021	----	----	----	01-Mar-2021	24-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2345_210226,	BH2347_210226	26-Feb-2021	----	----	----	01-Mar-2021	25-Aug-2021	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) QC400_210222		22-Feb-2021	03-Mar-2021	21-Aug-2021	✓	03-Mar-2021	21-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2203_210223,	BH2206_210223	23-Feb-2021	03-Mar-2021	22-Aug-2021	✓	03-Mar-2021	22-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2216_210224,	QC100_210224	24-Feb-2021	03-Mar-2021	23-Aug-2021	✓	03-Mar-2021	23-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) QC300_210225,	BH2343_210225	25-Feb-2021	03-Mar-2021	24-Aug-2021	✓	03-Mar-2021	24-Aug-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2345_210226,	BH2347_210226	26-Feb-2021	03-Mar-2021	25-Aug-2021	✓	03-Mar-2021	25-Aug-2021	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) QC400_210222		22-Feb-2021	----	----	----	03-Mar-2021	22-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2203_210223,	BH2206_210223	23-Feb-2021	----	----	----	03-Mar-2021	23-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2216_210224,	QC100_210224	24-Feb-2021	----	----	----	03-Mar-2021	24-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) QC300_210225,	BH2343_210225	25-Feb-2021	----	----	----	03-Mar-2021	25-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2345_210226,	BH2347_210226	26-Feb-2021	----	----	----	03-Mar-2021	26-Mar-2021	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) QC400_210222		22-Feb-2021	----	----	----	02-Mar-2021	22-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2203_210223,	BH2206_210223	23-Feb-2021	----	----	----	02-Mar-2021	23-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2216_210224,	QC100_210224	24-Feb-2021	----	----	----	02-Mar-2021	24-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) QC300_210225,	BH2343_210225	25-Feb-2021	----	----	----	02-Mar-2021	25-Mar-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2345_210226,	BH2347_210226	26-Feb-2021	----	----	----	02-Mar-2021	26-Mar-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) QC400_210222	22-Feb-2021	----	----	----	02-Mar-2021	22-Mar-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	02-Mar-2021	23-Mar-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	02-Mar-2021	24-Mar-2021	✓
Clear Plastic Bottle - Natural (EK040P) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	02-Mar-2021	25-Mar-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	02-Mar-2021	26-Mar-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) QC400_210222	22-Feb-2021	----	----	----	01-Mar-2021	22-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	01-Mar-2021	23-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	01-Mar-2021	24-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	01-Mar-2021	25-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	01-Mar-2021	26-Mar-2021	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) QC400_210222	22-Feb-2021	----	----	----	26-Feb-2021	24-Feb-2021	✗
Clear Plastic Bottle - Natural (EK057G) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	26-Feb-2021	25-Feb-2021	✗
Clear Plastic Bottle - Natural (EK057G) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	26-Feb-2021	26-Feb-2021	✓
Clear Plastic Bottle - Natural (EK057G) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	26-Feb-2021	27-Feb-2021	✓
Clear Plastic Bottle - Natural (EK057G) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	26-Feb-2021	28-Feb-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) QC400_210222	22-Feb-2021	----	----	----	01-Mar-2021	22-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2203_210223, BH2206_210223	23-Feb-2021	----	----	----	01-Mar-2021	23-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2216_210224, QC100_210224	24-Feb-2021	----	----	----	01-Mar-2021	24-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) QC300_210225, BH2343_210225	25-Feb-2021	----	----	----	01-Mar-2021	25-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2345_210226, BH2347_210226	26-Feb-2021	----	----	----	01-Mar-2021	26-Mar-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) QC400_210222		22-Feb-2021	02-Mar-2021	22-Mar-2021	✔	02-Mar-2021	22-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2203_210223,	BH2206_210223	23-Feb-2021	02-Mar-2021	23-Mar-2021	✔	02-Mar-2021	23-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2216_210224,	QC100_210224	24-Feb-2021	02-Mar-2021	24-Mar-2021	✔	02-Mar-2021	24-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) QC300_210225,	BH2343_210225	25-Feb-2021	02-Mar-2021	25-Mar-2021	✔	02-Mar-2021	25-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2345_210226,	BH2347_210226	26-Feb-2021	02-Mar-2021	26-Mar-2021	✔	02-Mar-2021	26-Mar-2021	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) QC400_210222		22-Feb-2021	02-Mar-2021	22-Mar-2021	✔	02-Mar-2021	22-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2203_210223,	BH2206_210223	23-Feb-2021	02-Mar-2021	23-Mar-2021	✔	02-Mar-2021	23-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2216_210224,	QC100_210224	24-Feb-2021	02-Mar-2021	24-Mar-2021	✔	02-Mar-2021	24-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) QC300_210225,	BH2343_210225	25-Feb-2021	02-Mar-2021	25-Mar-2021	✔	02-Mar-2021	25-Mar-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2345_210226,	BH2347_210226	26-Feb-2021	02-Mar-2021	26-Mar-2021	✔	02-Mar-2021	26-Mar-2021	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) QC400_210222		22-Feb-2021	----	----	----	26-Feb-2021	24-Feb-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2203_210223,	BH2206_210223	23-Feb-2021	----	----	----	26-Feb-2021	25-Feb-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2216_210224,	QC100_210224	24-Feb-2021	----	----	----	26-Feb-2021	26-Feb-2021	✔
Clear Plastic Bottle - Natural (EK071G) QC300_210225,	BH2343_210225	25-Feb-2021	----	----	----	26-Feb-2021	27-Feb-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2345_210226,	BH2347_210226	26-Feb-2021	----	----	----	26-Feb-2021	28-Feb-2021	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	17	17.65	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	20	15.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	36	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	33	12.12	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	11.76	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	9	36	25.00	15.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	11.76	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	36	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	11.76	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Page : 12 of 12
Work Order : EB2105448
Client : AECOM Australia Pty Ltd
Project : INLAND RAIL



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)

CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Ryth St, Stafford 4059, (Corner of Ryth & Shand Streets), Phone: 07 3243 7222

8/3

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date): 5 days TAT from samples reception		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		Custody Seal Intact? Yes No	
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20		Free ice / frozen ice bricks present upon receipt? Yes No	
ORDER NUMBER: 60553814_3100.V01-B2G Variation				Random Sample Temperature on Receipt: C	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289			
SAMPLER: B.Burke & S. Barron		SAMPLER MOBILE: 0490 494 804			
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):			
Email Reports to: krystle.nichols@aecom.com		Email Invoice to: krystle.nichols@aecom.com			
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (fold filtered bottle required).										Additional Information			
LAB ID	SAMPLE ID	DATE / TIME	M A T R I X	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA009) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO ₄ , Fluoride, Alkalinity)	(NT-08A) Total Nitrogen + NO ₂ + NO ₃ + NH ₃ + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005P) pH/PCT	(EA010P) Electrical Conductivity (PCT)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS I MG BRISBANE FOR ANALYSIS		
			W	IP, 2N, 1S	4														
	BH2229_210302	3/2/21 9:00 2/3/21	W	1 Green	1	X	X	X	X							X	X		

Environmental Division
Brisbane
Work Order Reference
EB2105730



Telephone : 61-7-3243 7222

Environmental Division
Brisbane
Work Order Reference
EB2105730



Telephone - 61-7-3243 7222

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2105730**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 2
Order number	: 60553814_3100.V01-BG2 Variatio	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: B. BURKE, S. BARRON		

Dates

Date Samples Received	: 02-Mar-2021 15:43	Issue Date	: 05-Mar-2021
Client Requested Due Date	: 12-Mar-2021	Scheduled Reporting Date	: 12-Mar-2021

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 3.4°C - Ice present
Receipt Detail	: Large Esky	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised, due to the limited volume submitted, only Sulphate, Chloride and Cations analysis has been assigned, as per client directive. If you would like to discuss this further please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- ### Summary of Sample(s) and Requested Analysis

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER Sulfate	WATER Chloride	WATER Major Cations
EB2105730-001	02-Mar-2021 10:00	BH2229_210302	✓	✓	✓

Sample(s) have been received within the recommended holding times for the requested analysis.

ACCOUNTS PAYABLE

- Email AP_CustomerService.ANZ@aecom.com

- *AU Certificate of Analysis - NATA (COA)	Email	krystle.nichols@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	krystle.nichols@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	krystle.nichols@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	krystle.nichols@aecom.com
- A4 - AU Tax Invoice (INV)	Email	krystle.nichols@aecom.com
- Chain of Custody (CoC) (COC)	Email	krystle.nichols@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	krystle.nichols@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	krystle.nichols@aecom.com

CERTIFICATE OF ANALYSIS

Work Order : **EB2105730**
Client : **AECOM Australia Pty Ltd**
Contact : **KRYSTLE NICHOLS**
Address :
 BRISBANE
Telephone : +61 07 3553 2000
Project : INLAND RAIL
Order number : 60553814_3100.V01-BG2 Variatio
C-O-C number : ----
Sampler : B. BURKE, S. BARRON
Site : ----
Quote number : BN/219/20
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 2
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61 7 3552 8616
Date Samples Received : 02-Mar-2021 15:43
Date Analysis Commenced : 08-Mar-2021
Issue Date : 12-Mar-2021 17:11



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting
 Ø = ALS is not NATA accredited for these tests.
 ~ = Indicates an estimated value.

- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2229_210302	----	----	----	----
Sampling date / time				02-Mar-2021 10:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2105730-001	-----	-----	-----	-----
Result					----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	27	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	469	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	46	----	----	----	----
Magnesium	7439-95-4	1	mg/L	23	----	----	----	----
Sodium	7440-23-5	1	mg/L	341	----	----	----	----
Potassium	7440-09-7	1	mg/L	2	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: EB2105730	Page	: 1 of 3
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 02-Mar-2021
Order number	: 60553814_3100.V01-BG2 Variatio	Date Analysis Commenced	: 08-Mar-2021
C-O-C number	: ----	Issue Date	: 12-Mar-2021
Sampler	: B. BURKE, S. BARRON		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3551409)									
EB2106110-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	12	0.00	0% - 50%
EB2105940-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	29	29	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3551410)									
EB2106110-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	26	27	0.00	0% - 20%
EB2105940-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	39	40	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3549206)									
EB2105730-001	BH2229_210302	ED093F: Calcium	7440-70-2	1	mg/L	46	55	18.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	23	28	18.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	341	408	18.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EB2106000-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	11	9	24.7	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	988	983	0.498	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	14	35.9	0% - 50%



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3551409)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.5	85.0	118
				<1	100 mg/L	95.5	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 3551410)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.3	90.0	115
				<1	1000 mg/L	109	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3549206)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.2	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.6	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.9	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.6	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3551409)							
EB2105948-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	97.8	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3551410)							
EB2105948-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	113	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2105730	Page	: 1 of 4
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 02-Mar-2021
Site	: ----	Issue Date	: 12-Mar-2021
Sampler	: B. BURKE, S. BARRON	No. of samples received	: 1
Order number	: 60553814_3100.V01-BG2 Variatio	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH2229_210302	02-Mar-2021	----	----	----	08-Mar-2021	30-Mar-2021	✔
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH2229_210302	02-Mar-2021	----	----	----	08-Mar-2021	30-Mar-2021	✔
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) BH2229_210302	02-Mar-2021	----	----	----	08-Mar-2021	09-Mar-2021	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Chloride by Discrete Analyser	ED045G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chloride by Discrete Analyser	ED045G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)

CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St. Stafford 4053. (Corner of Byth & Shand Streets). Phone: 07 3243 7222

Environmental Division
Brisbane

Work Order Reference
EB2115507

11/06

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date): 5 days TAT from samples reception	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Tracs Organics)	
PROJECT: Inland Rall		ALS QUOTE NO.: BN/219/20	
ORDER NUMBER: 60553814_3100.V01-B2G Variation		COC SEQUENCE NUMBER (Circle)	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289	
SAMPLER: B Burke @K.McGuffie		SAMPLER MOBILE: 0480 494 804	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):	
Email Reports to: krystle.nichols@aecom.com; Max.Setchfield@aecom.com		RECEIVED BY: <i>D Allen</i>	
Email Invoice to krystle.nichols@aecom.com		DATE/TIME: <i>5/6/21 6:37pm</i>	
		DATE/TIME: <i>15/3 3/6/21</i>	

Telephone : - 61-7-3243 7222

[illegible]

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2115507**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 3
Order number	: 60553814_3100.V01.B2G Variatio	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BIANCA BURKE, KEEGAN MCGUFFIE		

Dates

Date Samples Received	: 03-Jun-2021 18:37	Issue Date	: 03-Jun-2021
Client Requested Due Date	: 11-Jun-2021	Scheduled Reporting Date	: 11-Jun-2021

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: -1.3°C - Ice present
Receipt Detail	: Medium	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2115507-001	03-Jun-2021 00:00	BH2347_210603	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +
EB2115507-001	03-Jun-2021 00:00	BH2347_210603	✓	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

CERTIFICATE OF ANALYSIS

Work Order : **EB2115507**
Client : **AECOM Australia Pty Ltd**
Contact : **KRYSTLE NICHOLS**
Address :
 BRISBANE
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01.B2G Variatio**
C-O-C number : **----**
Sampler : **BIANCA BURKE, KEEGAN MCGUFFIE**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **1**
No. of samples analysed : **1**

Page : 1 of 5
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61 7 3552 8616
Date Samples Received : 03-Jun-2021 18:37
Date Analysis Commenced : 04-Jun-2021
Issue Date : 11-Jun-2021 13:42



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals). However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH2347_210603	----	----	----	----
Sampling date / time				03-Jun-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2115507-001	-----	-----	-----	-----
Result				----	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.90	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.34	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1170	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	783	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	430	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	291	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	291	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	248	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	60	----	----	----	----
Magnesium	7439-95-4	1	mg/L	68	----	----	----	----
Sodium	7440-23-5	1	mg/L	64	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	0.095	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.166	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	----	----	----	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_210603	---	---	---	---
Sampling date / time				03-Jun-2021 00:00	---	---	---	---	
Compound	CAS Number	LOR	Unit	EB2115507-001	-----	-----	-----	-----	
				Result	---	---	---	---	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	---	---	---	---	
Selenium	7782-49-2	0.01	mg/L	<0.01	---	---	---	---	
Vanadium	7440-62-2	0.01	mg/L	<0.01	---	---	---	---	
Zinc	7440-66-6	0.005	mg/L	<0.005	---	---	---	---	
Iron	7439-89-6	0.05	mg/L	0.24	---	---	---	---	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	---	---	---	---	
Boron	7440-42-8	0.05	mg/L	0.06	---	---	---	---	
Barium	7440-39-3	0.001	mg/L	0.102	---	---	---	---	
Beryllium	7440-41-7	0.001	mg/L	<0.001	---	---	---	---	
Cadmium	7440-43-9	0.0001	mg/L	0.0001	---	---	---	---	
Cobalt	7440-48-4	0.001	mg/L	<0.001	---	---	---	---	
Chromium	7440-47-3	0.001	mg/L	0.002	---	---	---	---	
Copper	7440-50-8	0.001	mg/L	0.001	---	---	---	---	
Manganese	7439-96-5	0.001	mg/L	0.170	---	---	---	---	
Nickel	7440-02-0	0.001	mg/L	0.004	---	---	---	---	
Lead	7439-92-1	0.001	mg/L	<0.001	---	---	---	---	
Selenium	7782-49-2	0.01	mg/L	<0.01	---	---	---	---	
Vanadium	7440-62-2	0.01	mg/L	<0.01	---	---	---	---	
Zinc	7440-66-6	0.005	mg/L	0.010	---	---	---	---	
Iron	7439-89-6	0.05	mg/L	0.49	---	---	---	---	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	---	---	---	---	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	---	---	---	---	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.3	---	---	---	---	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.12	---	---	---	---	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	---	---	---	---	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	---	---	---	---	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH2347_210603	----	----	----	----
Sampling date / time				03-Jun-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2115507-001	-----	-----	-----	-----
Result					----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.0	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.0	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.10	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.04	----	----	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	12.8	----	----	----	----
∅ Total Cations	----	0.01	meq/L	11.4	----	----	----	----
∅ Ionic Balance	----	0.01	%	6.10	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: EB2115507	Page	: 1 of 9
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 03-Jun-2021
Order number	: 60553814_3100.V01.B2G Variatio	Date Analysis Commenced	: 04-Jun-2021
C-O-C number	: ----	Issue Date	: 11-Jun-2021
Sampler	: BIANCA BURKE, KEEGAN MCGUFFIE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3729106)									
EB2115704-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.58	8.57	0.1	0% - 20%
EB2115349-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.52	7.48	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3729105)									
EB2115704-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	718	720	0.3	0% - 20%
EB2115349-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2510	2510	0.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3724920)									
EB2115363-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	349	336	4.0	0% - 20%
EB2115463-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	387	386	0.3	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3729108)									
EB2115714-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	17	16	9.3	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	17	16	9.3	0% - 50%
EB2115349-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	68	70	3.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	68	70	3.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3719012)									
EB2115022-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	998	995	0.3	0% - 20%
EB2115507-001	BH2347_210603	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3719013)									
EB2115022-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9340	9340	0.0	0% - 20%
EB2115507-001	BH2347_210603	ED045G: Chloride	16887-00-6	1	mg/L	248	248	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3717301)									

EG020T: Total Metals by ICP-MS (QC Lot: 3717408)

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3717408) - continued									
EB2115326-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.083	0.093	11.1	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.093	0.094	1.1	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.019	0.019	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.007	0.006	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	18.6	18.6	0.1	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.020	0.021	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.376	0.377	0.0	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.48	0.45	5.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	44.9	44.9	0.0	0% - 20%
EB2114891-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.031	0.031	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.017	0.018	0.0	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.05	0.06	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3717299)									
EB2115326-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2115502-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3717412)									
EB2115238-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3729107)									
EB2115704-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.2	1.2	0.0	0% - 50%
EB2115349-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.8	0.8	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3725789)									

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 Work Order : EB2115507
 Client : AECOM Australia Pty Ltd
 Project : INLAND RAIL



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3725789) - continued									
EB2115013-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.16	1.15	1.0	0% - 20%
EB2115679-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	23.9	24.1	1.1	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3719015)									
EB2115541-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.92	0.92	0.0	0% - 20%
EB2115507-001	BH2347_210603	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3725790)									
EB2115013-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2115679-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.23	0.21	8.6	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3722477)									
EB2114906-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EB2115560-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.4	0.0	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3722476)									
EB2114906-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EB2115560-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.48	0.46	2.8	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3719014)									
EB2115507-001	BH2347_210603	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.04	0.04	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit			Result	LCS	Low
EA005P: pH by PC Titrator (QCLot: 3729106)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 3729105)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	97.8	91.0	107
				<1	12890 µS/cm	98.2	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3724920)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	100	88.0	112
				<10	293 mg/L	104	88.0	112
				<10	2000 mg/L	100	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 3729108)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	101	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3719012)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.0	118
				<1	100 mg/L	94.4	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 3719013)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	90.0	115
				<1	1000 mg/L	105	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3717301)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.8	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	85.9	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.4	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3717300)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.7	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.8	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.0	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.3	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.4	83.0	112

Method Blank (MB) Report

Spike

Spike Recovery (%)

Acceptable Limits (%)

<i>Method:</i>	<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Concentration</i>	<i>LCS</i>	<i>Low</i>	<i>High</i>
EG020F: Dissolved Metals by ICP-MS (QCLot: 3717300) - continued									
EG020A-F:	Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	88.0	114
EG020A-F:	Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100.0	87.0	113
EG020A-F:	Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.6	81.0	125
EG020A-F:	Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.0	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3717408)									
EG020A-T:	Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	88.0	112
EG020A-T:	Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.9	81.0	119
EG020A-T:	Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	115	70.0	130
EG020A-T:	Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	88.0	111
EG020A-T:	Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	115
EG020A-T:	Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.2	89.0	115
EG020A-T:	Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.7	88.0	116
EG020A-T:	Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.8	89.0	112
EG020A-T:	Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.2	88.0	114
EG020A-T:	Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.9	88.0	116
EG020A-T:	Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.4	79.0	111
EG020A-T:	Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	87.0	114
EG020A-T:	Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.1	84.0	114
EG020A-T:	Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	107	82.0	128
EG020A-T:	Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	106	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3717299)									
EG035F:	Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.5	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3717412)									
EG035T:	Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3729107)									
EK040P:	Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	91.7	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3725789)									
EK055G:	Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	104	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3719015)									
EK057G:	Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3725790)									
EK059G:	Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.7	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3722477)									
EK061G:	Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	102	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3722476)									
EK067G:	Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	103	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3719014)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3719014) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	105	81.7	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3719012)							
EB2115022-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3719013)							
EB2115022-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3717300)							
EB2115326-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	100	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	83.6	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	84.0	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	93.5	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.7	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	90.7	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	88.6	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	86.8	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	86.9	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	87.6	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	91.8	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	90.5	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3717408)							
EB2114891-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	101	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	107	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	112	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	101	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	92.6	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	107	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	103	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	98.5	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3717408) - continued							
EB2114891-002	Anonymous	EG020A-T: Nickel	7440-02-0	1 mg/L	105	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	107	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.3	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3717299)							
EB2115326-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	73.9	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3717412)							
EB2115238-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	96.9	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3729107)							
EB2115349-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	92.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3725789)							
EB2115015-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	84.1	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3719015)							
EB2115541-006	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	95.3	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3725790)							
EB2115015-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	98.2	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3722477)							
EB2114906-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	92.5	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3722476)							
EB2114906-005	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	106	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3719014)							
EB2115606-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	80 mg/L	100	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2115507	Page	: 1 of 9
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 03-Jun-2021
Site	: ----	Issue Date	: 11-Jun-2021
Sampler	: BIANCA BURKE, KEEGAN MCGUFFIE	No. of samples received	: 1
Order number	: 60553814_3100.V01.B2G Variatio	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EB2115022--002	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB2115022--002	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural BH2347_210603	----	----	----	10-Jun-2021	04-Jun-2021	6

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) BH2347_210603	03-Jun-2021	----	----	----	10-Jun-2021	04-Jun-2021	✖
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH2347_210603	03-Jun-2021	----	----	----	10-Jun-2021	01-Jul-2021	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) BH2347_210603	03-Jun-2021	----	----	----	09-Jun-2021	10-Jun-2021	✔
EA065: Total Hardness as CaCO₃							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_210603	03-Jun-2021	----	----	----	07-Jun-2021	01-Jul-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH2347_210603	03-Jun-2021	----	----	----	10-Jun-2021	17-Jun-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH2347_210603	03-Jun-2021	----	----	----	04-Jun-2021	01-Jul-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH2347_210603	03-Jun-2021	----	----	----	04-Jun-2021	01-Jul-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_210603	03-Jun-2021	----	----	----	07-Jun-2021	01-Jul-2021	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2347_210603	03-Jun-2021	----	----	----	07-Jun-2021	30-Nov-2021	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2347_210603	03-Jun-2021	07-Jun-2021	30-Nov-2021	✓	07-Jun-2021	30-Nov-2021	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2347_210603	03-Jun-2021	----	----	----	07-Jun-2021	01-Jul-2021	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2347_210603	03-Jun-2021	----	----	----	07-Jun-2021	01-Jul-2021	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) BH2347_210603	03-Jun-2021	----	----	----	10-Jun-2021	01-Jul-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2347_210603	03-Jun-2021	----	----	----	09-Jun-2021	01-Jul-2021	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) BH2347_210603	03-Jun-2021	----	----	----	04-Jun-2021	05-Jun-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2347_210603	03-Jun-2021	----	----	----	09-Jun-2021	01-Jul-2021	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2347_210603	03-Jun-2021	08-Jun-2021	01-Jul-2021	✓	08-Jun-2021	01-Jul-2021	✓

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 Client : AECOM Australia Pty Ltd
 Project : INLAND RAIL



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2347_210603	03-Jun-2021	08-Jun-2021	01-Jul-2021	✔	08-Jun-2021	01-Jul-2021	✔
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) BH2347_210603	03-Jun-2021	----	----	----	04-Jun-2021	05-Jun-2021	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	6	33.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	6	16.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	20	15.00	15.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	6	16.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	6	16.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Blyth St, Stafford 4053. (Corner of Rytch & Shand Streets). Phone: 07 3243 7222

7/6.

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date): 5 days TAT from samples reception	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20	
ORDER NUMBER: 60553814_3100.V01-B2G Variation		COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289	
SAMPLER: B.Burke @K McGuffie		SAMPLER MOBILE: 0490 494 804	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):	
Email Reports to: krystle.nichols@aecom.com; Max.Scotchfield@aecom.com		RECEIVED BY: <i>Madison</i>	
Email Invoice to: krystle.nichols@aecom.com		DATE/TIME: 28/5/21 16:12	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		RECEIVED BY:	

SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).												Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA006) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-08A) Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005P) pH/pCT	(EA010P) Electrical Conductivity (pCT)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS MGT BRISBANE FOR ANALYSIS
1	BH2218-210526	26/5/21	W	1P, 2N, 1S	4	x	x	x	x	x	x	x	x	x	x	x	
2	BH2217-210526	26/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	
3	BH2206-210526	26/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	
4	BH2203-210526	26/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	Extra 1x250ml
5	BH2216-210527	27/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	Extra Volume
6	QC101-210527	27/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	
7	QC301-210527	27/5/21	W	1P, 1N, 1S	3	x	x	x	x	x	x	x	x	x	x	x	
8	QC401-210527	27/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	
9	BH2343210528	28/5/21	W	1P, 2N, 1S	4	x	x	x	x	x	x	x	x	x	x	x	
10	BH2345210528	28/5/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	
TOTAL																	

HT

Environmental
Brisbane
Work Order Ref
EB2114



Telephone : + 61-7-3243

HT

Environmental Division
Brisbane
Work Order Reference
EB2114962



Telephone : - 61-7-3243 7222

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2114962**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 3
Order number	: 60553814_3100.V01-B2G Variatio	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: B.BURKE & K.MCGUFFIE		

Dates

Date Samples Received	: 28-May-2021 16:12	Issue Date	: 29-May-2021
Client Requested Due Date	: 07-Jun-2021	Scheduled Reporting Date	: 07-Jun-2021

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 1.1°C - Ice present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 10 / 10

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please note where you have asked for 'Dissolved' metals for samples "QC301_201527 and QC401_210527" (ALS # 7 & 8), the laboratory will filter an aliquot from the non-preserved plastic (ALS Green label) container for this analysis, however this is a non-compliant container/process and should be taken into consideration when reviewing the metals data. Additional charges will be incurred for laboratory filtration.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
QC301_210527	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC401_210527	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
QC301_210527	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC401_210527	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2114962-001	26-May-2021 00:00	BH2218_210526	✓	✓	✓	✓	✓	✓	✓
EB2114962-002	26-May-2021 00:00	BH2217_210526	✓	✓	✓	✓	✓	✓	✓
EB2114962-003	26-May-2021 00:00	BH2206_210526	✓	✓	✓	✓	✓	✓	✓
EB2114962-004	26-May-2021 00:00	BH2203_210526	✓	✓	✓	✓	✓	✓	✓
EB2114962-005	27-May-2021 00:00	BH2216_210527	✓	✓	✓	✓	✓	✓	✓
EB2114962-006	27-May-2021 00:00	QC101_210527	✓	✓	✓	✓	✓	✓	✓
EB2114962-007	27-May-2021 00:00	QC301_210527	✓	✓	✓		✓	✓	✓
EB2114962-008	27-May-2021 00:00	QC401_210527	✓	✓	✓		✓	✓	✓
EB2114962-009	28-May-2021 00:00	BH2343210528	✓	✓	✓	✓	✓	✓	✓
EB2114962-010	28-May-2021 00:00	BH2345210528	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - NT-01D & 02A Major Cations & Anions (Ca, Mg, Na, K, Cl, SO4,	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +
EB2114962-001	26-May-2021 00:00	BH2218_210526	✓	✓	✓
EB2114962-002	26-May-2021 00:00	BH2217_210526	✓	✓	✓
EB2114962-003	26-May-2021 00:00	BH2206_210526	✓	✓	✓
EB2114962-004	26-May-2021 00:00	BH2203_210526	✓	✓	✓
EB2114962-005	27-May-2021 00:00	BH2216_210527	✓	✓	✓
EB2114962-006	27-May-2021 00:00	QC101_210527	✓	✓	✓
EB2114962-007	27-May-2021 00:00	QC301_210527	✓	✓	✓
EB2114962-008	27-May-2021 00:00	QC401_210527	✓	✓	✓
EB2114962-009	28-May-2021 00:00	BH2343210528	✓	✓	✓

[illegible]

CERTIFICATE OF ANALYSIS

Work Order : **EB2114962**
Client : **AECOM Australia Pty Ltd**
Contact : **KRYSTLE NICHOLS**
Address :
 BRISBANE
Telephone : +61 07 3553 2000
Project : INLAND RAIL
Order number : 60553814_3100.V01-B2G Variatio
C-O-C number : ----
Sampler : B.BURKE & K.MCGUFFIE
Site : ----
Quote number : BN/219/20
No. of samples received : 10
No. of samples analysed : 10

Page : 1 of 8
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61 7 3552 8616
Date Samples Received : 28-May-2021 16:12
Date Analysis Commenced : 29-May-2021
Issue Date : 07-Jun-2021 17:32



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK055G (Ammonia as N) / EK059G (Nitrite and Nitrate as N): Sample EB2114962_001 (BH2218_210526) was diluted due to matrix interference. LOR adjusted accordingly.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2218_210526	BH2217_210526	BH2206_210526	BH2203_210526	BH2216_210527
Sampling date / time				26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	27-May-2021 00:00
Compound	CAS Number	LOR	Unit	EB2114962-001	EB2114962-002	EB2114962-003	EB2114962-004	EB2114962-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.83	7.93	6.87	6.77	7.89
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	5.39	5.64	5.67	4.41	13.0
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1420	750	439	1350	3980
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	829	468	278	1390	2360
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	319	180	73	104	566
Total Alkalinity as CaCO ₃	----	1	mg/L	319	180	73	104	566
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	43	33	2	522	164
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	293	117	99	60	970
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	32	23	5	92	74
Magnesium	7439-95-4	1	mg/L	47	9	5	15	42
Sodium	7440-23-5	1	mg/L	205	126	75	173	565
Potassium	7440-09-7	1	mg/L	7	3	4	6	5
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO ₃	----	1	mg/L	273	94	33	291	358
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.003	0.002	0.004	0.003
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	0.06	0.26
Barium	7440-39-3	0.001	mg/L	0.110	0.119	0.210	0.434	0.064
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	0.009	0.002
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.013	<0.001
Copper	7440-50-8	0.001	mg/L	0.003	0.016	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.003	0.031	0.054	0.766	0.302
Nickel	7440-02-0	0.001	mg/L	0.008	0.006	0.001	0.008	0.004

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2218_210526	BH2217_210526	BH2206_210526	BH2203_210526	BH2216_210527
Sampling date / time				26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	27-May-2021 00:00
Compound	CAS Number	LOR	Unit	EB2114962-001	EB2114962-002	EB2114962-003	EB2114962-004	EB2114962-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.020	0.018	<0.005	0.009	0.005	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	4.76	16.9	0.08	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.003	0.002	0.005	0.002	
Boron	7440-42-8	0.05	mg/L	<0.05	0.05	<0.05	0.06	0.32	
Barium	7440-39-3	0.001	mg/L	0.137	0.147	0.252	0.536	0.073	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.013	0.004	<0.001	0.010	0.002	
Chromium	7440-47-3	0.001	mg/L	<0.001	0.003	<0.001	0.020	0.007	
Copper	7440-50-8	0.001	mg/L	0.014	0.029	<0.001	0.007	0.002	
Manganese	7439-96-5	0.001	mg/L	0.287	0.223	0.053	0.972	0.369	
Nickel	7440-02-0	0.001	mg/L	0.018	0.015	0.002	0.012	0.004	
Lead	7439-92-1	0.001	mg/L	<0.001	0.007	<0.001	0.004	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.022	0.029	0.007	0.032	<0.005	
Iron	7439-89-6	0.05	mg/L	0.24	1.05	5.27	21.9	0.58	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.6	0.5	<0.1	0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.01	0.03	0.08	0.30	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.02	1.61	<0.01	0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2218_210526	BH2217_210526	BH2206_210526	BH2203_210526	BH2216_210527
Sampling date / time					26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	26-May-2021 00:00	27-May-2021 00:00
Compound	CAS Number	LOR	Unit		EB2114962-001	EB2114962-002	EB2114962-003	EB2114962-004	EB2114962-005
Result					Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.02	1.62	<0.01	0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.1	0.6	0.5	13.8	1.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.1	2.2	0.5	13.8	1.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	0.38	0.02	0.04	0.20
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.34	<0.01	<0.01	0.02
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		15.5	7.58	4.29	14.6	42.1
∅ Total Cations	----	0.01	meq/L		----	----	----	----	44.6
∅ Total Cations	----	0.01	meq/L		14.6	7.44	4.02	13.5	----
∅ Ionic Balance	----	0.01	%		----	----	----	----	2.97
∅ Ionic Balance	----	0.01	%		3.23	0.92	3.21	4.03	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				QC101_210527	QC301_210527	QC401_210527	BH2343_210528	BH2345_210528
Sampling date / time				27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	28-May-2021 00:00	28-May-2021 00:00
Compound	CAS Number	LOR	Unit	EB2114962-006	EB2114962-007	EB2114962-008	EB2114962-009	EB2114962-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.98	6.47	6.34	7.71	7.72
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	12.9	0.12	0.48	0.95	1.14
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	3980	5	8	683	1980
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	2370	<10	<10	388	1260
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	564	2	4	277	579
Total Alkalinity as CaCO ₃	----	1	mg/L	564	2	4	277	579
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	165	<1	<1	6	5
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	973	<1	<1	62	394
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	75	<1	<1	48	149
Magnesium	7439-95-4	1	mg/L	43	<1	<1	41	126
Sodium	7440-23-5	1	mg/L	568	<1	2	37	78
Potassium	7440-09-7	1	mg/L	5	<1	<1	2	4
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO ₃	----	1	mg/L	364	<1	<1	289	891
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	0.21	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.065	<0.001	<0.001	0.011	0.023
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.302	<0.001	<0.001	0.005	0.001
Nickel	7440-02-0	0.001	mg/L	0.004	<0.001	<0.001	0.002	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC101_210527	QC301_210527	QC401_210527	BH2343_210528	BH2345_210528
Sampling date / time				27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	28-May-2021 00:00	28-May-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2114962-006	EB2114962-007	EB2114962-008	EB2114962-009	EB2114962-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	<0.005	<0.005	0.007	<0.005	
Iron	7439-89-6	0.05	mg/L	0.08	----	----	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.35	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.074	0.001	<0.001	0.012	0.024	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.382	0.004	<0.001	0.012	0.033	
Nickel	7440-02-0	0.001	mg/L	0.004	<0.001	<0.001	0.002	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	0.52	<0.05	<0.05	0.08	0.79	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	<0.1	<0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.23	0.04	0.29	0.05	0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.93	<0.01	0.01	<0.01	1.10	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC101_210527	QC301_210527	QC401_210527	BH2343_210528	BH2345_210528
Sampling date / time					27-May-2021 00:00	27-May-2021 00:00	27-May-2021 00:00	28-May-2021 00:00	28-May-2021 00:00
Compound	CAS Number	LOR	Unit		EB2114962-006	EB2114962-007	EB2114962-008	EB2114962-009	EB2114962-010
					Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.93	<0.01	0.01	<0.01	1.10
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.7	<0.1	0.3	<0.1	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.6	<0.1	0.3	<0.1	1.3
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.20	<0.01	<0.01	0.02	0.09
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	<0.01	<0.01	0.01	0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		42.2	0.04	0.08	7.41	22.8
∅ Total Cations	----	0.01	meq/L		44.1	----	----	----	----
∅ Total Cations	----	0.01	meq/L		----	<0.01	0.09	7.43	21.3
∅ Ionic Balance	----	0.01	%		0.37	----	----	----	----
∅ Ionic Balance	----	0.01	%		----	----	----	0.15	3.37

QUALITY CONTROL REPORT

Work Order	: EB2114962	Page	: 1 of 10
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 28-May-2021
Order number	: 60553814_3100.V01-B2G Variatio	Date Analysis Commenced	: 29-May-2021
C-O-C number	: ----	Issue Date	: 07-Jun-2021
Sampler	: B.BURKE & K.MCGUFFIE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3715327)									
EB2114938-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.68	7.74	0.7	0% - 20%
EB2114962-003	BH2206_210526	EA005-P: pH Value	----	0.01	pH Unit	6.87	6.83	0.6	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3715326)									
EB2114938-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	230	232	0.9	0% - 20%
EB2114962-003	BH2206_210526	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	439	439	0.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3712026)									
EB2114505-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2140	2130	0.4	0% - 20%
EB2114909-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1130	1130	0.4	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3712027)									
EB2114962-006	QC101_210527	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2370	2370	0.3	0% - 20%
EB2115213-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	234	232	0.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3715329)									
ET2101697-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	209	243	14.7	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1280	1300	1.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1490	1540	3.4	0% - 20%
EB2114962-003	BH2206_210526	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	73	72	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	73	72	1.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3706727)									
EB2114394-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EB2114458-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1	1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3706731)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3706731) - continued									
ET2101375-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	18	18	0.0	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 3706726)									
EB2114394-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	511	514	0.6	0% - 20%
EB2114458-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	10	10	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3706730)									
EB2114962-002	BH2217_210526	ED045G: Chloride	16887-00-6	1	mg/L	117	118	1.1	0% - 20%
ET2101375-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	180	180	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3711940)									
EB2114962-010	BH2345_210528	ED093F: Calcium	7440-70-2	1	mg/L	149	148	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	126	124	1.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	78	77	1.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EB2114962-001	BH2218_210526	ED093F: Calcium	7440-70-2	1	mg/L	32	31	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	47	47	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	205	205	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	7	7	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3711941)									
EB2114962-010	BH2345_210528	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.023	0.022	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EB2114962-001	BH2218_210526	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.110	0.116	4.5	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.004	0.0	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3711941) - continued									
EB2114962-001	BH2218_210526	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.020	0.019	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3709548)									
EB2114962-003	BH2206_210526	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.252	0.259	2.8	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.053	0.054	1.9	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	<0.005	27.6	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	5.27	5.35	1.6	0% - 20%
EB2114921-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.039	0.040	0.0	0% - 20%
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.217	0.221	2.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.133	0.132	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.32	0.29	11.1	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.18	0.19	5.8	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3711942)									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG035F: Dissolved Mercury by FIMS (QC Lot: 3711942) - continued									
EB2114962-001	BH2218_210526	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3709552)									
EB2114429-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2114962-006	QC101_210527	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3715328)									
EB2114938-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.1	0.0	No Limit
EB2114962-003	BH2206_210526	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3713008)									
EB2114584-011	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.91	1.95	2.0	0% - 20%
EB2114962-010	BH2345_210528	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3706728)									
EB2114962-002	BH2217_210526	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.01	0.01	0.0	No Limit
ET2101375-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3713007)									
EB2114584-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2114962-010	BH2345_210528	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.10	1.13	3.3	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3711421)									
EB2114930-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	6.9	6.2	10.5	0% - 50%
EB2114962-010	BH2345_210528	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3711420)									
EB2114930-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EB2114962-010	BH2345_210528	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	0.05	49.4	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3706729)									
EB2114966-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2114962-002	BH2217_210526	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.34	0.36	4.8	0% - 20%

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 3715327)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102
				----	7 pH Unit	101	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 3715326)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	97.0	91.0	107
				<1	12890 µS/cm	98.0	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3712026)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	101	88.0	112
				<10	293 mg/L	105	88.0	112
				<10	2000 mg/L	100	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3712027)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	103	88.0	112
				<10	293 mg/L	107	88.0	112
				<10	2000 mg/L	99.5	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 3715329)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	108	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3706727)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.5	85.0	118
				<1	100 mg/L	106	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3706731)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.2	85.0	118
				<1	100 mg/L	89.9	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 3706726)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.5	90.0	115
				<1	1000 mg/L	105	90.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 3706730)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	90.0	115
				<1	1000 mg/L	106	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3711940)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.8	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3711941)								

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3711941) - continued								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.4	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	105	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	103	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.6	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	103	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	105	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3709548)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.2	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	101	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.5	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.1	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.6	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.5	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.5	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	91.5	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	100	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.1	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	100	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3711942)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.0	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3709552)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	113	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3715328)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	99.6	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3713008)								



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3713008) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	99.4	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3706728)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3713007)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	92.7	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3711421)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	97.3	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3711420)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	103	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3706729)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	111	81.7	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3706727)							
EB2114394-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	98.9	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3706731)							
EB2114962-005	BH2216_210527	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3706726)							
EB2114394-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	96.7	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3706730)							
EB2114962-005	BH2216_210527	ED045G: Chloride	16887-00-6	400 mg/L	72.6	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3711941)							
EB2114962-002	BH2217_210526	EG020A-F: Arsenic	7440-38-2	1 mg/L	110	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	106	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	110	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	109	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	104	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	103	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	98.7	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3711941) - continued							
EB2114962-002	BH2217_210526	EG020A-F: Lead	7439-92-1	1 mg/L	110	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	104	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	109	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	103	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	113	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3709548)							
EB2114960-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	106	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	98.3	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	115	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	104	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	112	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	113	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	97.8	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	90.9	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	113	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	111	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	113	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	97.5	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3711942)							
EB2114962-002	BH2217_210526	EG035F: Mercury	7439-97-6	0.01 mg/L	86.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3709552)							
EB2114962-001	BH2218_210526	EG035T: Mercury	7439-97-6	0.01 mg/L	105	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3715328)							
EB2114938-007	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	95.0	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3713008)							
EB2114962-001	BH2218_210526	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	96.2	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3706728)							
EB2114962-005	BH2216_210527	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	98.2	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3713007)							
EB2114962-001	BH2218_210526	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	91.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3711421)							
EB2114962-001	BH2218_210526	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	100	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3711420)							
EB2114962-001	BH2218_210526	EK067G: Total Phosphorus as P	----	1 mg/L	104	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3706729)							
EB2114962-005	BH2216_210527						



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3706729) - continued							
EB2114962-005	BH2216_210527	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	110	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2114962	Page	: 1 of 12
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 28-May-2021
Site	: ----	Issue Date	: 07-Jun-2021
Sampler	: B.BURKE & K.MCGUFFIE	No. of samples received	: 10
Order number	: 60553814_3100.V01-B2G Variatio	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EB2114962--005	BH2216_210527	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	----	----	----	04-Jun-2021	26-May-2021	9
Clear Plastic Bottle - Natural							
BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	----	----	----	04-Jun-2021	27-May-2021	8
Clear Plastic Bottle - Natural							
BH2343_210528,	BH2345_210528	----	----	----	04-Jun-2021	28-May-2021	7
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	----	----	----	29-May-2021	28-May-2021	1
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural							
BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	----	----	----	29-May-2021	28-May-2021	1

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	04-Jun-2021	26-May-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	04-Jun-2021	27-May-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	04-Jun-2021	28-May-2021	✖
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	04-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	04-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	04-Jun-2021	25-Jun-2021	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	02-Jun-2021	02-Jun-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	02-Jun-2021	03-Jun-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	02-Jun-2021	04-Jun-2021	✔
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	04-Jun-2021	09-Jun-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	04-Jun-2021	10-Jun-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	04-Jun-2021	11-Jun-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	29-May-2021	23-Jun-2021	✔
Clear Plastic Bottle - Natural (ED041G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	29-May-2021	24-Jun-2021	✔
Clear Plastic Bottle - Natural (ED041G) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	29-May-2021	25-Jun-2021	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	29-May-2021	23-Jun-2021	✔
Clear Plastic Bottle - Natural (ED045G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	29-May-2021	24-Jun-2021	✔
Clear Plastic Bottle - Natural (ED045G) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	29-May-2021	25-Jun-2021	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC301_210527,	QC401_210527	27-May-2021	----	----	----	03-Jun-2021	03-Jun-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	03-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_210527,	QC101_210527	27-May-2021	----	----	----	03-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	03-Jun-2021	25-Jun-2021	✔
ED093F: SAR and Hardness Calculations								
Clear Plastic Bottle - Natural (ED093F) QC301_210527,	QC401_210527	27-May-2021	----	----	----	03-Jun-2021	03-Jun-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	03-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_210527,	QC101_210527	27-May-2021	----	----	----	03-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	03-Jun-2021	25-Jun-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-F) QC301_210527,	QC401_210527	27-May-2021	----	----	----	03-Jun-2021	23-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	03-Jun-2021	22-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2216_210527,	QC101_210527	27-May-2021	----	----	----	03-Jun-2021	23-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	03-Jun-2021	24-Nov-2021	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	03-Jun-2021	22-Nov-2021	✓	03-Jun-2021	22-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	03-Jun-2021	23-Nov-2021	✓	03-Jun-2021	23-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2343_210528,	BH2345_210528	28-May-2021	03-Jun-2021	24-Nov-2021	✓	03-Jun-2021	24-Nov-2021	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035F) QC301_210527,	QC401_210527	27-May-2021	----	----	----	04-Jun-2021	24-Jun-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	04-Jun-2021	23-Jun-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2216_210527,	QC101_210527	27-May-2021	----	----	----	04-Jun-2021	24-Jun-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	04-Jun-2021	25-Jun-2021	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	03-Jun-2021	23-Jun-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	03-Jun-2021	24-Jun-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	03-Jun-2021	25-Jun-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	04-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	04-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	04-Jun-2021	25-Jun-2021	✔
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	02-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	02-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	02-Jun-2021	25-Jun-2021	✔
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	29-May-2021	28-May-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	29-May-2021	29-May-2021	✔
Clear Plastic Bottle - Natural (EK057G) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	29-May-2021	30-May-2021	✔
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	02-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	02-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	02-Jun-2021	25-Jun-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	02-Jun-2021	23-Jun-2021	✔	02-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	02-Jun-2021	24-Jun-2021	✔	02-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2343_210528,	BH2345_210528	28-May-2021	02-Jun-2021	25-Jun-2021	✔	02-Jun-2021	25-Jun-2021	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	02-Jun-2021	23-Jun-2021	✔	02-Jun-2021	23-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	02-Jun-2021	24-Jun-2021	✔	02-Jun-2021	24-Jun-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2343_210528,	BH2345_210528	28-May-2021	02-Jun-2021	25-Jun-2021	✔	02-Jun-2021	25-Jun-2021	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2218_210526, BH2206_210526,	BH2217_210526, BH2203_210526	26-May-2021	----	----	----	29-May-2021	28-May-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2216_210527, QC301_210527,	QC101_210527, QC401_210527	27-May-2021	----	----	----	29-May-2021	29-May-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2343_210528,	BH2345_210528	28-May-2021	----	----	----	29-May-2021	30-May-2021	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	31	12.90	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	28	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	30	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	31	12.90	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	28	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	30	20.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	31	6.45	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	30	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	31	6.45	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Page : 12 of 12
Work Order : EB2114962
Client : AECOM Australia Pty Ltd
Project : INLAND RAIL



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St, Stafford 4053, (Corner of Byth & Shand Streets), Phone: 07 3243 7222

2x Estuaries.

Environmental Division
Brisbane
Work Order Reference
EB2118616



Telephone - 61-7-3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS: ☒ Standard TAT (List due date): 5 days TAT from samples reception		FOR: BOHANNON & PARTNERS (Wickham)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)			
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20		COC SEQUENCE NUMBER (Circle) COC: 2 3 4 5 6 7 OF: 2 3 4 5 6 7	
ORDER NUMBER: 60553814_3100.V01-B2G Variation					
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289			
SAMPLER: B. Burke & S. Barron		SAMPLER MOBILE: 0490 494 804		RELINQUISHED BY: B. Burke	
COC emailed to ALS? Circle YES/NO		EDD FORMAT (or default):		RECEIVED BY: DANER	
Email Reports to: krystle.nichols@aecom.com		DATE/TIME: 2/7/21 @ 12:19		DATE/TIME: 12/9 2/7/14	
Email Invoice to: krystle.nichols@aecom.com				RELINQUISHED BY:	
				DATE/TIME:	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).															Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA008) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO ₄ , Fluoride, Alkalinity)	(NT-08A) Total Nitrogen + NO ₂ + NO ₃ + NH ₃ + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005P) pH/PCPT	(EA010P) Electrical Conductivity (PCT)	TRU/PAH/BTEXN	Pesticides	PCBs	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS MG BRISBANE FOR ANALYSIS			
1	BH2347-210628	28/6/21	W	2N, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
2	BH2218-210629	29/6/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
3	BH2217-210629	29/6/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
4	BH2203-210629	29/6/21	W	"	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
5	BH2206-210629	29/6/21	W	5N, 5P	10	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
6	BH2216-210630	30/6/21	W	3N, 5P	8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	MS extra vol			
7	QC301-210630	30/6/21	W	2N, 4P	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	extra vol			
8	QC401-210630	30/6/21	W	3N, 4P	6	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
9	BH2343-210701	1/7/21	W	2N, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
10	BH2345-210701	1/7/21	W	2N, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
11	QC102-210630	30/6/21	W	2N, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
12	BH2344-210702	2/7/21	W	2N, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
13	BH2248-210702	2/7/21	W	2N, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
TOTAL																							

HT

HT



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB2118616**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 4
Order number	: 60553814_3100.V01-B2G Var.	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BIANCA BURKE, SUMMER BARRON		

Dates

Date Samples Received	: 02-Jul-2021 12:19	Issue Date	: 02-Jul-2021
Client Requested Due Date	: 09-Jul-2021	Scheduled Reporting Date	: 09-Jul-2021

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 3.2°C, 14.6°C - Ice present
Receipt Detail	: Medium	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised that all metal analyses have been assigned as per the quote table. If you wish to change this please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Samples requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
QC301_210630	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC401_210630	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
QC301_210630	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC401_210630	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2118616-001	28-Jun-2021 00:00	BH2347_210628	✓	✓	✓	✓	✓	✓	✓
EB2118616-002	29-Jun-2021 00:00	BH2218_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-003	29-Jun-2021 00:00	BH2217_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-004	29-Jun-2021 00:00	BH2203_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-005	29-Jun-2021 00:00	BH2206_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-006	30-Jun-2021 00:00	BH2216_210630	✓	✓	✓	✓	✓	✓	✓
EB2118616-007	30-Jun-2021 00:00	QC301_210630	✓	✓	✓		✓	✓	✓
EB2118616-008	30-Jun-2021 00:00	QC401_210630	✓	✓	✓		✓	✓	✓
EB2118616-009	01-Jul-2021 00:00	BH2343_210701	✓	✓	✓	✓	✓	✓	✓
EB2118616-010	01-Jul-2021 00:00	BH2345_210701	✓	✓	✓	✓	✓	✓	✓
EB2118616-011	30-Jun-2021 00:00	QC102_210630	✓	✓	✓	✓	✓	✓	✓
EB2118616-012	02-Jul-2021 00:00	BH2344_210702	✓	✓	✓	✓	✓	✓	✓
EB2118616-013	02-Jul-2021 00:00	BH2348_210702	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-07 TRH/BTEX/PAH	WATER - W-13 OC/OP/PCB
EB2118616-001	28-Jun-2021 00:00	BH2347_210628	✓	✓	✓	✓	✓	✓	✓
EB2118616-002	29-Jun-2021 00:00	BH2218_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-003	29-Jun-2021 00:00	BH2217_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-004	29-Jun-2021 00:00	BH2203_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-005	29-Jun-2021 00:00	BH2206_210629	✓	✓	✓	✓	✓	✓	✓
EB2118616-006	30-Jun-2021 00:00	BH2216_210630	✓	✓	✓	✓	✓	✓	✓



			WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-07 TRH/BTEXN/PAH	WATER - W-13 OC/OP/PCB
EB2118616-007	30-Jun-2021 00:00	QC301_210630	✓	✓	✓	✓	✓	✓	✓
EB2118616-008	30-Jun-2021 00:00	QC401_210630	✓	✓	✓	✓	✓	✓	✓
EB2118616-009	01-Jul-2021 00:00	BH2343_210701	✓	✓	✓	✓	✓	✓	✓
EB2118616-010	01-Jul-2021 00:00	BH2345_210701	✓	✓	✓	✓	✓	✓	✓
EB2118616-011	30-Jun-2021 00:00	QC102_210630	✓	✓	✓	✓	✓	✓	✓
EB2118616-012	02-Jul-2021 00:00	BH2344_210702	✓	✓	✓	✓	✓	✓	✓
EB2118616-013	02-Jul-2021 00:00	BH2348_210702	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method		Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
Client Sample ID(s)	Container						
EA005-P: pH by PC Titrator							
BH2203_210629	Clear Plastic Bottle - Natural	----	30-Jun-2021	02-Jul-2021	✗	----	----
BH2206_210629	Clear Plastic Bottle - Natural	----	30-Jun-2021	02-Jul-2021	✗	----	----
BH2216_210630	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2217_210629	Clear Plastic Bottle - Natural	----	30-Jun-2021	02-Jul-2021	✗	----	----
BH2218_210629	Clear Plastic Bottle - Natural	----	30-Jun-2021	02-Jul-2021	✗	----	----
BH2347_210628	Clear Plastic Bottle - Natural	----	29-Jun-2021	02-Jul-2021	✗	----	----
QC102_210630	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
QC301_210630	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
QC401_210630	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
EK057G: Nitrite as N by Discrete Analyser							
BH2203_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2206_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2217_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2218_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2347_210628	Clear Plastic Bottle - Natural	----	30-Jun-2021	02-Jul-2021	✗	----	----
EK071G: Reactive Phosphorus as P-By Discrete Analyser							
BH2203_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2206_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2217_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2218_210629	Clear Plastic Bottle - Natural	----	01-Jul-2021	02-Jul-2021	✗	----	----
BH2347_210628	Clear Plastic Bottle - Natural	----	30-Jun-2021	02-Jul-2021	✗	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB2118616**
Client : **AECOM Australia Pty Ltd**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Var.**
C-O-C number : **----**
Sampler : **BIANCA BURKE, SUMMER BARRON**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **13**
No. of samples analysed : **13**

Page : 1 of 21
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 02-Jul-2021 12:19
Date Analysis Commenced : 03-Jul-2021
Issue Date : 09-Jul-2021 18:04



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan		Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2347_210628	BH2218_210629	BH2217_210629	BH2203_210629	BH2206_210629
Sampling date / time				28-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EB2118616-001	EB2118616-002	EB2118616-003	EB2118616-004	EB2118616-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.94	7.77	7.85	6.77	6.85
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.54	5.46	5.56	5.06	6.26
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1180	1400	720	1130	448
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	761	792	470	1130	282
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	451	256	102	203	26
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	299	299	189	103	75
Total Alkalinity as CaCO3	----	1	mg/L	299	299	189	103	75
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	40	32	403	2
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	255	294	120	55	102
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	62	30	26	60	4
Magnesium	7439-95-4	1	mg/L	72	44	9	13	4
Sodium	7440-23-5	1	mg/L	75	201	129	166	74
Potassium	7440-09-7	1	mg/L	1	7	3	6	4
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.005	<0.001	0.003	0.003	0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.095	0.115	0.092	0.199	0.216
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.007	0.005	0.007	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.006	0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.222	0.334	0.497	0.699	0.053
Nickel	7440-02-0	0.001	mg/L	0.002	0.015	0.008	0.010	0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_210628	BH2218_210629	BH2217_210629	BH2203_210629	BH2206_210629
Sampling date / time				28-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EB2118616-001	EB2118616-002	EB2118616-003	EB2118616-004	EB2118616-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.020	<0.005	0.007	<0.005	
Iron	7439-89-6	0.05	mg/L	0.21	0.06	0.46	16.6	4.53	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.006	0.001	0.003	0.004	0.002	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.102	0.132	0.141	0.261	0.238	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.013	0.009	0.008	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.001	<0.001	0.002	0.012	0.002	
Copper	7440-50-8	0.001	mg/L	<0.001	0.005	0.008	0.005	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.230	0.544	0.562	0.772	0.058	
Nickel	7440-02-0	0.001	mg/L	0.004	0.019	0.014	0.010	0.002	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.001	0.002	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.023	0.022	0.016	0.009	
Iron	7439-89-6	0.05	mg/L	0.49	0.28	1.50	17.7	4.87	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.3	0.6	0.5	0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.15	0.03	0.03	0.11	0.08	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.02	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.18	0.05	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_210628	BH2218_210629	BH2217_210629	BH2203_210629	BH2206_210629
Sampling date / time					28-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00
Compound	CAS Number	LOR	Unit		EB2118616-001	EB2118616-002	EB2118616-003	EB2118616-004	EB2118616-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.18	0.05	0.02	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.6	0.2	0.3	10.0	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.8	0.2	0.3	10.0	0.2
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.09	0.02	0.44	0.08	0.02
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.04	<0.01	0.40	0.02	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		13.2	15.1	7.83	12.0	4.42
ø Total Cations	----	0.01	meq/L		----	----	----	----	4.01
ø Total Cations	----	0.01	meq/L		12.3	14.0	7.73	11.4	----
ø Ionic Balance	----	0.01	%		----	----	----	----	4.80
ø Ionic Balance	----	0.01	%		3.69	3.64	0.65	2.40	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2347_210628	BH2218_210629	BH2217_210629	BH2203_210629	BH2206_210629
Sampling date / time				28-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EB2118616-001	EB2118616-002	EB2118616-003	EB2118616-004	EB2118616-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2347_210628	BH2218_210629	BH2217_210629	BH2203_210629	BH2206_210629
Sampling date / time				28-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EB2118616-001	EB2118616-002	EB2118616-003	EB2118616-004	EB2118616-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	80	<50
C15 - C28 Fraction	----	100	µg/L	170	<100	<100	180	200
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	170	<50	<50	260	200
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	110	<100	<100	190	110
>C16 - C34 Fraction	----	100	µg/L	110	<100	<100	<100	130
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	220	<100	<100	190	240
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	110	<100	<100	190	110
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_210628	BH2218_210629	BH2217_210629	BH2203_210629	BH2206_210629
Sampling date / time					28-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00	29-Jun-2021 00:00
Compound	CAS Number	LOR	Unit		EB2118616-001	EB2118616-002	EB2118616-003	EB2118616-004	EB2118616-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		112	106	112	94.5	98.7
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		95.5	97.3	108	93.9	95.0
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		87.6	86.1	94.6	77.0	80.2
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		24.8	27.1	26.6	15.9	21.9
2-Chlorophenol-D4	93951-73-6	1.0	%		72.8	75.1	73.6	58.3	66.6
2,4,6-Tribromophenol	118-79-6	1.0	%		82.6	76.5	85.5	74.6	74.0
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		83.1	79.4	81.6	70.9	68.8
Anthracene-d10	1719-06-8	1.0	%		87.9	84.1	87.0	72.8	73.1
4-Terphenyl-d14	1718-51-0	1.0	%		86.2	82.0	85.8	70.2	70.2
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		109	106	110	100	110
Toluene-D8	2037-26-5	2	%		103	100	101	104	103
4-Bromofluorobenzene	460-00-4	2	%		112	108	109	107	110



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210630	QC301_210630	QC401_210630	BH2343_210701	BH2345_210701
Sampling date / time					30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	01-Jul-2021 00:00	01-Jul-2021 00:00
Compound	CAS Number	LOR	Unit		EB2118616-006	EB2118616-007	EB2118616-008	EB2118616-009	EB2118616-010
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.77	6.30	5.90	7.86	7.84
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		16.0	0.12	0.12	0.95	1.26
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		4510	1	<1	785	2050
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2570	<10	<10	439	1360
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		496	<1	<1	349	963
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		595	2	5	315	602
Total Alkalinity as CaCO3	----	1	mg/L		595	2	5	315	602
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		155	<1	<1	11	6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1130	<1	<1	72	403
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		98	<1	<1	59	168
Magnesium	7439-95-4	1	mg/L		61	<1	<1	49	132
Sodium	7440-23-5	1	mg/L		820	<1	<1	41	90
Potassium	7440-09-7	1	mg/L		7	<1	<1	2	5
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		0.28	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.073	<0.001	<0.001	0.013	0.017
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.002	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.388	<0.001	<0.001	0.005	0.094
Nickel	7440-02-0	0.001	mg/L		0.003	<0.001	<0.001	0.002	0.005

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210630	QC301_210630	QC401_210630	BH2343_210701	BH2345_210701
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	01-Jul-2021 00:00	01-Jul-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2118616-006	EB2118616-007	EB2118616-008	EB2118616-009	EB2118616-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	0.007	0.005	
Iron	7439-89-6	0.05	mg/L	0.20	----	----	<0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	0.30	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.081	<0.001	<0.001	0.015	0.020	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.003	<0.001	<0.001	<0.001	0.001	
Chromium	7440-47-3	0.001	mg/L	0.005	<0.001	<0.001	<0.001	0.002	
Copper	7440-50-8	0.001	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.418	<0.001	<0.001	0.022	0.140	
Nickel	7440-02-0	0.001	mg/L	0.004	<0.001	<0.001	0.003	0.007	
Lead	7439-92-1	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.015	<0.005	<0.005	0.006	<0.005	
Iron	7439-89-6	0.05	mg/L	0.89	<0.05	<0.05	0.27	1.12	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	<0.1	<0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	<0.01	0.03	<0.01	0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.24	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.49	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210630	QC301_210630	QC401_210630	BH2343_210701	BH2345_210701
Sampling date / time					30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	01-Jul-2021 00:00	01-Jul-2021 00:00
Compound	CAS Number	LOR	Unit		EB2118616-006	EB2118616-007	EB2118616-008	EB2118616-009	EB2118616-010
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	0.73
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.6	<0.1	<0.1	<0.1	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	<0.1	<0.1	<0.1	0.9
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.08	<0.01	<0.01	0.02	0.06
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	<0.01	<0.01	0.03	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		47.0	0.04	0.10	8.55	23.5
ø Total Cations	----	0.01	meq/L		45.8	<0.01	<0.01	8.81	23.3
ø Ionic Balance	----	0.01	%		1.33	----	----	1.48	0.49
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2216_210630	QC301_210630	QC401_210630	BH2343_210701	BH2345_210701
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	01-Jul-2021 00:00	01-Jul-2021 00:00
Compound	CAS Number	LOR	Unit	EB2118616-006	EB2118616-007	EB2118616-008	EB2118616-009	EB2118616-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2216_210630	QC301_210630	QC401_210630	BH2343_210701	BH2345_210701
Sampling date / time				30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	01-Jul-2021 00:00	01-Jul-2021 00:00
Compound	CAS Number	LOR	Unit	EB2118616-006	EB2118616-007	EB2118616-008	EB2118616-009	EB2118616-010
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210630	QC301_210630	QC401_210630	BH2343_210701	BH2345_210701
Sampling date / time					30-Jun-2021 00:00	30-Jun-2021 00:00	30-Jun-2021 00:00	01-Jul-2021 00:00	01-Jul-2021 00:00
Compound	CAS Number	LOR	Unit		EB2118616-006	EB2118616-007	EB2118616-008	EB2118616-009	EB2118616-010
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		109	111	88.5	107	98.1
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		110	97.8	90.3	111	101
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		102	81.9	74.0	99.0	85.1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		27.2	24.6	23.0	26.3	25.8
2-Chlorophenol-D4	93951-73-6	1.0	%		76.6	70.1	68.6	75.4	73.8
2,4,6-Tribromophenol	118-79-6	1.0	%		80.8	73.9	73.0	79.5	76.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		79.6	72.3	72.2	78.2	76.6
Anthracene-d10	1719-06-8	1.0	%		84.1	77.7	75.2	84.7	83.0
4-Terphenyl-d14	1718-51-0	1.0	%		83.0	78.0	75.0	85.8	82.9
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		108	109	108	112	108
Toluene-D8	2037-26-5	2	%		103	101	99.9	98.2	99.3
4-Bromofluorobenzene	460-00-4	2	%		110	108	108	107	108



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC102_210630	BH2344_210702	BH2348_210702	----	----
Sampling date / time					30-Jun-2021 00:00	02-Jul-2021 00:00	02-Jul-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2118616-011	EB2118616-012	EB2118616-013	-----	-----
				Result	Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.80	8.03	8.30	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		16.1	1.86	5.64	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		4520	1180	748	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2620	704	444	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		502	492	107	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	3	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		598	518	256	----	----
Total Alkalinity as CaCO3	----	1	mg/L		598	518	260	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		153	7	2	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1120	108	96	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		99	90	18	----	----
Magnesium	7439-95-4	1	mg/L		62	65	15	----	----
Sodium	7440-23-5	1	mg/L		830	95	134	----	----
Potassium	7440-09-7	1	mg/L		7	2	2	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		0.30	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		0.071	<0.001	0.090	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		0.002	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		0.386	0.017	0.023	----	----
Nickel	7440-02-0	0.001	mg/L		0.003	0.002	0.002	----	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC102_210630	BH2344_210702	BH2348_210702	----	----
Sampling date / time				30-Jun-2021 00:00	02-Jul-2021 00:00	02-Jul-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EB2118616-011	EB2118616-012	EB2118616-013	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.008	0.006	----	----	
Iron	7439-89-6	0.05	mg/L	0.20	<0.05	<0.05	----	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	----	----	
Boron	7440-42-8	0.05	mg/L	0.30	<0.05	<0.05	----	----	
Barium	7440-39-3	0.001	mg/L	0.081	0.014	0.161	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
Cobalt	7440-48-4	0.001	mg/L	0.003	0.002	0.001	----	----	
Chromium	7440-47-3	0.001	mg/L	0.004	0.004	0.005	----	----	
Copper	7440-50-8	0.001	mg/L	0.004	0.002	0.004	----	----	
Manganese	7439-96-5	0.001	mg/L	0.423	0.169	0.047	----	----	
Nickel	7440-02-0	0.001	mg/L	0.004	0.012	0.007	----	----	
Lead	7439-92-1	0.001	mg/L	0.001	0.002	0.002	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Zinc	7440-66-6	0.005	mg/L	0.014	0.020	0.020	----	----	
Iron	7439-89-6	0.05	mg/L	0.92	2.40	1.39	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.1	0.1	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	<0.01	0.07	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.06	<0.01	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC102_210630	BH2344_210702	BH2348_210702	----	----
Sampling date / time					30-Jun-2021 00:00	02-Jul-2021 00:00	02-Jul-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2118616-011	EB2118616-012	EB2118616-013	-----	-----
				Result	Result	Result		----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	0.06	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.6	0.4	0.2	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	0.5	0.2	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	0.20	0.06	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	<0.01	<0.01	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		46.7	13.5	7.94	----	----
ø Total Cations	----	0.01	meq/L		46.3	14.0	8.01	----	----
ø Ionic Balance	----	0.01	%		0.43	1.75	0.43	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				QC102_210630	BH2344_210702	BH2348_210702	----	----
Sampling date / time				30-Jun-2021 00:00	02-Jul-2021 00:00	02-Jul-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	EB2118616-011	EB2118616-012	EB2118616-013	-----	-----
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC102_210630	BH2344_210702	BH2348_210702	----	----
Sampling date / time					30-Jun-2021 00:00	02-Jul-2021 00:00	02-Jul-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2118616-011	EB2118616-012	EB2118616-013	-----	-----
				Result	Result	Result		----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC102_210630	BH2344_210702	BH2348_210702	----	----
Sampling date / time					30-Jun-2021 00:00	02-Jul-2021 00:00	02-Jul-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2118616-011	EB2118616-012	EB2118616-013	-----	-----
				Result	Result	Result		----	----
EP080: BTEXN - Continued									
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		97.6	111	105	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		86.9	103	108	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		77.5	88.7	94.3	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		23.1	27.7	24.1	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		66.7	79.4	66.8	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%		69.3	80.7	69.5	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		68.5	85.7	74.0	----	----
Anthracene-d10	1719-06-8	1.0	%		73.5	86.4	80.2	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		73.3	87.9	80.3	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		112	114	111	----	----
Toluene-D8	2037-26-5	2	%		103	101	100	----	----
4-Bromofluorobenzene	460-00-4	2	%		114	107	106	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	37	138
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	45	139
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	45	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2,4,6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: EB2118616	Page	: 1 of 16
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 02-Jul-2021
Order number	: 60553814_3100.V01-B2G Var.	Date Analysis Commenced	: 03-Jul-2021
C-O-C number	: ----	Issue Date	: 09-Jul-2021
Sampler	: BIANCA BURKE, SUMMER BARRON		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 13		
No. of samples analysed	: 13		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan		Brisbane Organics, Stafford, QLD

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: WATER					Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3777282)									
EB2118540-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.53	7.57	0.5	0% - 20%
EB2118616-005	BH2206_210629	EA005-P: pH Value	----	0.01	pH Unit	6.85	6.86	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3777281)									
EB2118540-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	287	288	0.4	0% - 20%
EB2118616-005	BH2206_210629	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	448	448	0.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3772242)									
EB2118202-021	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	20000	20200	1.3	0% - 20%
EB2118202-030	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	17600	17900	1.7	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3772243)									
EB2118616-006	BH2216_210630	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2570	2600	1.3	0% - 20%
EB2118623-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	43000	43700	1.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3777284)									
EB2118540-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	69	67	3.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	69	67	3.7	0% - 20%
EB2118616-005	BH2206_210629	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	75	76	1.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	75	76	1.5	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3772245)									
EB2118579-025	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EB2118557-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	3	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3774422)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3774422) - continued									
EB2118179-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EB2118616-006	BH2216_210630	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	155	154	0.8	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3772246)									
EB2118579-025	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EB2118557-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3140	3190	1.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3774423)									
EB2118179-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2340	2350	0.4	0% - 20%
EB2118616-006	BH2216_210630	ED045G: Chloride	16887-00-6	1	mg/L	1130	1120	1.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3774850)									
EB2118594-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	63	63	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	12	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	43	38	11.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	14	13	0.0	0% - 50%
ET2103004-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	9	9	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	6	6	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3774849)									
EB2118594-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.011	0.012	9.2	0% - 50%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.013	0.014	7.9	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.029	0.029	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	4.42	4.66	5.1	0% - 20%
ET2103004-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.016	0.016	0.0	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3774849) - continued									
ET2103004-001	Anonymous	EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.020	0.021	6.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.14	0.41	99.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3772382)									
EB2118433-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.045	0.046	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.54	0.53	0.0	0% - 50%
EB2118616-006	BH2216_210630	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.003	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.081	0.083	2.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.418	0.430	2.9	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.015	0.014	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.30	0.32	4.8	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.89	0.90	1.2	0% - 50%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG035F: Dissolved Mercury by FIMS (QC Lot: 3774851)									
EB2118594-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ET2103004-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3772384)									
EB2118616-001	BH2347_210628	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2118616-011	QC102_210630	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3777283)									
EB2118540-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.0	No Limit
EB2118616-005	BH2206_210629	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3776102)									
EB2118559-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.03	0.0	No Limit
EB2118616-009	BH2343_210701	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3772244)									
EB2118579-025	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2118557-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3772250)									
ET2101376-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3774426)									
EB2118644-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2118616-006	BH2216_210630	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3776103)									
EB2118559-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.18	1.16	1.4	0% - 20%
EB2118616-009	BH2343_210701	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3775181)									
EB2118351-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	19.8	19.8	0.0	0% - 20%
EB2118616-004	BH2203_210629	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	10.0	10.2	2.0	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3775180)									
EB2118351-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	4.74	4.00	16.9	0% - 20%
EB2118616-004	BH2203_210629	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.07	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3772248)									
EB2118557-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3774425)									
EB2118644-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2118616-006	BH2216_210630	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.01	0.02	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3774190)									
EB2118616-005	BH2206_210629	EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3774191)									
EB2118616-005	BH2206_210629	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit

EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3774189)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3774189) - continued									
EB2118616-005	BH2206_210629	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3774192)									
EB2118616-005	BH2206_210629	EP071: C15 - C28 Fraction	----	100	µg/L	200	<100	66.3	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3776685)									
EB2117966-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2118616-007	QC301_210630	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3774192)									
EB2118616-005	BH2206_210629	EP071: >C10 - C16 Fraction	----	100	µg/L	110	<100	11.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	130	<100	29.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3776685)									
EB2117966-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2118616-007	QC301_210630	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 3776685)									
EB2117966-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit

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 Work Order : EB2118616
 Client : AECOM Australia Pty Ltd
 Project : INLAND RAIL



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 3776685) - continued									
EB2117966-003	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EB2118616-007	QC301_210630	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 3777282)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 3777281)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	99.6	91.0	107
				<1	12890 µS/cm	99.4	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3772242)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	100	88.0	112
				<10	293 mg/L	103	88.0	112
				<10	2000 mg/L	99.3	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3772243)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	103	88.0	112
				<10	293 mg/L	108	88.0	112
				<10	2000 mg/L	97.9	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 3777284)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	99.8	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3772245)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.0	118
				<1	100 mg/L	95.8	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3774422)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.0	118
				<1	100 mg/L	98.2	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 3772246)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	90.0	115
				<1	1000 mg/L	106	90.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 3774423)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	105	90.0	115
				<1	1000 mg/L	106	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3774850)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.3	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3774849)								

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 3774849) - continued								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.9	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	88.2	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.1	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.9	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.2	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.5	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	99.2	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.6	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.4	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.1	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.9	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.1	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3772382)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	98.5	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	103	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	106	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	99.2	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.5	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.9	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	104	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.8	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3774851)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.6	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3772384)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.4	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3777283)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	103	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3776102)								



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3776102) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	102	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3772244)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3772250)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.6	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3774426)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	96.4	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3776103)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	92.1	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3775181)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.0	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3775180)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	102	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3772248)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3774425)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	81.7	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3774190)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	80.7	55.0	131
EP068A: Organochlorine Pesticides (OC) (QCLot: 3774191)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	83.7	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	82.3	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	84.2	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	85.4	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	81.8	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	82.0	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	78.9	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	80.8	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	79.7	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	78.2	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	79.8	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	81.2	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	81.4	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	82.0	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	79.2	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	72.5	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	# 37.2	42.0	122



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3774191) - continued								
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	75.2	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	67.3	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	80.2	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	83.6	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3774191)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	82.4	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	94.8	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	# 3.0	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	66.8	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	84.8	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	85.8	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	81.3	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	85.4	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	86.6	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	82.0	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	80.2	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	85.1	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	83.5	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	77.2	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	76.4	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	79.0	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	65.8	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	65.2	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	90.3	27.5	146
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3774189)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	73.4	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	86.8	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	75.9	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	82.0	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	77.4	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	84.7	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	83.9	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	83.1	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	92.8	47.0	136



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3774189) - continued								
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	80.7	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	94.8	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	80.1	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	89.9	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	82.9	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	85.9	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	77.2	53.0	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3774192)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	88.6	51.9	126
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	76.4	51.4	124
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3776685)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	100	66.8	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3774192)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	86.5	53.2	125
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	73.1	49.5	123
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3776685)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	99.1	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080: BTEXN (QCLot: 3776685)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	98.7	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	100	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	96.9	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	99.7	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	109	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	106	77.8	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3772245)							
EB2118578-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	108	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3774422)							
EB2118616-002	BH2218_210629	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	108	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3772246)							
EB2118578-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3774423)							
EB2118616-002	BH2218_210629	ED045G: Chloride	16887-00-6	400 mg/L	98.1	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3774849)							
EB2118594-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	90.4	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	102	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	92.2	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	92.7	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.7	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	84.8	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	91.2	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	91.7	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	91.2	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	91.8	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	90.2	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	86.6	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3772382)							
EB2118433-003	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	104	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	107	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	112	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	111	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	109	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	108	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	111	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	113	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	110	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	103	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	110	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	104	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3774851)							
EB2118599-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	91.7	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3772384)							
EB2118616-002	BH2218_210629	EG035T: Mercury	7439-97-6	0.01 mg/L	83.4	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK040P: Fluoride by PC Titrator (QCLot: 3777283)							
EB2118544-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	97.4	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3776102)							
EB2118559-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	98.6	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3772244)							
EB2118578-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	103	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3772250)							
EB2118616-012	BH2344_210702	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	100	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3774426)							
EB2118616-002	BH2218_210629	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	110	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3776103)							
EB2118559-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	89.9	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3775181)							
EB2118413-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	# Not Determined	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3775180)							
EB2118413-001	Anonymous	EK067G: Total Phosphorus as P	----	2 mg/L	# Not Determined	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3772248)							
EB2118578-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	112	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3774425)							
EB2118616-002	BH2218_210629	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	122	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3774190)							
EB2118616-005	BH2206_210629	EP066: Total Polychlorinated biphenyls	----	20 µg/L	114	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3774191)							
EB2118616-005	BH2206_210629	EP068: gamma-BHC	58-89-9	20 µg/L	91.7	60.2	130
		EP068: Heptachlor	76-44-8	20 µg/L	82.2	48.1	132
		EP068: Aldrin	309-00-2	20 µg/L	76.1	53.7	120
		EP068: Dieldrin	60-57-1	20 µg/L	75.4	55.3	124
		EP068: Endrin	72-20-8	20 µg/L	72.6	48.9	131
		EP068: 4,4`-DDT	50-29-3	20 µg/L	80.0	39.4	134
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3774191)							
EB2118616-005	BH2206_210629	EP068: Diazinon	333-41-5	10 µg/L	126	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	86.7	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	89.9	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	70.8	47.3	127



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3774191) - continued							
EB2118616-005	BH2206_210629	EP068: Prothiofos	34643-46-4	10 µg/L	83.1	45.5	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3774189)							
EB2118616-005	BH2206_210629	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	91.5	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	101	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3774192)							
EB2118616-005	BH2206_210629	EP071: C10 - C14 Fraction	----	1070 µg/L	85.1	49.0	134
		EP071: C15 - C28 Fraction	----	1770 µg/L	69.0	50.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3776685)							
EB2118287-001	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	96.3	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3774192)							
EB2118616-005	BH2206_210629	EP071: >C10 - C16 Fraction	----	1560 µg/L	81.4	43.0	119
		EP071: >C16 - C34 Fraction	----	1190 µg/L	65.9	38.0	114
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3776685)							
EB2118287-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	99.8	70.0	130
EP080: BTEXN (QCLot: 3776685)							
EB2118287-001	Anonymous	EP080: Benzene	71-43-2	10 µg/L	103	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	102	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2118616	Page	: 1 of 18
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 02-Jul-2021
Site	: ----	Issue Date	: 09-Jul-2021
Sampler	: BIANCA BURKE, SUMMER BARRON	No. of samples received	: 13
Order number	: 60553814_3100.V01-B2G Var.	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP068A: Organochlorine Pesticides (OC)	QC-3774191-002	----	Endrin aldehyde	7421-93-4	37.2 %	42.0-122%	Recovery less than lower control limit
EP068B: Organophosphorus Pesticides (OP)	QC-3774191-002	----	Monocrotophos	6923-22-4	3.0 %	5.00-32.6%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EB2118413--001	Anonymous	Total Kjeldahl Nitrogen as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	EB2118413--001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural BH2343_210701,	BH2345_210701	----	----	----	07-Jul-2021	02-Jul-2021	5
Clear Plastic Bottle - Natural BH2344_210702,	BH2348_210702	----	----	----	07-Jul-2021	03-Jul-2021	4
Clear Plastic Bottle - Natural BH2347_210628		----	----	----	07-Jul-2021	29-Jun-2021	8
Clear Plastic Bottle - Natural BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	----	----	----	07-Jul-2021	30-Jun-2021	7
Clear Plastic Bottle - Natural BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	----	----	----	07-Jul-2021	01-Jul-2021	6
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural BH2347_210628		----	----	----	05-Jul-2021	30-Jun-2021	5
Clear Plastic Bottle - Natural BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	----	----	----	05-Jul-2021	01-Jul-2021	4
Clear Plastic Bottle - Natural BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	----	----	----	05-Jul-2021	02-Jul-2021	3
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural BH2347_210628		----	----	----	05-Jul-2021	30-Jun-2021	5



Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK071G: Reactive Phosphorus as P by discrete analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural BH2218_210629, BH2203_210629, BH2217_210629, BH2206_210629	----	----	----	05-Jul-2021	01-Jul-2021	4
Clear Plastic Bottle - Natural BH2216_210630, QC401_210630, QC301_210630, QC102_210630	----	----	----	05-Jul-2021	02-Jul-2021	3

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	07-Jul-2021	02-Jul-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	07-Jul-2021	03-Jul-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2347_210628		28-Jun-2021	----	----	----	07-Jul-2021	29-Jun-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	07-Jul-2021	30-Jun-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	07-Jul-2021	01-Jul-2021	✖



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	07-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Natural (EA010-P) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	07-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Natural (EA010-P) BH2347_210628		28-Jun-2021	----	----	----	07-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Natural (EA010-P) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	07-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Natural (EA010-P) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	07-Jul-2021	28-Jul-2021	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	03-Jul-2021	08-Jul-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	03-Jul-2021	09-Jul-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2347_210628		28-Jun-2021	----	----	----	03-Jul-2021	05-Jul-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	03-Jul-2021	06-Jul-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	03-Jul-2021	07-Jul-2021	✓
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC301_210630,	QC401_210630	30-Jun-2021	----	----	----	06-Jul-2021	07-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	06-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	06-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_210628		28-Jun-2021	----	----	----	06-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	06-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_210630,	QC102_210630	30-Jun-2021	----	----	----	06-Jul-2021	28-Jul-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	07-Jul-2021	15-Jul-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	07-Jul-2021	16-Jul-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2347_210628		28-Jun-2021	----	----	----	07-Jul-2021	12-Jul-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	07-Jul-2021	13-Jul-2021	✓
Clear Plastic Bottle - Natural (ED037-P) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	07-Jul-2021	14-Jul-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	03-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	03-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2347_210628		28-Jun-2021	----	----	----	05-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	05-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	05-Jul-2021	28-Jul-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	03-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	03-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2347_210628		28-Jun-2021	----	----	----	05-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	05-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	05-Jul-2021	28-Jul-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC301_210630,	QC401_210630	30-Jun-2021	----	----	----	06-Jul-2021	07-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	06-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	06-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_210628		28-Jun-2021	----	----	----	06-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	06-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_210630,	QC102_210630	30-Jun-2021	----	----	----	06-Jul-2021	28-Jul-2021	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-F) QC301_210630,	QC401_210630	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	06-Jul-2021	28-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	06-Jul-2021	29-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2347_210628		28-Jun-2021	----	----	----	06-Jul-2021	25-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	06-Jul-2021	26-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2216_210630,	QC102_210630	30-Jun-2021	----	----	----	06-Jul-2021	27-Dec-2021	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2343_210701,	BH2345_210701	01-Jul-2021	03-Jul-2021	28-Dec-2021	✓	03-Jul-2021	28-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2344_210702,	BH2348_210702	02-Jul-2021	03-Jul-2021	29-Dec-2021	✓	03-Jul-2021	29-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2347_210628		28-Jun-2021	03-Jul-2021	25-Dec-2021	✓	03-Jul-2021	25-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	03-Jul-2021	26-Dec-2021	✓	03-Jul-2021	26-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	03-Jul-2021	27-Dec-2021	✓	03-Jul-2021	27-Dec-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035F) QC301_210630,	QC401_210630	30-Jun-2021	----	----	----	06-Jul-2021	28-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	06-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	06-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2347_210628		28-Jun-2021	----	----	----	06-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	06-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2216_210630,	QC102_210630	30-Jun-2021	----	----	----	06-Jul-2021	28-Jul-2021	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	05-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	05-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2347_210628		28-Jun-2021	----	----	----	05-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	05-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	05-Jul-2021	28-Jul-2021	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	07-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	07-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2347_210628		28-Jun-2021	----	----	----	07-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	07-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	07-Jul-2021	28-Jul-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	06-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	06-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2347_210628		28-Jun-2021	----	----	----	06-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	06-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	06-Jul-2021	28-Jul-2021	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	03-Jul-2021	03-Jul-2021	✓
Clear Plastic Bottle - Natural (EK057G) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	03-Jul-2021	04-Jul-2021	✓
Clear Plastic Bottle - Natural (EK057G) BH2347_210628		28-Jun-2021	----	----	----	05-Jul-2021	30-Jun-2021	✗
Clear Plastic Bottle - Natural (EK057G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	05-Jul-2021	01-Jul-2021	✗
Clear Plastic Bottle - Natural (EK057G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	05-Jul-2021	02-Jul-2021	✗
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	06-Jul-2021	29-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	06-Jul-2021	30-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2347_210628		28-Jun-2021	----	----	----	06-Jul-2021	26-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	06-Jul-2021	27-Jul-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	06-Jul-2021	28-Jul-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2343_210701,	BH2345_210701	01-Jul-2021	06-Jul-2021	29-Jul-2021	✔	06-Jul-2021	29-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2344_210702,	BH2348_210702	02-Jul-2021	06-Jul-2021	30-Jul-2021	✔	06-Jul-2021	30-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2347_210628		28-Jun-2021	06-Jul-2021	26-Jul-2021	✔	06-Jul-2021	26-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	06-Jul-2021	27-Jul-2021	✔	06-Jul-2021	27-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	06-Jul-2021	28-Jul-2021	✔	06-Jul-2021	28-Jul-2021	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2343_210701,	BH2345_210701	01-Jul-2021	06-Jul-2021	29-Jul-2021	✔	06-Jul-2021	29-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2344_210702,	BH2348_210702	02-Jul-2021	06-Jul-2021	30-Jul-2021	✔	06-Jul-2021	30-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2347_210628		28-Jun-2021	06-Jul-2021	26-Jul-2021	✔	06-Jul-2021	26-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	06-Jul-2021	27-Jul-2021	✔	06-Jul-2021	27-Jul-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	06-Jul-2021	28-Jul-2021	✔	06-Jul-2021	28-Jul-2021	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2343_210701,	BH2345_210701	01-Jul-2021	----	----	----	03-Jul-2021	03-Jul-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2344_210702,	BH2348_210702	02-Jul-2021	----	----	----	03-Jul-2021	04-Jul-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2347_210628		28-Jun-2021	----	----	----	05-Jul-2021	30-Jun-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	----	----	----	05-Jul-2021	01-Jul-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	----	----	----	05-Jul-2021	02-Jul-2021	✖



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) BH2343_210701,	BH2345_210701	01-Jul-2021	05-Jul-2021	08-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2344_210702,	BH2348_210702	02-Jul-2021	05-Jul-2021	09-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2347_210628		28-Jun-2021	05-Jul-2021	05-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	05-Jul-2021	06-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	05-Jul-2021	07-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) BH2343_210701,	BH2345_210701	01-Jul-2021	05-Jul-2021	08-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2344_210702,	BH2348_210702	02-Jul-2021	05-Jul-2021	09-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2347_210628		28-Jun-2021	05-Jul-2021	05-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	05-Jul-2021	06-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	05-Jul-2021	07-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) BH2343_210701,	BH2345_210701	01-Jul-2021	05-Jul-2021	08-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2344_210702,	BH2348_210702	02-Jul-2021	05-Jul-2021	09-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2347_210628		28-Jun-2021	05-Jul-2021	05-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	05-Jul-2021	06-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	05-Jul-2021	07-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2343_210701,	BH2345_210701	01-Jul-2021	05-Jul-2021	08-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2344_210702,	BH2348_210702	02-Jul-2021	05-Jul-2021	09-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2347_210628		28-Jun-2021	05-Jul-2021	05-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	05-Jul-2021	06-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	05-Jul-2021	07-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) BH2343_210701,	BH2345_210701	01-Jul-2021	05-Jul-2021	08-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP071) BH2344_210702,	BH2348_210702	02-Jul-2021	05-Jul-2021	09-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP071) BH2347_210628		28-Jun-2021	05-Jul-2021	05-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP071) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	05-Jul-2021	06-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber Glass Bottle - Unpreserved (EP071) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	05-Jul-2021	07-Jul-2021	✓	08-Jul-2021	14-Aug-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2343_210701,	BH2345_210701	01-Jul-2021	07-Jul-2021	15-Jul-2021	✓	07-Jul-2021	15-Jul-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2344_210702,	BH2348_210702	02-Jul-2021	07-Jul-2021	16-Jul-2021	✓	07-Jul-2021	16-Jul-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_210628		28-Jun-2021	07-Jul-2021	12-Jul-2021	✓	07-Jul-2021	12-Jul-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2218_210629, BH2203_210629,	BH2217_210629, BH2206_210629	29-Jun-2021	07-Jul-2021	13-Jul-2021	✓	07-Jul-2021	13-Jul-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2216_210630, QC401_210630,	QC301_210630, QC102_210630	30-Jun-2021	07-Jul-2021	14-Jul-2021	✓	07-Jul-2021	14-Jul-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
BH2343_210701,	BH2345_210701	01-Jul-2021	05-Jul-2021	08-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP071)								
BH2344_210702,	BH2348_210702	02-Jul-2021	05-Jul-2021	09-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP071)								
BH2347_210628		28-Jun-2021	05-Jul-2021	05-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
Amber Glass Bottle - Unpreserved (EP071)								
BH2218_210629,	BH2217_210629,	29-Jun-2021	05-Jul-2021	06-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
BH2203_210629,	BH2206_210629							
Amber Glass Bottle - Unpreserved (EP071)								
BH2216_210630,	QC301_210630,	30-Jun-2021	05-Jul-2021	07-Jul-2021	✔	08-Jul-2021	14-Aug-2021	✔
QC401_210630,	QC102_210630							
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2343_210701,	BH2345_210701	01-Jul-2021	07-Jul-2021	15-Jul-2021	✔	07-Jul-2021	15-Jul-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2344_210702,	BH2348_210702	02-Jul-2021	07-Jul-2021	16-Jul-2021	✔	07-Jul-2021	16-Jul-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2347_210628		28-Jun-2021	07-Jul-2021	12-Jul-2021	✔	07-Jul-2021	12-Jul-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2218_210629,	BH2217_210629,	29-Jun-2021	07-Jul-2021	13-Jul-2021	✔	07-Jul-2021	13-Jul-2021	✔
BH2203_210629,	BH2206_210629							
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2216_210630,	QC301_210630,	30-Jun-2021	07-Jul-2021	14-Jul-2021	✔	07-Jul-2021	14-Jul-2021	✔
QC401_210630,	QC102_210630							
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2343_210701,	BH2345_210701	01-Jul-2021	07-Jul-2021	15-Jul-2021	✔	07-Jul-2021	15-Jul-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2344_210702,	BH2348_210702	02-Jul-2021	07-Jul-2021	16-Jul-2021	✔	07-Jul-2021	16-Jul-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2347_210628		28-Jun-2021	07-Jul-2021	12-Jul-2021	✔	07-Jul-2021	12-Jul-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2218_210629,	BH2217_210629,	29-Jun-2021	07-Jul-2021	13-Jul-2021	✔	07-Jul-2021	13-Jul-2021	✔
BH2203_210629,	BH2206_210629							
Amber VOC Vial - Sulfuric Acid (EP080)								
BH2216_210630,	QC301_210630,	30-Jun-2021	07-Jul-2021	14-Jul-2021	✔	07-Jul-2021	14-Jul-2021	✔
QC401_210630,	QC102_210630							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	5	34	14.71	10.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	7.69	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	10.00	✖	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	13	7.69	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	18	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	30	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	13	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	3	34	8.82	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
pH by PC Titrator	EA005-P	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	18	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	30	20.00	15.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	3	34	8.82	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	18	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	3	34	8.82	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	18	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St, Stafford 4053, (Corner of Byth & Shand Streets), Phone: 07 3243 7222

Environmental Division
Brisbane
Work Order Reference
EB2126645



Telephone: + 61-7-3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date): 5 days TAT from samples reception		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)			
PROJECT: Inland Rail		ALS QUOTE NO.: BN219/20		COC SEQUENCE NUMBER (Circle)	
ORDER NUMBER: 60553014_3100_V01-B2G Variation				COC: 0 2 3 4 5 8 7	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 280		OF: 1 2 3 4 5 8 7	
SAMPLER: B.Burke & K.McGuffie		SAMPLER MOBILE: 0490 484 804		RECEIVED BY: Joshua Hean	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):		DATE/TIME: 20/9/21 1449	
Email Reports to: krystle.nichols@aecom.com; erinna.kosman@aecom.com				DATE/TIME:	
Email Invoice to: krystle.nichols@aecom.com				DATE/TIME:	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MAT R I X	CONTAINER INFORMATION	ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price)	Additional Information
				TYPE & PRESERVATIVE (refer to codes below)	Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottle required)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS MGT BRISBANE FOR ANALYSIS
1	BH2347-210914	14/9/21	W	SP, 2 unpreserved	✓	
2	BH2235-210914	"	"	"	✓	
3	BH2234-210914	"	"	"	✓	
4	BH2233-210914	"	"	"	✓	
5	BH2248-210915	15/9/21	"	3P, 2 unpreserved	✓	
6	BH2216-210915	15/9/21	"	2P, 1 unpreserved	✓	
7	QC103-210915	15/9/21	"	3P, 1 unpreserved	✓	
8	BH2309-210916	16/9/21	"	5P, 2 unpreserved	✓	
9	Discharge water	16/9/21	"	"	✓	
10	BH2206-210916	16/9/21	"	"	✓	
11	BH2205-210916	16/9/21	"	"	✓	
12	BH2210-210917	17/9/21	"	2P, 2 up	✓	
13	BH2210-210917	17/9/21	"	5P, 2 up	✓	
14	QC105-210917	17/9/21	"	"	✓	
15	BH2218-210917	17/9/21	"	3P, 1 up	✓	
16	BH2217-210917	17/9/21	"	"	✓	
17	BH2214-210918	18/9/21	"	5P, 2 up	✓	
18	BH2215-210918	18/9/21	"	3P, 2 up	✓	
19	BH2343-210918	18/9/21	"	3P, 2 up	✓	
20	BH2344-210918	18/9/21	"	"	✓	
21	BH2345-210918	18/9/21	"	"	✓	
22	QC302-210918	18/9/21	"	"	✓	
23	QC402-210918	18/9/21	"	"	✓	
TOTAL						

Add. vol cor (Green Bottle)
internal QA/QC

✓ Potential Excrement / Biohazard

HT

Ex Extra Orange bottles



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB2126645**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 5
Order number	: 60553814_3100.V01-B2GVariation	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BIANCA BURKE, KEEGAN MCGUFFIE		

Dates

Date Samples Received	: 20-Sep-2021 14:49	Issue Date	: 20-Sep-2021
Client Requested Due Date	: 27-Sep-2021	Scheduled Reporting Date	: 27-Sep-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 9.7°C, 10.4°C - Ice present
Receipt Detail	: HARD ESKY	No. of samples received / analysed	: 23 / 22

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please be advised; samples 5-7, 15, 16, 19-21 were received with no compliant container for pesticides analysis. As such, pesticides analysis has been removed from this workorder. If you would like to proceed with analysis from a non-compliant container, please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- Please note where you have asked for 'Dissolved' metals on "QC302_210918" and "QC402_210918", the laboratory will filter an aliquot from the non-preserved plastic (ALS Green label) container for this analysis, however this is a non-compliant container/process and should be taken into consideration when reviewing the metals data. Additional charges will be incurred for laboratory filtration.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
QC302_210918	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC402_210918	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
QC302_210918	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC402_210918	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EK040-P Fluoride (PCT)	WATER - NT-02A Major Anions (Cl, SO ₄ , Fluoride, Alkalinity)	WATER - W-03 15 Metals (NEPM Suite)
EB2126645-001	14-Sep-2021 00:00	BH2347_210914	✓	✓	✓	✓	✓	✓	✓
EB2126645-002	14-Sep-2021 00:00	BH2235_210914	✓	✓	✓	✓	✓	✓	✓
EB2126645-003	14-Sep-2021 00:00	BH2234_210914	✓	✓	✓	✓	✓	✓	✓
EB2126645-004	14-Sep-2021 00:00	BH2233_210914	✓	✓	✓	✓	✓	✓	✓
EB2126645-005	15-Sep-2021 00:00	BH2248_210915	✓	✓	✓	✓	✓	✓	✓
EB2126645-006	15-Sep-2021 00:00	BH2216_210915	✓	✓	✓	✓	✓	✓	✓
EB2126645-007	15-Sep-2021 00:00	QC103_210915	✓	✓	✓	✓	✓	✓	✓
EB2126645-008	16-Sep-2021 00:00	BH2309_210916	✓	✓	✓	✓	✓	✓	✓
EB2126645-010	16-Sep-2021 00:00	BH2206_210916	✓	✓	✓	✓	✓	✓	✓
EB2126645-011	16-Sep-2021 00:00	BH2203_210916	✓	✓	✓	✓	✓	✓	✓
EB2126645-013	17-Sep-2021 00:00	BH2210_210917	✓	✓	✓	✓	✓	✓	✓
EB2126645-014	17-Sep-2021 00:00	QC105_210917	✓	✓	✓	✓	✓	✓	✓
EB2126645-015	17-Sep-2021 00:00	BH2218_210917	✓	✓	✓	✓	✓	✓	✓
EB2126645-016	17-Sep-2021 00:00	BH2217_210917	✓	✓	✓	✓	✓	✓	✓
EB2126645-017	18-Sep-2021 00:00	BH2214_210918	✓	✓	✓	✓	✓	✓	✓
EB2126645-018	18-Sep-2021 00:00	BH2215_210918	✓	✓	✓	✓	✓	✓	✓
EB2126645-019	18-Sep-2021 00:00	BH2343_210918	✓	✓	✓	✓	✓	✓	✓
EB2126645-020	18-Sep-2021 00:00	BH2344_210918	✓	✓	✓	✓	✓	✓	✓
EB2126645-021	18-Sep-2021 00:00	BH2345_210918	✓	✓	✓	✓	✓	✓	✓
EB2126645-022	18-Sep-2021 00:00	QC302_210918	✓	✓	✓		✓	✓	✓
EB2126645-023	18-Sep-2021 00:00	QC402_210918	✓	✓	✓		✓	✓	✓



Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P + 15 Metals (Total) (NEPM)	WATER - W-07 SG TRH/BTEXN/PAH with SG clean up	WATER - W-12 OC/OP Pesticides
EB2126645-001	14-Sep-2021 00:00	BH2347_210914	✓	✓	✓	✓	✓	✓
EB2126645-002	14-Sep-2021 00:00	BH2235_210914	✓	✓	✓	✓		✓
EB2126645-003	14-Sep-2021 00:00	BH2234_210914	✓	✓	✓	✓		✓
EB2126645-004	14-Sep-2021 00:00	BH2233_210914	✓	✓	✓	✓		✓
EB2126645-005	15-Sep-2021 00:00	BH2248_210915	✓	✓	✓	✓		
EB2126645-006	15-Sep-2021 00:00	BH2216_210915	✓	✓	✓	✓		
EB2126645-007	15-Sep-2021 00:00	QC103_210915	✓	✓	✓	✓		
EB2126645-008	16-Sep-2021 00:00	BH2309_210916	✓	✓	✓	✓		✓
EB2126645-010	16-Sep-2021 00:00	BH2206_210916	✓	✓	✓	✓	✓	✓
EB2126645-011	16-Sep-2021 00:00	BH2203_210916	✓	✓	✓	✓	✓	✓
EB2126645-012	16-Sep-2021 00:00	QC104_210916					✓	
EB2126645-013	17-Sep-2021 00:00	BH2210_210917	✓	✓	✓	✓		✓
EB2126645-014	17-Sep-2021 00:00	QC105_210917	✓	✓	✓	✓		✓
EB2126645-015	17-Sep-2021 00:00	BH2218_210917	✓	✓	✓	✓		
EB2126645-016	17-Sep-2021 00:00	BH2217_210917	✓	✓	✓	✓		
EB2126645-017	18-Sep-2021 00:00	BH2214_210918	✓	✓	✓	✓		✓
EB2126645-018	18-Sep-2021 00:00	BH2215_210918	✓	✓	✓	✓		✓
EB2126645-019	18-Sep-2021 00:00	BH2343_210918	✓	✓	✓	✓		
EB2126645-020	18-Sep-2021 00:00	BH2344_210918	✓	✓	✓	✓		
EB2126645-021	18-Sep-2021 00:00	BH2345_210918	✓	✓	✓	✓		
EB2126645-022	18-Sep-2021 00:00	QC302_210918	✓	✓	✓	✓		✓
EB2126645-023	18-Sep-2021 00:00	QC402_210918	✓	✓	✓	✓		✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) WATER No analysis requested	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & Polychlorinated Biphenyls (PCB)	WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	WATER - W-07 TRH/BTEXN/PAH
EB2126645-001	14-Sep-2021 00:00	BH2347_210914		✓		
EB2126645-002	14-Sep-2021 00:00	BH2235_210914		✓	✓	✓
EB2126645-003	14-Sep-2021 00:00	BH2234_210914		✓	✓	✓
EB2126645-004	14-Sep-2021 00:00	BH2233_210914		✓	✓	✓
EB2126645-005	15-Sep-2021 00:00	BH2248_210915		✓		
EB2126645-006	15-Sep-2021 00:00	BH2216_210915		✓		
EB2126645-007	15-Sep-2021 00:00	QC103_210915		✓		
EB2126645-008	16-Sep-2021 00:00	BH2309_210916		✓	✓	✓



			(On Hold) WATER No analysis requested	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)	WATER - W-07 TRH/BTEXN/PAH
EB2126645-009	16-Sep-2021 00:00	Discharge Water	✓		
EB2126645-010	16-Sep-2021 00:00	BH2206_210916		✓	
EB2126645-011	16-Sep-2021 00:00	BH2203_210916		✓	
EB2126645-013	17-Sep-2021 00:00	BH2210_210917		✓	✓
EB2126645-014	17-Sep-2021 00:00	QC105_210917		✓	✓
EB2126645-015	17-Sep-2021 00:00	BH2218_210917		✓	
EB2126645-016	17-Sep-2021 00:00	BH2217_210917		✓	
EB2126645-017	18-Sep-2021 00:00	BH2214_210918		✓	✓
EB2126645-018	18-Sep-2021 00:00	BH2215_210918		✓	✓
EB2126645-019	18-Sep-2021 00:00	BH2343_210918		✓	
EB2126645-020	18-Sep-2021 00:00	BH2344_210918		✓	
EB2126645-021	18-Sep-2021 00:00	BH2345_210918		✓	
EB2126645-022	18-Sep-2021 00:00	QC302_210918		✓	✓
EB2126645-023	18-Sep-2021 00:00	QC402_210918		✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
BH2203_210916	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2206_210916	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2210_210917	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2214_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2215_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2216_210915	Clear Plastic Bottle - Natural	----	15-Sep-2021	20-Sep-2021	✗	----	----
BH2217_210917	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2218_210917	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2233_210914	Clear Plastic Bottle - Natural	----	14-Sep-2021	20-Sep-2021	✗	----	----
BH2234_210914	Clear Plastic Bottle - Natural	----	14-Sep-2021	20-Sep-2021	✗	----	----
BH2235_210914	Clear Plastic Bottle - Natural	----	14-Sep-2021	20-Sep-2021	✗	----	----
BH2248_210915	Clear Plastic Bottle - Natural	----	15-Sep-2021	20-Sep-2021	✗	----	----
BH2309_210916	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2343_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2344_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2345_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2347_210914	Clear Plastic Bottle - Natural	----	14-Sep-2021	20-Sep-2021	✗	----	----
QC103_210915	Clear Plastic Bottle - Natural	----	15-Sep-2021	20-Sep-2021	✗	----	----
QC105_210917	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
QC302_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
QC402_210918	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
EK057G: Nitrite as N by Discrete Analyser							
BH2203_210916	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2206_210916	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----



BH2210_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
BH2216_210915	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2217_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
BH2218_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
BH2233_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2234_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2235_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2248_210915	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2309_210916	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2347_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
QC103_210915	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
QC105_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
EK071G: Reactive Phosphorus as P-By Discrete Analyser							
BH2203_210916	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2206_210916	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2210_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
BH2216_210915	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2217_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
BH2218_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----
BH2233_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2234_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2235_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
BH2248_210915	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
BH2309_210916	Clear Plastic Bottle - Natural	----	18-Sep-2021	20-Sep-2021	✗	----	----
BH2347_210914	Clear Plastic Bottle - Natural	----	16-Sep-2021	20-Sep-2021	✗	----	----
QC103_210915	Clear Plastic Bottle - Natural	----	17-Sep-2021	20-Sep-2021	✗	----	----
QC105_210917	Clear Plastic Bottle - Natural	----	19-Sep-2021	20-Sep-2021	✗	----	----

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email

AP_CustomerService.ANZ@aecom.com

EMMA KOEMAN

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)

Email

emma.koeman@aecom.com

Email

emma.koeman@aecom.com

Email

emma.koeman@aecom.com

Email

emma.koeman@aecom.com

Email

emma.koeman@aecom.com

Email

emma.koeman@aecom.com

Email

emma.koeman@aecom.com

KRYSTLE NICHOLS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

CERTIFICATE OF ANALYSIS

Work Order : **EB2126645**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2GVariation**
C-O-C number : **----**
Sampler : **BIANCA BURKE, KEEGAN McGUFFIE**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **23**
No. of samples analysed : **22**

Page : 1 of 33
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 20-Sep-2021 14:49
Date Analysis Commenced : 20-Sep-2021
Issue Date : 27-Sep-2021 14:25



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan	Senior Organic Chemist - PFAS	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK061G (Total Kjeldahl Nitrogen as N): Sample EB2126645_018 (BH2215_210918) was diluted due to matrix interference. LOR adjusted accordingly.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the method.
- EG035T (Total Mercury): Positive mercury results have been confirmed by re-extraction and re-analysis.
- EG020-F (Dissolved Metals by ICP-MS) were found to be higher than EG020-T (Total Metals by ICP-MS) for some samples. This was confirmed by re-digestion and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2347_210914	BH2235_210914	BH2234_210914	BH2233_210914	BH2248_210915
Sampling date / time				14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	15-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-001	EB2126645-002	EB2126645-003	EB2126645-004	EB2126645-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.26	8.16	8.24	8.09	8.48
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.50	2.23	3.35	2.19	5.56
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1140	760	578	690	760
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	712	614	357	415	440
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	436	263	131	187	113
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	19
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	275	311	215	166	238
Total Alkalinity as CaCO3	----	1	mg/L	275	311	215	166	257
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	3	4	3	1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	240	70	56	129	98
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	59	59	26	37	19
Magnesium	7439-95-4	1	mg/L	70	28	16	23	16
Sodium	7440-23-5	1	mg/L	72	83	88	69	136
Potassium	7440-09-7	1	mg/L	<1	2	1	2	1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.06
Barium	7440-39-3	0.001	mg/L	0.080	0.210	0.071	0.105	0.125
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.002	0.010	0.001	0.004	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.004	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.023	0.771	0.187	0.381	0.039
Nickel	7440-02-0	0.001	mg/L	0.004	0.018	0.002	0.004	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_210914	BH2235_210914	BH2234_210914	BH2233_210914	BH2248_210915
Sampling date / time				14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	15-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-001	EB2126645-002	EB2126645-003	EB2126645-004	EB2126645-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.005	0.012	0.010	0.007	<0.005	
Iron	7439-89-6	0.05	mg/L	0.07	0.50	<0.05	1.41	0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.002	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.089	0.226	0.080	0.137	0.158	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	0.014	0.003	0.006	<0.001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.002	0.003	0.001	
Copper	7440-50-8	0.001	mg/L	0.102	0.008	0.003	0.003	0.001	
Manganese	7439-96-5	0.001	mg/L	0.028	0.803	0.200	0.471	0.050	
Nickel	7440-02-0	0.001	mg/L	0.005	0.021	0.002	0.007	0.002	
Lead	7439-92-1	0.001	mg/L	0.003	0.002	0.003	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.071	0.014	0.008	0.012	0.009	
Iron	7439-89-6	0.05	mg/L	0.16	0.88	0.75	2.90	0.74	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.3	0.4	0.2	0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.04	0.06	0.02	0.12	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.62	0.65	0.03	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_210914	BH2235_210914	BH2234_210914	BH2233_210914	BH2248_210915
Sampling date / time					14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	15-Sep-2021 00:00
Compound	CAS Number	LOR	Unit		EB2126645-001	EB2126645-002	EB2126645-003	EB2126645-004	EB2126645-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.62	0.67	0.03	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.2	1.7	0.1	0.2	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.8	2.4	0.1	0.2	0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.03	0.20	0.12	0.18	0.04
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	0.11	0.04	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		12.4	8.25	5.96	7.02	7.92
ø Total Cations	----	0.01	meq/L		11.8	8.91	6.47	6.79	8.21
ø Ionic Balance	----	0.01	%		2.36	3.84	4.10	1.64	1.77
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		----	<1	<1	<1	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2347_210914	BH2235_210914	BH2234_210914	BH2233_210914	BH2248_210915
Sampling date / time				14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	15-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-001	EB2126645-002	EB2126645-003	EB2126645-004	EB2126645-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2347_210914	BH2235_210914	BH2234_210914	BH2233_210914	BH2248_210915
Sampling date / time				14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	15-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-001	EB2126645-002	EB2126645-003	EB2126645-004	EB2126645-005
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	----	290	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	----	860	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	----	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	1150	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L	----	690	<100	<100	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2347_210914	BH2235_210914	BH2234_210914	BH2233_210914	BH2248_210915
Sampling date / time				14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	14-Sep-2021 00:00	15-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-001	EB2126645-002	EB2126645-003	EB2126645-004	EB2126645-005
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C16 - C34 Fraction	----	100	µg/L	----	460	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	----	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	1150	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	690	<100	<100	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	----	94.1	99.0	105	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	94.5	76.5	78.4	82.4	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	93.3	67.0	80.8	93.4	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	32.6	31.5	31.1	32.7	----
2-Chlorophenol-D4	93951-73-6	1.0	%	75.6	76.2	73.5	77.2	----
2,4,6-Tribromophenol	118-79-6	1.0	%	92.4	103	91.4	101	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	75.2	67.1	71.8	76.9	----
Anthracene-d10	1719-06-8	1.0	%	95.9	80.9	91.0	95.6	----
4-Terphenyl-d14	1718-51-0	1.0	%	105	89.6	100	108	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	99.4	96.2	96.8	96.9	----
Toluene-D8	2037-26-5	2	%	97.8	98.0	98.0	98.3	----
4-Bromofluorobenzene	460-00-4	2	%	103	101	102	105	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210915	QC103_210915	BH2309_210916	BH2206_210916	BH2203_210916
Sampling date / time					15-Sep-2021 00:00	15-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00
Compound	CAS Number	LOR	Unit		EB2126645-006	EB2126645-007	EB2126645-008	EB2126645-010	EB2126645-011
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.14	8.13	7.14	6.94	7.28
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		16.3	16.4	37.4	7.11	2.63
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		4850	4860	9600	453	1050
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2680	2660	5640	304	832
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		501	497	443	24	312
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		697	707	100	28	66
Total Alkalinity as CaCO3	----	1	mg/L		697	707	100	28	66
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		115	116	333	7	424
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1130	1140	3240	128	15
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		95	95	52	3	102
Magnesium	7439-95-4	1	mg/L		64	63	76	4	14
Sodium	7440-23-5	1	mg/L		840	838	1810	80	107
Potassium	7440-09-7	1	mg/L		6	6	12	4	7
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	0.002	0.001	0.002	0.002
Boron	7440-42-8	0.05	mg/L		0.39	0.39	0.16	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.066	0.067	2.13	0.229	0.059
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.001	0.001	0.008	0.002	0.007
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.210	0.212	0.737	0.035	1.00
Nickel	7440-02-0	0.001	mg/L		0.003	0.003	0.004	0.002	0.016

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210915	QC103_210915	BH2309_210916	BH2206_210916	BH2203_210916
Sampling date / time				15-Sep-2021 00:00	15-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2126645-006	EB2126645-007	EB2126645-008	EB2126645-010	EB2126645-011	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.102	0.007	0.011	
Iron	7439-89-6	0.05	mg/L	0.05	0.05	0.77	3.64	19.4	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.002	0.002	0.003	
Boron	7440-42-8	0.05	mg/L	0.33	0.35	0.13	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.074	0.072	2.16	0.252	0.074	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.009	0.003	0.006	
Chromium	7440-47-3	0.001	mg/L	0.002	0.001	<0.001	<0.001	0.002	
Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.002	0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.289	0.282	0.805	0.037	1.20	
Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.004	0.002	0.010	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.010	0.010	0.125	<0.005	0.006	
Iron	7439-89-6	0.05	mg/L	0.45	0.40	1.50	3.96	27.8	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.1	<0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.05	0.05	<0.01	0.02	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.02	4.19	0.22	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2216_210915	QC103_210915	BH2309_210916	BH2206_210916	BH2203_210916
Sampling date / time					15-Sep-2021 00:00	15-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00
Compound	CAS Number	LOR	Unit		EB2126645-006	EB2126645-007	EB2126645-008	EB2126645-010	EB2126645-011
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.01	0.02	4.19	0.22	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.4	0.4	0.6	<0.1	4.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	0.4	4.8	0.2	4.2
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.04	0.05	0.08	<0.01	0.04
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.01	0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		48.2	48.7	100	4.32	10.6
ø Total Cations	----	0.01	meq/L		46.7	46.5	87.9	4.06	11.1
ø Ionic Balance	----	0.01	%		1.58	2.28	6.61	3.04	2.34
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		----	----	<1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		----	----	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		----	----	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		----	----	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		----	----	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		----	----	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		----	----	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		----	----	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		----	----	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		----	----	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		----	----	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		----	----	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2216_210915	QC103_210915	BH2309_210916	BH2206_210916	BH2203_210916
Sampling date / time				15-Sep-2021 00:00	15-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-006	EB2126645-007	EB2126645-008	EB2126645-010	EB2126645-011
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	----	----	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	----	----	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	----	----	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	----	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	----	----	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	----	----	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	----	----	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	----	----	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	----	----	----	60	<50
C15 - C28 Fraction	----	100	µg/L	----	----	----	210	120
C29 - C36 Fraction	----	50	µg/L	----	----	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	----	270	120
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	----	----	----	150	<100



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2216_210915	QC103_210915	BH2309_210916	BH2206_210916	BH2203_210916
Sampling date / time				15-Sep-2021 00:00	15-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-006	EB2126645-007	EB2126645-008	EB2126645-010	EB2126645-011
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	----	----	----	110	<100
>C34 - C40 Fraction	----	100	µg/L	----	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	----	260	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	----	150	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	----	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	----	----	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	----	----	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	----	----	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	----	----	1560	----	----
C15 - C28 Fraction	----	100	µg/L	----	----	7540	----	----
C29 - C36 Fraction	----	50	µg/L	----	----	330	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	----	9430	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	----	----	4480	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2216_210915	QC103_210915	BH2309_210916	BH2206_210916	BH2203_210916
Sampling date / time				15-Sep-2021 00:00	15-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00	16-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-006	EB2126645-007	EB2126645-008	EB2126645-010	EB2126645-011
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C16 - C34 Fraction	----	100	µg/L	----	----	4860	----	----
>C34 - C40 Fraction	----	100	µg/L	----	----	270	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	----	9610	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	----	4480	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	----	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	----	----	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	----	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	----	----	<2	<2	<2
^ Total Xylenes	----	2	µg/L	----	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	----	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	----	----	<5	<5	<5
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	----	----	93.2	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	----	118	90.3	89.9
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	----	115	90.5	88.0
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	----	----	30.8	31.6	32.7
2-Chlorophenol-D4	93951-73-6	1.0	%	----	----	72.7	73.6	76.8
2,4,6-Tribromophenol	118-79-6	1.0	%	----	----	116	97.4	105
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	----	----	75.5	62.7	61.2
Anthracene-d10	1719-06-8	1.0	%	----	----	96.7	83.8	85.5
4-Terphenyl-d14	1718-51-0	1.0	%	----	----	98.1	92.8	89.2
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	----	----	97.3	98.6	97.5
Toluene-D8	2037-26-5	2	%	----	----	101	98.6	102
4-Bromofluorobenzene	460-00-4	2	%	----	----	102	103	103



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				QC104_210916	BH2210_210917	QC105_210917	BH2218_210917	BH2217_210917
Sampling date / time				16-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-012	EB2126645-013	EB2126645-014	EB2126645-015	EB2126645-016
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	8.36	8.36	8.17	8.27
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	----	57.3	56.8	5.33	5.62
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	10400	10400	1340	780
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	5990	5870	777	480
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	----	276	279	245	106
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	32	24	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	756	770	276	208
Total Alkalinity as CaCO3	----	1	mg/L	----	788	794	276	208
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	139	140	36	18
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	3040	3030	268	119
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	15	16	29	26
Magnesium	7439-95-4	1	mg/L	----	58	58	42	10
Sodium	7440-23-5	1	mg/L	----	2190	2180	192	133
Potassium	7440-09-7	1	mg/L	----	13	13	7	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	0.002	0.002	0.002	0.003
Boron	7440-42-8	0.05	mg/L	----	0.34	0.33	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	----	0.133	0.134	0.155	0.127
Beryllium	7440-41-7	0.001	mg/L	----	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	----	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	----	<0.001	<0.001	0.007	<0.001
Chromium	7440-47-3	0.001	mg/L	----	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	----	<0.001	<0.001	0.003	<0.001
Manganese	7439-96-5	0.001	mg/L	----	0.256	0.260	0.291	0.362
Nickel	7440-02-0	0.001	mg/L	----	0.002	0.002	0.020	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC104_210916	BH2210_210917	QC105_210917	BH2218_210917	BH2217_210917
Sampling date / time				16-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2126645-012	EB2126645-013	EB2126645-014	EB2126645-015	EB2126645-016	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	----	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	----	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	----	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	----	<0.005	0.005	0.029	0.006	
Iron	7439-89-6	0.05	mg/L	----	0.78	0.79	0.25	0.17	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	----	0.002	0.003	0.002	0.003	
Boron	7440-42-8	0.05	mg/L	----	0.29	0.32	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	----	0.156	0.158	0.468	0.210	
Beryllium	7440-41-7	0.001	mg/L	----	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	----	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	----	0.002	0.002	0.014	0.001	
Chromium	7440-47-3	0.001	mg/L	----	0.002	0.003	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	----	0.002	0.002	0.015	0.002	
Manganese	7439-96-5	0.001	mg/L	----	0.286	0.285	0.368	0.283	
Nickel	7440-02-0	0.001	mg/L	----	0.004	0.005	0.035	0.003	
Lead	7439-92-1	0.001	mg/L	----	0.001	0.002	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	----	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	----	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	----	<0.005	0.010	0.078	<0.005	
Iron	7439-89-6	0.05	mg/L	----	1.52	1.64	0.65	0.40	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	----	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	----	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	----	2.0	2.0	0.5	0.5	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	----	0.18	0.01	0.09	0.06	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	----	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	----	0.07	0.26	0.03	0.07	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC104_210916	BH2210_210917	QC105_210917	BH2218_210917	BH2217_210917
Sampling date / time					16-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit		EB2126645-012	EB2126645-013	EB2126645-014	EB2126645-015	EB2126645-016
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L	----	0.07	0.26	0.03	0.07	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	0.2	0.1	0.9	0.2	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	----	0.3	0.4	0.9	0.3	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	----	0.07	0.08	9.55	0.32	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	----	<0.01	<0.01	0.38	0.20	
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L	----	104	104	13.8	7.89	
ø Total Cations	----	0.01	meq/L	----	101	101	13.4	7.96	
ø Ionic Balance	----	0.01	%	----	1.60	1.72	1.43	0.44	
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L	----	<1	<1	----	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L	----	<0.5	<0.5	----	----	
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	----	<0.5	<0.5	----	----	
beta-BHC	319-85-7	0.5	µg/L	----	<0.5	<0.5	----	----	
gamma-BHC	58-89-9	0.5	µg/L	----	<0.5	<0.5	----	----	
delta-BHC	319-86-8	0.5	µg/L	----	<0.5	<0.5	----	----	
Heptachlor	76-44-8	0.5	µg/L	----	<0.5	<0.5	----	----	
Aldrin	309-00-2	0.5	µg/L	----	<0.5	<0.5	----	----	
Heptachlor epoxide	1024-57-3	0.5	µg/L	----	<0.5	<0.5	----	----	
trans-Chlordane	5103-74-2	0.5	µg/L	----	<0.5	<0.5	----	----	
alpha-Endosulfan	959-98-8	0.5	µg/L	----	<0.5	<0.5	----	----	
cis-Chlordane	5103-71-9	0.5	µg/L	----	<0.5	<0.5	----	----	
Dieldrin	60-57-1	0.5	µg/L	----	<0.5	<0.5	----	----	
4,4'-DDE	72-55-9	0.5	µg/L	----	<0.5	<0.5	----	----	
Endrin	72-20-8	0.5	µg/L	----	<0.5	<0.5	----	----	
beta-Endosulfan	33213-65-9	0.5	µg/L	----	<0.5	<0.5	----	----	
4,4'-DDD	72-54-8	0.5	µg/L	----	<0.5	<0.5	----	----	
Endrin aldehyde	7421-93-4	0.5	µg/L	----	<0.5	<0.5	----	----	
Endosulfan sulfate	1031-07-8	0.5	µg/L	----	<0.5	<0.5	----	----	



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				QC104_210916	BH2210_210917	QC105_210917	BH2218_210917	BH2217_210917
Sampling date / time				16-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-012	EB2126645-013	EB2126645-014	EB2126645-015	EB2126645-016
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	----	<2.0	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L	----	<0.5	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L	----	<2.0	<2.0	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	----	<0.5	<0.5	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	----	<0.5	<0.5	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	----	<0.5	<0.5	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	----	<0.5	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	----	<0.5	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L	----	<2.0	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L	----	<0.5	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L	----	<0.5	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	----	<0.5	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L	----	<2.0	<2.0	----	----
Malathion	121-75-5	0.5	µg/L	----	<0.5	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L	----	<0.5	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	----	<0.5	<0.5	----	----
Parathion	56-38-2	2.0	µg/L	----	<2.0	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	----	<0.5	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	----	<0.5	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	----	<0.5	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L	----	<0.5	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L	----	<0.5	<0.5	----	----
Ethion	563-12-2	0.5	µg/L	----	<0.5	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L	----	<0.5	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	----	<0.5	<0.5	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	140	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	140	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				QC104_210916	BH2210_210917	QC105_210917	BH2218_210917	BH2217_210917
Sampling date / time				16-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-012	EB2126645-013	EB2126645-014	EB2126645-015	EB2126645-016
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	----	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	----	100	120	----	----
C29 - C36 Fraction	----	50	µg/L	----	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	100	120	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	----	<100	<100	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				QC104_210916	BH2210_210917	QC105_210917	BH2218_210917	BH2217_210917
Sampling date / time				16-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00	17-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-012	EB2126645-013	EB2126645-014	EB2126645-015	EB2126645-016
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
>C16 - C34 Fraction	----	100	µg/L	----	<100	140	----	----
>C34 - C40 Fraction	----	100	µg/L	----	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	----	<100	140	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	----	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	----	91.1	98.7	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	----	86.3	93.9	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	----	93.6	101	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	32.4	29.2	31.5	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	77.8	66.5	74.5	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%	96.6	87.7	96.8	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	74.8	65.5	70.7	----	----
Anthracene-d10	1719-06-8	1.0	%	90.4	87.0	93.6	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	101	99.0	105	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	100	98.7	98.7	----	----
Toluene-D8	2037-26-5	2	%	97.4	98.3	100	----	----
4-Bromofluorobenzene	460-00-4	2	%	103	99.6	102	----	----



Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Sample ID

				BH2214_210918	BH2215_210918	BH2343_210918	BH2344_210918	BH2345_210918
Sampling date / time				18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-017	EB2126645-018	EB2126645-019	EB2126645-020	EB2126645-021
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.83	7.82	8.16	8.37	7.94
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	36.7	32.5	0.96	1.79	1.18
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	13900	17500	990	1170	1930
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	7880	11000	645	687	1300
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	942	1620	448	500	911
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	23	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	669	312	309	492	544
Total Alkalinity as CaCO3	----	1	mg/L	669	312	309	515	544
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	129	308	13	4	5
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	4290	5700	149	107	385
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	110	159	69	88	157
Magnesium	7439-95-4	1	mg/L	162	297	67	68	126
Sodium	7440-23-5	1	mg/L	2590	3010	47	92	82
Potassium	7440-09-7	1	mg/L	11	18	2	2	4
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.008	0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	0.07	0.08	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.622	0.108	0.017	<0.001	0.019
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.002	0.011	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	4.25	0.837	0.004	0.140	0.020
Nickel	7440-02-0	0.001	mg/L	0.002	0.007	0.002	0.003	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2214_210918	BH2215_210918	BH2343_210918	BH2344_210918	BH2345_210918
Sampling date / time				18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2126645-017	EB2126645-018	EB2126645-019	EB2126645-020	EB2126645-021	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.008	0.011	0.006	<0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	4.45	1.34	<0.05	0.34	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.008	0.002	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	0.06	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.651	0.113	0.020	0.017	0.024	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.004	0.013	<0.001	0.004	0.002	
Chromium	7440-47-3	0.001	mg/L	0.003	<0.001	<0.001	0.004	0.001	
Copper	7440-50-8	0.001	mg/L	0.010	0.003	0.001	0.003	0.002	
Manganese	7439-96-5	0.001	mg/L	4.29	0.908	0.049	0.192	0.061	
Nickel	7440-02-0	0.001	mg/L	0.004	0.007	0.004	0.020	0.005	
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	<0.001	0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.055	0.011	0.007	0.020	<0.005	
Iron	7439-89-6	0.05	mg/L	8.46	1.58	0.54	3.56	1.31	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.3	0.1	0.1	0.1	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	2.16	0.10	0.21	<0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	0.73	0.01	1.36	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2214_210918	BH2215_210918	BH2343_210918	BH2344_210918	BH2345_210918
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00
Compound	CAS Number	LOR	Unit		EB2126645-017	EB2126645-018	EB2126645-019	EB2126645-020	EB2126645-021
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	0.73	0.01	1.36
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		6.8	<0.5	0.3	0.3	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		6.8	<0.5	1.0	0.3	1.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		1.37	0.18	0.06	0.24	0.11
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.73	0.04	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		137	173	10.6	13.4	21.8
ø Total Cations	----	0.01	meq/L		132	164	11.0	14.0	21.9
ø Ionic Balance	----	0.01	%		1.97	2.87	1.87	2.37	0.09
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2214_210918	BH2215_210918	BH2343_210918	BH2344_210918	BH2345_210918
Sampling date / time				18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-017	EB2126645-018	EB2126645-019	EB2126645-020	EB2126645-021
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2214_210918	BH2215_210918	BH2343_210918	BH2344_210918	BH2345_210918
Sampling date / time				18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-017	EB2126645-018	EB2126645-019	EB2126645-020	EB2126645-021
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	420	120	----	----	----
C29 - C36 Fraction	----	50	µg/L	720	50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	1140	170	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	1090	140	----	----	----
>C34 - C40 Fraction	----	100	µg/L	160	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	1250	140	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2214_210918	BH2215_210918	BH2343_210918	BH2344_210918	BH2345_210918
Sampling date / time				18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00	18-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	EB2126645-017	EB2126645-018	EB2126645-019	EB2126645-020	EB2126645-021
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	63.4	93.0	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	68.6	102	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	67.1	107	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	23.2	32.4	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	52.0	75.3	----	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%	79.0	105	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	44.9	72.1	----	----	----
Anthracene-d10	1719-06-8	1.0	%	62.8	93.5	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	68.8	105	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	98.5	98.5	----	----	----
Toluene-D8	2037-26-5	2	%	96.0	96.6	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	103	102	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC302_210918	QC402_210918	----	----	----
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2126645-022	EB2126645-023	-----	-----	-----
				Result	Result		----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.89	6.13	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		0.12	0.12	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1	<1	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		<10	<10	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	<1	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		4	5	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		4	5	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	<1	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	<1	----	----	----
Sodium	7440-23-5	1	mg/L		<1	<1	----	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC302_210918	QC402_210918	----	----	----
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2126645-022	EB2126645-023	-----	-----	-----
				Result	Result		----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001		----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01		----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01		----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005		----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001		----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05		----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001		----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001		----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001		----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001		----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001		----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001		----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001		----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001		----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001		----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01		----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01		----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005		----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05		----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001		----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001		----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1		----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01		----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01		----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01		----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01		----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC302_210918	QC402_210918	----	----	----
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2126645-022	EB2126645-023	-----	-----	-----
				Result	Result		----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		0.08	0.10	----	----	----
ø Total Cations	----	0.01	meq/L		<0.01	<0.01	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	<0.5	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC302_210918	QC402_210918	----	----	----
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2126645-022	EB2126645-023	-----	-----	-----
					Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	<0.5	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	<0.5	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	<0.5	----	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	<0.5	----	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	<0.5	----	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	<0.5	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	<0.5	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC302_210918	QC402_210918	----	----	----
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2126645-022	EB2126645-023	-----	-----	-----
				Result	Result		----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5		----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0		----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0		----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5		----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5		----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20		----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50		----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100		----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50		----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50		----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20		----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20		----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100		----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100		----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100		----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100		----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100		----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1		----	----	----
Toluene	108-88-3	2	µg/L	<2	<2		----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2		----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2		----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2		----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2		----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1		----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5		----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%	77.9	85.7		----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC302_210918	QC402_210918	----	----	----
Sampling date / time					18-Sep-2021 00:00	18-Sep-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2126645-022	EB2126645-023	-----	-----	-----
				Result	Result		----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		85.6	90.4	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		28.0	26.6	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		70.5	67.4	----	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%		83.5	77.7	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		60.8	66.6	----	----	----
Anthracene-d10	1719-06-8	1.0	%		76.1	83.0	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		81.5	92.7	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		100	101	----	----	----
Toluene-D8	2037-26-5	2	%		99.0	99.2	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		103	104	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	37	138
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	45	139
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	45	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2,4,6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: EB2126645	Page	: 1 of 20
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 20-Sep-2021
Order number	: 60553814_3100.V01-B2GVariation	Date Analysis Commenced	: 20-Sep-2021
C-O-C number	: ----	Issue Date	: 27-Sep-2021
Sampler	: BIANCA BURKE, KEEGAN McGUFFIE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 23		
No. of samples analysed	: 22		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan	Senior Organic Chemist - PFAS	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3919464)									
EB2126161-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.94	8.00	0.8	0% - 20%
EB2126645-005	BH2248_210915	EA005-P: pH Value	----	0.01	pH Unit	8.48	8.48	0.0	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3919467)									
EB2126645-017	BH2214_210918	EA005-P: pH Value	----	0.01	pH Unit	7.83	7.91	1.0	0% - 20%
EB2126663-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.48	7.52	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3919463)									
EB2126161-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2660	2640	0.4	0% - 20%
EB2126645-005	BH2248_210915	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	760	760	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3919469)									
EB2126645-017	BH2214_210918	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	13900	13800	0.8	0% - 20%
EB2126663-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4460	4390	1.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3913213)									
EB2126573-015	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	<10	0.0	No Limit
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3914429)									
EB2126645-005	BH2248_210915	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	440	433	1.5	0% - 20%
EB2126645-016	BH2217_210917	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	480	481	0.3	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3919466)									
EB2126161-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	72	73	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO ₃	----	1	mg/L	72	73	0.0	0% - 20%
EB2126645-005	BH2248_210915	ED037-P: Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	19	18	0.0	0% - 50%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3919466) - continued									
EB2126645-005	BH2248_210915	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	238	234	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	257	252	1.8	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3919470)									
EB2126645-017	BH2214_210918	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	669	664	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	669	664	0.7	0% - 20%
EB2126663-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	389	380	2.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	389	380	2.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3912234)									
EB2126645-001	BH2347_210914	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	7	7	0.0	No Limit
EB2126645-013	BH2210_210917	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	139	142	1.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3912238)									
EB2126645-023	QC402_210918	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 3912233)									
EB2126645-001	BH2347_210914	ED045G: Chloride	16887-00-6	1	mg/L	240	242	0.8	0% - 20%
EB2126645-013	BH2210_210917	ED045G: Chloride	16887-00-6	1	mg/L	3040	3110	2.2	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3912237)									
EB2126645-023	QC402_210918	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3912500)									
EB2126645-011	BH2203_210916	ED093F: Calcium	7440-70-2	1	mg/L	102	100	1.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	14	14	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	107	106	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	7	7	0.0	No Limit
EB2126645-001	BH2347_210914	ED093F: Calcium	7440-70-2	1	mg/L	59	59	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	70	71	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	72	74	2.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3912505)									
EB2126645-023	QC402_210918	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3912499)									
EB2126645-011	BH2203_210916	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.003	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3912499) - continued									
EB2126645-011	BH2203_210916	EG020A-F: Barium	7440-39-3	0.001	mg/L	0.059	0.059	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.007	0.006	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.00	1.00	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.016	0.017	0.0	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.011	0.011	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	19.4	19.5	0.6	0% - 20%
EB2126645-001	BH2347_210914	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.080	0.079	1.4	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.023	0.023	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.07	0.06	0.0	No Limit
		EG020F: Dissolved Metals by ICP-MS (QC Lot: 3912504)							
EB2126645-023	QC402_210918	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3912504) - continued									
EB2126645-023	QC402_210918	EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3912745)									
EB2126645-001	BH2347_210914	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.089	0.082	7.7	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.102	0.095	6.5	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.028	0.026	8.2	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.005	0.004	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.071	0.065	8.4	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	0.16	0.15	12.6	No Limit		
EB2126645-011	BH2203_210916	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.074	0.074	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	1.20	1.22	2.4	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.010	0.010	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.008	31.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	27.8	28.4	2.3	0% - 20%		
EG020T: Total Metals by ICP-MS (QC Lot: 3912746)									
EB2126645-023	QC402_210918	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3912746) - continued									
EB2126645-023	QC402_210918	EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit		
EG035F: Dissolved Mercury by FIMS (QC Lot: 3912501)									
EB2126645-013	BH2210_210917	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2126645-001	BH2347_210914	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3912503)									
EB2126645-023	QC402_210918	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3912755)									
EB2126645-001	BH2347_210914	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2126645-013	BH2210_210917	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3912756)									
EB2126645-023	QC402_210918	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3919465)									
EB2126161-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.8	0.8	0.0	No Limit
EB2126645-005	BH2248_210915	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.1	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3919468)									
EB2126645-017	BH2214_210918	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.0	No Limit
EB2126663-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	4.6	4.8	3.8	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3919933)									
EB2126593-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.06	52.3	No Limit
EB2126603-010	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.40	0.40	0.0	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3919936)									
EB2126645-003	BH2234_210914	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.0	No Limit
EB2126645-015	BH2218_210917	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.09	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3912231)									
EB2126645-001	BH2347_210914	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2126645-013	BH2210_210917	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3912235)									
EB2126645-023	QC402_210918	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3919934)									

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 Work Order : EB2126645
 Client : AECOM AUSTRALIA PTY LTD
 Project : INLAND RAIL



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3919934) - continued									
EB2126593-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.53	0.53	0.0	0% - 20%
EB2126603-010	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3919935)									
EB2126645-003	BH2234_210914	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.03	0.0	No Limit
EB2126645-015	BH2218_210917	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.04	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3917737)									
EB2126584-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	16.3	15.2	7.2	0% - 20%
EB2126645-007	QC103_210915	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3917738)									
EB2126645-019	BH2343_210918	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3917736)									
EB2126584-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	2.82	2.78	1.7	0% - 20%
EB2126645-007	QC103_210915	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3917739)									
EB2126645-019	BH2343_210918	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3912232)									
EB2126645-001	BH2347_210914	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.0	No Limit
EB2126645-013	BH2210_210917	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3912236)									
EB2126645-023	QC402_210918	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3914049)									
EB2126645-018	BH2215_210918	EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3914047)									
EB2126645-018	BH2215_210918	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3914047) - continued									
EB2126645-018	BH2215_210918	EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3914047)									
EB2126645-018	BH2215_210918	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3914045)									
EB2126645-018	BH2215_210918	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrvsene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3914045) - continued									
EB2126645-018	BH2215_210918	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3914048)									
EB2126645-018	BH2215_210918	EP071: C15 - C28 Fraction	----	100	µg/L	120	140	9.8	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	50	60	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3915268)									
EB2125564-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2126645-010	BH2206_210916	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3914048)									
EB2126645-018	BH2215_210918	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	140	170	22.3	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3915268)									
EB2125564-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2126645-010	BH2206_210916	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 3915268)									
EB2125564-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2126645-010	BH2206_210916	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit		

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLOT: 3919464)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA005P: pH by PC Titrator (QCLOT: 3919467)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLOT: 3919463)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	101	91.0	107
				<1	12890 µS/cm	99.5	91.0	107
EA010P: Conductivity by PC Titrator (QCLOT: 3919469)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	98.3	91.0	107
				<1	24800 µS/cm	100	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLOT: 3913213)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	101	88.0	112
				<10	293 mg/L	101	88.0	112
				<10	2000 mg/L	97.0	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLOT: 3914429)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	98.6	88.0	112
				<10	293 mg/L	101	88.0	112
				<10	2000 mg/L	100	80.9	118
ED037P: Alkalinity by PC Titrator (QCLOT: 3919466)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	111	80.0	120
ED037P: Alkalinity by PC Titrator (QCLOT: 3919470)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	98.2	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLOT: 3912234)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.2	85.0	118
				<1	100 mg/L	93.8	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLOT: 3912238)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.5	85.0	118
				<1	100 mg/L	94.7	85.0	118
ED045G: Chloride by Discrete Analyser (QCLOT: 3912233)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.8	90.0	115
				<1	1000 mg/L	104	90.0	115
ED045G: Chloride by Discrete Analyser (QCLOT: 3912237)								



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
					LCS		Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
ED045G: Chloride by Discrete Analyser (QCLot: 3912237) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.5	90.0	115
				<1	1000 mg/L	104	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3912500)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	70.0	130
ED093F: Dissolved Major Cations (QCLot: 3912505)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3912499)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.7	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.7	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.7	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.2	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.8	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.6	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.2	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	100	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.0	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.3	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.2	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.8	82.0	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 3912504)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.6	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.8	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.9	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.5	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.2	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.6	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.8	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	89.0	120



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 3912504) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.0	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.6	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.4	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3912745)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.1	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	101	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.4	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	105	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	108	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.1	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82.0	118
EG020T: Total Metals by ICP-MS (QCLot: 3912746)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	102	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	103	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.6	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	103	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	105	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	101	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82.0	118

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EG035F: Dissolved Mercury by FIMS (QCLot: 3912501)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.2	84.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3912503)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	84.6	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3912755)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.6	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3912756)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.9	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3919465)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	96.0	80.0	117
EK040P: Fluoride by PC Titrator (QCLot: 3919468)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	99.1	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3919933)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	102	83.5	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3919936)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	100	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3912231)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.0	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3912235)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	93.9	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3919934)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	95.4	85.7	111
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3919935)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	95.5	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3917737)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	96.6	70.1	108
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3917738)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	87.4	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3917736)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	98.4	79.2	105
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3917739)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	104	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3912232)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	94.2	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3912236)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	96.6	81.7	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3914049)								



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3914049) - continued								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	81.7	55.0	131
EP068A: Organochlorine Pesticides (OC) (QCLot: 3914047)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	86.4	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	82.3	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	84.3	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	87.9	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	92.8	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	90.4	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	84.9	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	89.4	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	87.6	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	109	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	87.8	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	85.0	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	88.8	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	97.0	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	86.0	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	84.9	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	80.9	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	92.0	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	80.2	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	84.1	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	83.6	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3914047)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	85.4	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	94.4	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	11.1	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	74.6	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	92.2	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	83.2	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	85.9	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	88.2	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	82.7	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	91.0	56.3	125



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3914047) - continued								
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	76.9	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	83.3	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	77.0	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	92.1	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	75.0	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	78.4	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	83.1	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	87.8	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	85.6	27.5	146
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 3914046)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	103	34.0	110
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	89.4	43.0	105
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 3914046)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	99.1	34.0	110
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	85.2	43.0	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914045)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	82.6	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	87.2	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	94.6	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	95.5	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	94.5	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	94.8	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	93.5	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	92.8	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	98.0	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	92.7	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	92.6	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	100	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	102	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	94.0	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	95.8	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	92.8	53.0	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3914048)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	124	51.9	126
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	104	51.4	124



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3914048) - continued								
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3915268)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	107	66.8	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914048)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	117	53.2	125
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	105	49.5	123
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3915268)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	111	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080: BTEXN (QCLot: 3915268)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	102	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	105	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	109	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	112	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	115	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	91.8	77.8	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3912234)							
EB2126645-002	BH2235_210914	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	99.2	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3912233)							
EB2126645-002	BH2235_210914	ED045G: Chloride	16887-00-6	400 mg/L	108	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3912499)							
EB2126645-002	BH2235_210914	EG020A-F: Arsenic	7440-38-2	1 mg/L	100	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	104	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	100	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3912499) - continued							
EB2126645-002	BH2235_210914	EG020A-F: Cadmium	7440-43-9	0.25 mg/L	97.8	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	102	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	98.3	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	99.6	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	97.4	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	106	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.8	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	95.2	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	93.9	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3912504)							
EB2126648-004	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	102	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	99.4	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	101	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	96.8	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	102	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	99.7	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	96.5	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	103	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.5	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	96.0	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	94.4	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3912745)							
EB2126645-002	BH2235_210914	EG020A-T: Arsenic	7440-38-2	1 mg/L	102	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	103	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	97.8	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	99.8	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	101	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	100	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	97.2	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	98.9	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	101	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	104	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3912746)							
EB2126647-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	107	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	87.4	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3912746) - continued							
EB2126647-001	Anonymous	EG020A-T: Barium	7440-39-3	1 mg/L	105	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	100	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	102	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	103	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	97.8	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	91.8	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	101	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	105	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	101	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3912501)							
EB2126645-002	BH2235_210914	EG035F: Mercury	7439-97-6	0.01 mg/L	83.6	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3912503)							
EB2126668-004	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	86.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3912755)							
EB2126645-002	BH2235_210914	EG035T: Mercury	7439-97-6	0.01 mg/L	89.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3912756)							
EB2126647-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	90.0	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3919465)							
EB2126161-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	95.8	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 3919468)							
EB2126645-014	QC105_210917	EK040P: Fluoride	16984-48-8	5 mg/L	96.0	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3919933)							
EB2126603-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	99.1	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3919936)							
EB2126645-004	BH2233_210914	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	91.3	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3912231)							
EB2126645-002	BH2235_210914	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	96.4	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3912235)							
EB2126645-021	BH2345_210918	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	93.7	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3919934)							
EB2126603-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	# Not Determined	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3919935)							
EB2126645-004	BH2233_210914	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	92.9	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3917737)							
EB2126584-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3917738)							
EB2126645-020	BH2344_210918	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	104	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3917736)							
EB2126584-003	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	# Not Determined	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3917739)							
EB2126645-020	BH2344_210918	EK067G: Total Phosphorus as P	----	1 mg/L	101	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3912232)							
EB2126645-002	BH2235_210914	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	102	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3914049)							
EB2126645-018	BH2215_210918	EP066: Total Polychlorinated biphenyls	----	20 µg/L	77.6	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3914047)							
EB2126645-018	BH2215_210918	EP068: gamma-BHC	58-89-9	20 µg/L	68.8	60.2	130
		EP068: Heptachlor	76-44-8	20 µg/L	73.7	48.1	132
		EP068: Aldrin	309-00-2	20 µg/L	63.3	53.7	120
		EP068: Dieldrin	60-57-1	20 µg/L	66.2	55.3	124
		EP068: Endrin	72-20-8	20 µg/L	77.9	48.9	131
		EP068: 4,4'-DDT	50-29-3	20 µg/L	69.2	39.4	134
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3914047)							
EB2126645-018	BH2215_210918	EP068: Diazinon	333-41-5	10 µg/L	88.7	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	75.7	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	67.1	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	79.1	47.3	127
		EP068: Prothiofos	34643-46-4	10 µg/L	69.2	45.5	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914045)							
EB2126645-018	BH2215_210918	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	83.8	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	83.6	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3915268)							
EB2126645-002	BH2235_210914	EP080: C6 - C9 Fraction	----	40 µg/L	98.6	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3915268)							
EB2126645-002	BH2235_210914	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	111	70.0	130
EP080: BTEXN (QCLot: 3915268)							
EB2126645-002	BH2235_210914	EP080: Benzene	71-43-2	10 µg/L	101	70.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 3915268) - continued							
EB2126645-002	BH2235_210914	EP080: Toluene	108-88-3	10 µg/L	103	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2126645	Page	: 1 of 22
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 20-Sep-2021
Site	: ----	Issue Date	: 27-Sep-2021
Sampler	: BIANCA BURKE, KEEGAN MCGUFFIE	No. of samples received	: 23
Order number	: 60553814_3100.V01-B2GVariation	No. of samples analysed	: 22

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EB2126603--001	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EB2126584--003	Anonymous	Total Kjeldahl Nitrogen as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	EB2126584--003	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	----	----	----	24-Sep-2021	14-Sep-2021	10
Clear Plastic Bottle - Natural BH2248_210915, QC103_210915	BH2216_210915,	----	----	----	24-Sep-2021	15-Sep-2021	9
Clear Plastic Bottle - Natural BH2309_210916, BH2203_210916	BH2206_210916,	----	----	----	24-Sep-2021	16-Sep-2021	8
Clear Plastic Bottle - Natural BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	----	----	----	24-Sep-2021	17-Sep-2021	7
Clear Plastic Bottle - Natural BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	----	----	----	24-Sep-2021	18-Sep-2021	6
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	----	----	----	20-Sep-2021	16-Sep-2021	4
Clear Plastic Bottle - Natural BH2248_210915, QC103_210915	BH2216_210915,	----	----	----	20-Sep-2021	17-Sep-2021	3



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural BH2309_210916, BH2203_210916	BH2206_210916,	----	----	20-Sep-2021	18-Sep-2021	2
Clear Plastic Bottle - Natural BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	----	----	20-Sep-2021	19-Sep-2021	1
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	----	----	20-Sep-2021	16-Sep-2021	4
Clear Plastic Bottle - Natural BH2248_210915, QC103_210915	BH2216_210915,	----	----	20-Sep-2021	17-Sep-2021	3
Clear Plastic Bottle - Natural BH2309_210916, BH2203_210916	BH2206_210916,	----	----	20-Sep-2021	18-Sep-2021	2
Clear Plastic Bottle - Natural BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	----	----	20-Sep-2021	19-Sep-2021	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Matrix: WATER					
Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	1	14	7.14	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	5	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Chloride by Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	1	21	4.76	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	5	0.00	5.00	NEPM 2013 B3 & ALS QC Standard



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	14-Sep-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	15-Sep-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	16-Sep-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	17-Sep-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	24-Sep-2021	18-Sep-2021	✖



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	12-Oct-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	13-Oct-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	14-Oct-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	15-Oct-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	21-Sep-2021	21-Sep-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	21-Sep-2021	22-Sep-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	21-Sep-2021	23-Sep-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	21-Sep-2021	24-Sep-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	21-Sep-2021	25-Sep-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC302_210918,	QC402_210918	18-Sep-2021	----	----	----	24-Sep-2021	25-Sep-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	12-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	13-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	14-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	15-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2214_210918, BH2343_210918, BH2345_210918	BH2215_210918, BH2344_210918,	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✔
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	28-Sep-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	29-Sep-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	30-Sep-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	01-Oct-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	24-Sep-2021	02-Oct-2021	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	20-Sep-2021	12-Oct-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	20-Sep-2021	13-Oct-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	20-Sep-2021	14-Oct-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	20-Sep-2021	15-Oct-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	20-Sep-2021	16-Oct-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	20-Sep-2021	12-Oct-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	20-Sep-2021	13-Oct-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	20-Sep-2021	14-Oct-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	20-Sep-2021	15-Oct-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	20-Sep-2021	16-Oct-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC302_210918,	QC402_210918	18-Sep-2021	----	----	----	24-Sep-2021	25-Sep-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	12-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	13-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	14-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	15-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2214_210918, BH2343_210918, BH2345_210918	BH2215_210918, BH2344_210918,	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-F) QC302_210918,	QC402_210918	18-Sep-2021	----	----	----	24-Sep-2021	17-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	13-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	14-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	15-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	16-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2214_210918, BH2343_210918, BH2345_210918	BH2215_210918, BH2344_210918,	18-Sep-2021	----	----	----	24-Sep-2021	17-Mar-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	24-Sep-2021	13-Mar-2022	✓	24-Sep-2021	13-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	24-Sep-2021	14-Mar-2022	✓	24-Sep-2021	14-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	24-Sep-2021	15-Mar-2022	✓	24-Sep-2021	15-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	24-Sep-2021	16-Mar-2022	✓	24-Sep-2021	16-Mar-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	24-Sep-2021	17-Mar-2022	✓	24-Sep-2021	17-Mar-2022	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035F) QC302_210918,	QC402_210918	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	12-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	13-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	14-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	15-Oct-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2214_210918, BH2343_210918, BH2345_210918	BH2215_210918, BH2344_210918,	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	12-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	13-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	14-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	15-Oct-2021	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✔
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	24-Sep-2021	12-Oct-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	24-Sep-2021	13-Oct-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	24-Sep-2021	14-Oct-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	24-Sep-2021	15-Oct-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	24-Sep-2021	16-Oct-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	23-Sep-2021	12-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	23-Sep-2021	13-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	23-Sep-2021	14-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	23-Sep-2021	15-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	23-Sep-2021	16-Oct-2021	✔
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	20-Sep-2021	16-Sep-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	20-Sep-2021	17-Sep-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	20-Sep-2021	18-Sep-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	20-Sep-2021	19-Sep-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	20-Sep-2021	20-Sep-2021	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	23-Sep-2021	12-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	23-Sep-2021	13-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	23-Sep-2021	14-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	23-Sep-2021	15-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	23-Sep-2021	16-Oct-2021	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	23-Sep-2021	12-Oct-2021	✓	23-Sep-2021	12-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	23-Sep-2021	13-Oct-2021	✓	23-Sep-2021	13-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	23-Sep-2021	14-Oct-2021	✓	23-Sep-2021	14-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	23-Sep-2021	15-Oct-2021	✓	23-Sep-2021	15-Oct-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	23-Sep-2021	16-Oct-2021	✓	23-Sep-2021	16-Oct-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	23-Sep-2021	12-Oct-2021	✔	23-Sep-2021	12-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	23-Sep-2021	13-Oct-2021	✔	23-Sep-2021	13-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	23-Sep-2021	14-Oct-2021	✔	23-Sep-2021	14-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	23-Sep-2021	15-Oct-2021	✔	23-Sep-2021	15-Oct-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	23-Sep-2021	16-Oct-2021	✔	23-Sep-2021	16-Oct-2021	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	----	----	----	20-Sep-2021	16-Sep-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2248_210915, QC103_210915	BH2216_210915,	15-Sep-2021	----	----	----	20-Sep-2021	17-Sep-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	----	----	----	20-Sep-2021	18-Sep-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2210_210917, BH2218_210917,	QC105_210917, BH2217_210917	17-Sep-2021	----	----	----	20-Sep-2021	19-Sep-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2214_210918, BH2343_210918, BH2345_210918, QC402_210918	BH2215_210918, BH2344_210918, QC302_210918,	18-Sep-2021	----	----	----	20-Sep-2021	20-Sep-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) BH2235_210914, BH2233_210914	BH2234_210914,	14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2309_210916		16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2210_210917,	QC105_210917	17-Sep-2021	21-Sep-2021	24-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP066) BH2214_210918,	BH2215_210918	18-Sep-2021	21-Sep-2021	25-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2210_210917,	QC105_210917	17-Sep-2021	21-Sep-2021	24-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	21-Sep-2021	25-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2309_210916, BH2203_210916	BH2206_210916,	16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2210_210917,	QC105_210917	17-Sep-2021	21-Sep-2021	24-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP068) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	21-Sep-2021	25-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2347_210914		14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071SG) BH2206_210916, QC104_210916	BH2203_210916,	16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2347_210914		14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071SG) BH2206_210916, QC104_210916	BH2203_210916,	16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2309_210916, BH2203_210916,	BH2206_210916, QC104_210916	16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2210_210917,	QC105_210917	17-Sep-2021	21-Sep-2021	24-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	21-Sep-2021	25-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) BH2235_210914, BH2233_210914	BH2234_210914,	14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071) BH2309_210916		16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071) BH2210_210917,	QC105_210917	17-Sep-2021	21-Sep-2021	24-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	21-Sep-2021	25-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	22-Sep-2021	28-Sep-2021	✔	22-Sep-2021	28-Sep-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_210916, BH2203_210916,	BH2206_210916, QC104_210916	16-Sep-2021	22-Sep-2021	30-Sep-2021	✔	22-Sep-2021	30-Sep-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2210_210917,	QC105_210917	17-Sep-2021	22-Sep-2021	01-Oct-2021	✔	22-Sep-2021	01-Oct-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	22-Sep-2021	02-Oct-2021	✔	22-Sep-2021	02-Oct-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) BH2235_210914, BH2233_210914	BH2234_210914,	14-Sep-2021	21-Sep-2021	21-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071) BH2309_210916		16-Sep-2021	21-Sep-2021	23-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071) BH2210_210917,	QC105_210917	17-Sep-2021	21-Sep-2021	24-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber Glass Bottle - Unpreserved (EP071) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	21-Sep-2021	25-Sep-2021	✔	23-Sep-2021	31-Oct-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	22-Sep-2021	28-Sep-2021	✔	22-Sep-2021	28-Sep-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_210916, BH2203_210916,	BH2206_210916, QC104_210916	16-Sep-2021	22-Sep-2021	30-Sep-2021	✔	22-Sep-2021	30-Sep-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2210_210917,	QC105_210917	17-Sep-2021	22-Sep-2021	01-Oct-2021	✔	22-Sep-2021	01-Oct-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	22-Sep-2021	02-Oct-2021	✔	22-Sep-2021	02-Oct-2021	✔
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_210914, BH2234_210914,	BH2235_210914, BH2233_210914	14-Sep-2021	22-Sep-2021	28-Sep-2021	✔	22-Sep-2021	28-Sep-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_210916, BH2203_210916,	BH2206_210916, QC104_210916	16-Sep-2021	22-Sep-2021	30-Sep-2021	✔	22-Sep-2021	30-Sep-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2210_210917,	QC105_210917	17-Sep-2021	22-Sep-2021	01-Oct-2021	✔	22-Sep-2021	01-Oct-2021	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2214_210918, QC302_210918,	BH2215_210918, QC402_210918	18-Sep-2021	22-Sep-2021	02-Oct-2021	✔	22-Sep-2021	02-Oct-2021	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	27	14.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	10.00	✗	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	21	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	5	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	21	19.05	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Evaluation	Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected		
Laboratory Control Samples (LCS) - Continued							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	21	19.05	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	25	24.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Ammonia as N by Discrete analyser	EK055G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	21	4.76	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	27	7.41	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	24	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	21	4.76	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	21	4.76	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	10	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	5	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3).
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St, Stafford 4053. (Corner of Byth & Shand Streets). Phone: 07 3243 7222

Environmental Division
Brisbane
Work Order Reference
EB2131032



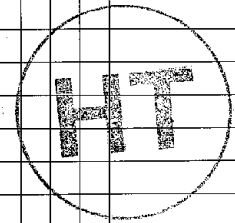
Telephone : ~ 61-7-3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date): 5 days TAT from samples reception		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		Date of receipt:	
PROJECT: Inland Rail		ALS QUOTE NO.: EN219/20		Date of analysis:	
ORDER NUMBER: 60553814_3100.V01-B2G Variation		COC SEQUENCE NUMBER (Circle)		Date of completion:	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289		Date of report:	
SAMPLER: B.Burke & K.McGuffie		SAMPLER MOBILE: 0490 494 804		Date of invoice:	
COC emailed to ALS? Circle (YES / NO)		RELINQUISHED BY:		RECEIVED BY: <i>T. Alls</i>	
Email Reports to: krystle.nichols@aecom.com; emma.koeman@aecom.com		DATE/TIME:		DATE/TIME: <i>11/12/21</i>	
Email Invoice to: krystle.nichols@aecom.com		DATE/TIME:		DATE/TIME: <i>1235</i>	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY		SAMPLE DETAILS		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB: Suite Codes must be listed to attract suite price)															Additional Information	
		MATRIX: Solid(S) Water(W)				Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottle required)																
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA008) Sodium Adsorption Ratio (calculation)	(EA018) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) - Hardness	(NT-02A) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-03A) Total Nitrogen + NO2	(W-037) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG007) Total Metals by (ICPMS (inc. digestion) (Fe)	(W-037) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG008) Dissolved Metals by (ICPMS (Fe)	(EA009) pH(pHCT)	(EA010) Electrical Conductivity (PCT)	(W-037) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG008) Dissolved Metals by (ICPMS (Fe)	(EA009) pH(pHCT)	(EA010) Electrical Conductivity (PCT)	Comments on likely contaminant levels, dilutions, or samples requiring specific OC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS MGT BRISBANE FOR ANALYSIS	
1	BH2347-21025	25/10/21	W	SP 2NP	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	BH226-21025	25/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	BH217-211026	26/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4	BH2201-211026	26/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5	BH2233-211026	26/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
6	BH2234-211026	26/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7	BH2235-211026	26/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
8	BH2203-211027	27/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	BH2206-211027	27/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10	BH2210-211027	27/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11	BH2214-211027	27/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
12	BH2215-211027	27/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13	QC100-211027	27/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14	BH2309-211028	28/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	BH2316-211028	28/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
16	BH2343-211028	28/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
17	BH2345-211028	28/10/21	W			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18	BH2248-211028	28/10/21	W	SP 6NP	11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	QC100-211028	28/10/21	W	4P 2NP	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
20	QC400-211028	28/10/21	W		6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21	BH2344-211028	28/10/21	W	SP 2NP	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
TOTAL																						

Please use purple glass vial with "use this" written on it (not)



Extra volume for lab QC's

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2131032**

Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 7
Order number	: 60553814_3100.V01-B2G Variatio	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BIANCA BURKE, KEEGAN McGUFFIE		

Dates

Date Samples Received	: 01-Nov-2021 12:35	Issue Date	: 02-Nov-2021
Client Requested Due Date	: 09-Nov-2021	Scheduled Reporting Date	: 09-Nov-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 19.8/18.7°C - Ice present
Receipt Detail	: MEDIUM HARD ESKY	No. of samples received / analysed	: 21 / 21

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised, Metals analysis has been removed from samples QC300 and QC400 as no filtered metals container was provided and a total metals container was instead. If you would like to discuss this please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- ***02/11/2021*: SRN has been resent to acknowledge the addition of total metals analysis to samples QC300 and QC400 as per email directive received from Emma Koeman. For any further information regarding these adjustments please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2131032-001	25-Oct-2021 00:00	BH2347_211025	✓	✓	✓	✓	✓	✓	✓
EB2131032-002	25-Oct-2021 00:00	BH2218_211025	✓	✓	✓	✓	✓	✓	✓
EB2131032-003	26-Oct-2021 00:00	BH2217_211026	✓	✓	✓	✓	✓	✓	✓
EB2131032-004	26-Oct-2021 00:00	BH2201_211026	✓	✓	✓	✓	✓	✓	✓
EB2131032-005	26-Oct-2021 00:00	BH2233_211026	✓	✓	✓	✓	✓	✓	✓
EB2131032-006	26-Oct-2021 00:00	BH2234_211026	✓	✓	✓	✓	✓	✓	✓
EB2131032-007	26-Oct-2021 00:00	BH2235_211026	✓	✓	✓	✓	✓	✓	✓
EB2131032-008	27-Oct-2021 00:00	BH2203_211027	✓	✓	✓	✓	✓	✓	✓
EB2131032-009	27-Oct-2021 00:00	BH2206_211027	✓	✓	✓	✓	✓	✓	✓
EB2131032-010	27-Oct-2021 00:00	BH2210_211027	✓	✓	✓	✓	✓	✓	✓
EB2131032-011	27-Oct-2021 00:00	BH2214_211027	✓	✓	✓	✓	✓	✓	✓
EB2131032-012	27-Oct-2021 00:00	BH2215_211027	✓	✓	✓	✓	✓	✓	✓
EB2131032-013	27-Oct-2021 00:00	QC100_211027	✓	✓	✓	✓	✓	✓	✓
EB2131032-015	28-Oct-2021 00:00	BH2216_211028	✓	✓	✓	✓	✓	✓	✓
EB2131032-016	28-Oct-2021 00:00	BH2343_211028	✓	✓	✓	✓	✓	✓	✓
EB2131032-017	28-Oct-2021 00:00	BH2345_211028	✓	✓	✓	✓	✓	✓	✓
EB2131032-018	28-Oct-2021 00:00	BH2248_211028	✓	✓	✓	✓	✓	✓	✓
EB2131032-019	28-Oct-2021 00:00	QC300_211028	✓	✓	✓	✓	✓	✓	✓
EB2131032-020	28-Oct-2021 00:00	QC400_211028	✓	✓	✓	✓	✓	✓	✓
EB2131032-021	28-Oct-2021 00:00	BH2344_211028	✓	✓	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - EP068 OC & OP Pesticides	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-07 SG TRH/BTEXN/PAH with SG clean up
EB2131032-001	25-Oct-2021 00:00	BH2347_211025	✓	✓	✓	✓	✓	✓	✓
EB2131032-002	25-Oct-2021 00:00	BH2218_211025	✓	✓	✓	✓	✓	✓	✓
EB2131032-003	26-Oct-2021 00:00	BH2217_211026	✓	✓	✓	✓	✓	✓	✓
EB2131032-004	26-Oct-2021 00:00	BH2201_211026	✓	✓	✓	✓	✓	✓	✓



			WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & OC & OP Pesticides	WATER - EP068 Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P + TRH/BTEXN/PAH with SG clean up
EB2131032-005	26-Oct-2021 00:00	BH2233_211026	✓	✓	✓	✓	✓
EB2131032-006	26-Oct-2021 00:00	BH2234_211026	✓	✓	✓	✓	✓
EB2131032-007	26-Oct-2021 00:00	BH2235_211026	✓	✓	✓	✓	✓
EB2131032-008	27-Oct-2021 00:00	BH2203_211027	✓	✓	✓	✓	✓
EB2131032-009	27-Oct-2021 00:00	BH2206_211027	✓	✓	✓	✓	✓
EB2131032-010	27-Oct-2021 00:00	BH2210_211027	✓	✓	✓	✓	✓
EB2131032-011	27-Oct-2021 00:00	BH2214_211027	✓	✓	✓	✓	✓
EB2131032-012	27-Oct-2021 00:00	BH2215_211027	✓	✓	✓	✓	✓
EB2131032-013	27-Oct-2021 00:00	QC100_211027	✓	✓	✓	✓	✓
EB2131032-014	28-Oct-2021 00:00	BH2309_211028			✓		✓
EB2131032-015	28-Oct-2021 00:00	BH2216_211028	✓	✓	✓	✓	✓
EB2131032-016	28-Oct-2021 00:00	BH2343_211028	✓	✓	✓	✓	✓
EB2131032-017	28-Oct-2021 00:00	BH2345_211028	✓	✓	✓	✓	✓
EB2131032-018	28-Oct-2021 00:00	BH2248_211028	✓	✓	✓	✓	✓
EB2131032-019	28-Oct-2021 00:00	QC300_211028	✓	✓	✓	✓	✓
EB2131032-020	28-Oct-2021 00:00	QC400_211028	✓	✓	✓	✓	✓
EB2131032-021	28-Oct-2021 00:00	BH2344_211028	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID Sampling date / time Sample ID

			WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)
EB2131032-001	25-Oct-2021 00:00	BH2347_211025	✓
EB2131032-002	25-Oct-2021 00:00	BH2218_211025	✓
EB2131032-003	26-Oct-2021 00:00	BH2217_211026	✓
EB2131032-004	26-Oct-2021 00:00	BH2201_211026	✓
EB2131032-005	26-Oct-2021 00:00	BH2233_211026	✓
EB2131032-006	26-Oct-2021 00:00	BH2234_211026	✓
EB2131032-007	26-Oct-2021 00:00	BH2235_211026	✓
EB2131032-008	27-Oct-2021 00:00	BH2203_211027	✓
EB2131032-009	27-Oct-2021 00:00	BH2206_211027	✓
EB2131032-010	27-Oct-2021 00:00	BH2210_211027	✓
EB2131032-011	27-Oct-2021 00:00	BH2214_211027	✓
EB2131032-012	27-Oct-2021 00:00	BH2215_211027	✓
EB2131032-013	27-Oct-2021 00:00	QC100_211027	✓



			WATER - EP066-PCB-WA Polychlorinated Biphenyls (PCB)
EB2131032-014	28-Oct-2021 00:00	BH2309_211028	✓
EB2131032-015	28-Oct-2021 00:00	BH2216_211028	✓
EB2131032-016	28-Oct-2021 00:00	BH2343_211028	✓
EB2131032-017	28-Oct-2021 00:00	BH2345_211028	✓
EB2131032-018	28-Oct-2021 00:00	BH2248_211028	✓
EB2131032-019	28-Oct-2021 00:00	QC300_211028	✓
EB2131032-020	28-Oct-2021 00:00	QC400_211028	✓
EB2131032-021	28-Oct-2021 00:00	BH2344_211028	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
BH2201_211026	Clear Plastic Bottle - Natural	----	26-Oct-2021	01-Nov-2021	✗	----	----	
BH2203_211027	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2206_211027	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2210_211027	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2214_211027	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2215_211027	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2216_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2217_211026	Clear Plastic Bottle - Natural	----	26-Oct-2021	01-Nov-2021	✗	----	----	
BH2218_211025	Clear Plastic Bottle - Natural	----	25-Oct-2021	01-Nov-2021	✗	----	----	
BH2233_211026	Clear Plastic Bottle - Natural	----	26-Oct-2021	01-Nov-2021	✗	----	----	
BH2234_211026	Clear Plastic Bottle - Natural	----	26-Oct-2021	01-Nov-2021	✗	----	----	
BH2235_211026	Clear Plastic Bottle - Natural	----	26-Oct-2021	01-Nov-2021	✗	----	----	
BH2248_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2343_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2344_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2345_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2347_211025	Clear Plastic Bottle - Natural	----	25-Oct-2021	01-Nov-2021	✗	----	----	
QC100_211027	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
QC300_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
QC400_211028	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
EK055G: Ammonia as N by Discrete analyser								
BH2201_211026	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2203_211027	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2206_211027	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2210_211027	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2214_211027	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2215_211027	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----	
BH2216_211028	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----	
BH2217_211026	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2218_211025	Clear Plastic Bottle - Natural	----	26-Oct-2021	01-Nov-2021	✗	----	----	
BH2233_211026	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	
BH2234_211026	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----	

[illegible]



BH2344_211028	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2345_211028	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2347_211025	Clear Plastic Bottle - Natural	26-Oct-2021	23-Nov-2021	01-Nov-2021	✗	----	----
QC100_211027	Clear Plastic Bottle - Natural	28-Oct-2021	25-Nov-2021	01-Nov-2021	✗	----	----
QC300_211028	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
QC400_211028	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
EK067G: Total Phosphorus as P By Discrete Analyser							
BH2201_211026	Clear Plastic Bottle - Natural	28-Oct-2021	25-Nov-2021	01-Nov-2021	✗	----	----
BH2203_211027	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2206_211027	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2210_211027	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2214_211027	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2215_211027	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
BH2216_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
BH2217_211026	Clear Plastic Bottle - Natural	28-Oct-2021	25-Nov-2021	01-Nov-2021	✗	----	----
BH2218_211025	Clear Plastic Bottle - Natural	27-Oct-2021	24-Nov-2021	01-Nov-2021	✗	----	----
BH2233_211026	Clear Plastic Bottle - Natural	28-Oct-2021	25-Nov-2021	01-Nov-2021	✗	----	----
BH2234_211026	Clear Plastic Bottle - Natural	28-Oct-2021	25-Nov-2021	01-Nov-2021	✗	----	----
BH2235_211026	Clear Plastic Bottle - Natural	28-Oct-2021	25-Nov-2021	01-Nov-2021	✗	----	----
BH2248_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
BH2343_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
BH2344_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
BH2345_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
BH2347_211025	Clear Plastic Bottle - Natural	27-Oct-2021	24-Nov-2021	01-Nov-2021	✗	----	----
QC100_211027	Clear Plastic Bottle - Natural	29-Oct-2021	26-Nov-2021	01-Nov-2021	✗	----	----
QC300_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
QC400_211028	Clear Plastic Bottle - Natural	30-Oct-2021	27-Nov-2021	01-Nov-2021	✗	----	----
EK071G: Reactive Phosphorus as P-By Discrete Analyser							
BH2201_211026	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----
BH2203_211027	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----
BH2206_211027	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----
BH2210_211027	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----
BH2214_211027	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----
BH2215_211027	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----
BH2216_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----
BH2217_211026	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----
BH2218_211025	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----
BH2233_211026	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----
BH2234_211026	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----
BH2235_211026	Clear Plastic Bottle - Natural	----	28-Oct-2021	01-Nov-2021	✗	----	----
BH2248_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----
BH2343_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----
BH2344_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----
BH2345_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----
BH2347_211025	Clear Plastic Bottle - Natural	----	27-Oct-2021	01-Nov-2021	✗	----	----
QC100_211027	Clear Plastic Bottle - Natural	----	29-Oct-2021	01-Nov-2021	✗	----	----
QC300_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----
QC400_211028	Clear Plastic Bottle - Natural	----	30-Oct-2021	01-Nov-2021	✗	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB2131032**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Variatio**
C-O-C number : **----**
Sampler : **BIANCA BURKE, KEEGAN McGUFFIE**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **21**
No. of samples analysed : **21**

Page : 1 of 33
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 01-Nov-2021 12:35
Date Analysis Commenced : 01-Nov-2021
Issue Date : 09-Nov-2021 16:38



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan	Senior Organic Chemist - PFAS	Brisbane Organics, Stafford, QLD
Timothy Creagh	2IC Organic Chemist	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EG020-F (Dissolved Metals by ICP-MS) were found to be higher than EG020-T (Total Metals by ICP-MS) for some samples. This was confirmed by re-digestion and re-analysis.
- EK061G (Total Kjeldahl Nitrogen as N): Some samples were diluted due to matrix interference. LOR adjusted accordingly.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EP071SG (SV TRH Silica Gel) & EP075(SIM) PAH: LOR values have been raised for sample 'BH2309_211028' due to limited sample volume submitted. The recommended sample volume for these tests is 100mL (1 x 100mL amber glass bottle).
- EG035T (Total Mercury): Positive mercury results have been confirmed by re-extraction and re-analysis.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the method.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2347_211025	BH2218_211025	BH2217_211026	BH2201_211026	BH2233_211026
Sampling date / time				25-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-001	EB2131032-002	EB2131032-003	EB2131032-004	EB2131032-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.35	8.24	8.32	8.47	8.07
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.44	4.95	5.66	10.9	1.47
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1080	1270	750	1090	987
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	795	759	500	715	740
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	449	248	89	76	335
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	16	<1	6	27	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	263	271	187	336	155
Total Alkalinity as CaCO3	----	1	mg/L	279	271	193	363	155
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	15	34	10	2
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	234	260	113	132	237
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	66	30	21	22	70
Magnesium	7439-95-4	1	mg/L	69	42	9	5	39
Sodium	7440-23-5	1	mg/L	70	179	123	217	62
Potassium	7440-09-7	1	mg/L	<1	8	3	4	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.003	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.094	0.145	0.096	0.157	0.161
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.002	0.008	<0.001	<0.001	0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	0.003	0.021	<0.001
Manganese	7439-96-5	0.001	mg/L	0.144	0.386	0.004	0.001	0.193
Nickel	7440-02-0	0.001	mg/L	0.005	0.020	0.005	<0.001	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_211025	BH2218_211025	BH2217_211026	BH2201_211026	BH2233_211026
Sampling date / time				25-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2131032-001	EB2131032-002	EB2131032-003	EB2131032-004	EB2131032-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.005	0.021	0.019	0.017	<0.005	
Iron	7439-89-6	0.05	mg/L	0.54	0.55	<0.05	<0.05	0.87	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.011	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.100	0.137	0.670	0.178	0.170	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.002	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0002	0.0003	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	0.009	0.077	<0.001	0.002	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.063	0.001	0.003	
Copper	7440-50-8	0.001	mg/L	0.008	0.009	0.218	0.028	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.126	0.192	1.62	0.002	0.201	
Nickel	7440-02-0	0.001	mg/L	0.007	0.023	0.083	<0.001	0.003	
Lead	7439-92-1	0.001	mg/L	0.001	<0.001	0.023	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.06	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.010	0.026	0.273	0.006	<0.005	
Iron	7439-89-6	0.05	mg/L	0.60	0.54	40.0	0.70	2.00	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.4	0.6	0.5	0.2	0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.04	0.05	<0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.06	0.65	1.56	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_211025	BH2218_211025	BH2217_211026	BH2201_211026	BH2233_211026
Sampling date / time					25-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-001	EB2131032-002	EB2131032-003	EB2131032-004	EB2131032-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.01	0.06	0.65	1.56	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.6	0.2	0.6	0.3	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.6	0.3	1.2	1.9	0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.07	0.20	0.62	0.05	0.06
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.05	0.12	0.45	0.04	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		12.3	13.1	7.75	11.2	9.82
ø Total Cations	----	0.01	meq/L		12.0	12.9	7.22	11.0	9.45
ø Ionic Balance	----	0.01	%		1.16	0.45	3.58	0.60	1.94
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2347_211025	BH2218_211025	BH2217_211026	BH2201_211026	BH2233_211026
Sampling date / time				25-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-001	EB2131032-002	EB2131032-003	EB2131032-004	EB2131032-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2347_211025	BH2218_211025	BH2217_211026	BH2201_211026	BH2233_211026
Sampling date / time				25-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-001	EB2131032-002	EB2131032-003	EB2131032-004	EB2131032-005
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_211025	BH2218_211025	BH2217_211026	BH2201_211026	BH2233_211026
Sampling date / time					25-Oct-2021 00:00	25-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00	26-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-001	EB2131032-002	EB2131032-003	EB2131032-004	EB2131032-005
				Result	Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%	69.2	84.3	73.1	86.0	82.7	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%	59.1	77.8	66.5	63.0	65.5	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%	55.6	77.5	68.5	68.0	65.7	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%	57.2	74.0	62.9	69.4	63.7	
Anthracene-d10	1719-06-8	1.0	%	67.1	87.3	74.6	82.7	76.8	
4-Terphenyl-d14	1718-51-0	1.0	%	74.9	97.3	82.7	93.5	88.0	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	96.5	99.4	99.5	94.2	95.8	
Toluene-D8	2037-26-5	2	%	97.1	93.8	95.8	94.1	97.0	
4-Bromofluorobenzene	460-00-4	2	%	108	108	111	108	109	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2234_211026	BH2235_211026	BH2203_211027	BH2206_211027	BH2210_211027
Sampling date / time					26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-006	EB2131032-007	EB2131032-008	EB2131032-009	EB2131032-010
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.36	8.26	7.66	7.29	8.49
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		2.99	1.97	1.04	6.63	56.6
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		557	748	957	540	10400
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		353	632	782	332	5560
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		132	267	471	41	270
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		13	<1	<1	<1	59
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		194	308	76	38	743
Total Alkalinity as CaCO3	----	1	mg/L		207	308	76	38	802
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1	1	428	9	128
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		58	72	10	150	2900
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		28	64	172	5	16
Magnesium	7439-95-4	1	mg/L		15	26	10	7	56
Sodium	7440-23-5	1	mg/L		79	74	52	98	2140
Potassium	7440-09-7	1	mg/L		1	3	5	5	13
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.001	0.002	0.003	0.002
Boron	7440-42-8	0.05	mg/L		0.06	<0.05	<0.05	<0.05	0.38
Barium	7440-39-3	0.001	mg/L		0.079	0.250	0.063	0.259	0.141
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	0.004	0.003	0.002	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	0.002	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.215	1.00	0.338	0.048	0.266
Nickel	7440-02-0	0.001	mg/L		<0.001	0.008	0.005	0.004	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2234_211026	BH2235_211026	BH2203_211027	BH2206_211027	BH2210_211027
Sampling date / time				26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2131032-006	EB2131032-007	EB2131032-008	EB2131032-009	EB2131032-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.010	0.007	0.009	<0.005	
Iron	7439-89-6	0.05	mg/L	1.34	1.14	9.75	4.92	0.20	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	0.003	0.003	0.003	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.35	
Barium	7440-39-3	0.001	mg/L	0.085	0.287	0.064	0.285	0.193	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.001	0.013	0.004	0.003	0.002	
Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.004	<0.001	0.004	
Copper	7440-50-8	0.001	mg/L	<0.001	0.007	<0.001	0.001	0.002	
Manganese	7439-96-5	0.001	mg/L	0.223	1.17	0.488	0.056	0.289	
Nickel	7440-02-0	0.001	mg/L	0.002	0.017	0.005	0.007	0.004	
Lead	7439-92-1	0.001	mg/L	0.002	0.003	<0.001	<0.001	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.015	<0.005	0.009	0.008	
Iron	7439-89-6	0.05	mg/L	2.05	2.00	14.5	6.18	2.53	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.3	0.2	<0.1	1.9	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.04	<0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2234_211026	BH2235_211026	BH2203_211027	BH2206_211027	BH2210_211027
Sampling date / time					26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-006	EB2131032-007	EB2131032-008	EB2131032-009	EB2131032-010
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.1	18.1	2.6	0.3	<0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.1	18.1	2.6	0.3	<0.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.18	0.25	0.03	0.02	0.27
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	0.17	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		5.79	8.20	10.7	5.18	100
ø Total Cations	----	0.01	meq/L		6.09	8.63	11.8	5.22	98.8
ø Ionic Balance	----	0.01	%		2.53	2.51	4.82	0.37	0.84
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2234_211026	BH2235_211026	BH2203_211027	BH2206_211027	BH2210_211027
Sampling date / time				26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-006	EB2131032-007	EB2131032-008	EB2131032-009	EB2131032-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	200	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	850	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	1050	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	580	<100	<100	<100



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2234_211026	BH2235_211026	BH2203_211027	BH2206_211027	BH2210_211027
Sampling date / time				26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-006	EB2131032-007	EB2131032-008	EB2131032-009	EB2131032-010
Result				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	480	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	1060	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	580	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2234_211026	BH2235_211026	BH2203_211027	BH2206_211027	BH2210_211027
Sampling date / time					26-Oct-2021 00:00	26-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-006	EB2131032-007	EB2131032-008	EB2131032-009	EB2131032-010
				Result	Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%	89.3	78.3	91.3	82.5	84.1	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%	68.6	72.1	78.5	66.0	73.2	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%	68.8	65.4	77.4	68.8	69.3	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%	70.3	63.7	74.4	68.3	69.6	
Anthracene-d10	1719-06-8	1.0	%	83.7	75.0	86.6	76.6	82.4	
4-Terphenyl-d14	1718-51-0	1.0	%	94.8	78.4	99.8	84.7	90.0	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	113	97.0	110	102	95.2	
Toluene-D8	2037-26-5	2	%	96.4	95.8	92.7	96.9	95.1	
4-Bromofluorobenzene	460-00-4	2	%	110	108	107	113	112	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2214_211027	BH2215_211027	QC100_211027	BH2309_211028	BH2216_211028
Sampling date / time					27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-011	EB2131032-012	EB2131032-013	EB2131032-014	EB2131032-015
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.09	7.96	7.99	----	8.21
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		35.2	32.3	32.5	----	15.6
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		13600	17000	17000	----	5380
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		7520	10000	9760	----	2960
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		953	1560	1570	----	631
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		637	291	293	----	650
Total Alkalinity as CaCO3	----	1	mg/L		637	291	293	----	650
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		142	296	295	----	107
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		4170	5540	5450	----	1340
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		116	155	156	----	129
Magnesium	7439-95-4	1	mg/L		161	286	286	----	75
Sodium	7440-23-5	1	mg/L		2500	2940	2960	----	900
Potassium	7440-09-7	1	mg/L		11	17	17	----	8
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.007	0.002	0.002	----	0.002
Boron	7440-42-8	0.05	mg/L		0.09	0.09	0.06	----	0.24
Barium	7440-39-3	0.001	mg/L		0.685	0.177	0.222	----	0.089
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.001	0.019	0.019	----	0.002
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Manganese	7439-96-5	0.001	mg/L		4.23	1.28	1.28	----	0.425
Nickel	7440-02-0	0.001	mg/L		0.001	0.006	0.006	----	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2214_211027	BH2215_211027	QC100_211027	BH2309_211028	BH2216_211028
Sampling date / time				27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2131032-011	EB2131032-012	EB2131032-013	EB2131032-014	EB2131032-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.007	----	0.005	
Iron	7439-89-6	0.05	mg/L	2.94	4.30	4.46	----	0.58	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.010	0.002	0.002	----	0.002	
Boron	7440-42-8	0.05	mg/L	0.06	0.07	0.07	----	0.28	
Barium	7440-39-3	0.001	mg/L	0.735	0.143	0.143	----	0.097	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	----	0.0002	
Cobalt	7440-48-4	0.001	mg/L	0.010	0.020	0.020	----	0.003	
Chromium	7440-47-3	0.001	mg/L	0.033	0.004	0.005	----	0.006	
Copper	7440-50-8	0.001	mg/L	0.013	0.002	0.006	----	0.008	
Manganese	7439-96-5	0.001	mg/L	4.42	1.10	1.10	----	0.457	
Nickel	7440-02-0	0.001	mg/L	0.016	0.009	0.009	----	0.004	
Lead	7439-92-1	0.001	mg/L	0.006	<0.001	<0.001	----	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.04	<0.01	<0.01	----	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.045	0.006	0.007	----	0.016	
Iron	7439-89-6	0.05	mg/L	22.7	6.35	6.65	----	2.29	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.3	0.1	0.1	----	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	2.87	<0.01	0.02	----	0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.04	<0.01	<0.01	----	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2214_211027	BH2215_211027	QC100_211027	BH2309_211028	BH2216_211028
Sampling date / time					27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-011	EB2131032-012	EB2131032-013	EB2131032-014	EB2131032-015
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.04	<0.01	<0.01	----	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		8.5	<0.5	<0.5	----	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		8.5	<0.5	<0.5	----	0.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		1.15	0.25	0.24	----	0.07
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	----	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		133	168	166	----	53.0
ø Total Cations	----	0.01	meq/L		128	160	160	----	52.0
ø Ionic Balance	----	0.01	%		2.01	2.64	1.60	----	1.00
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2214_211027	BH2215_211027	QC100_211027	BH2309_211028	BH2216_211028
Sampling date / time				27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-011	EB2131032-012	EB2131032-013	EB2131032-014	EB2131032-015
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	150	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	730	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<70	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	880	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	440	<100



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2214_211027	BH2215_211027	QC100_211027	BH2309_211028	BH2216_211028
Sampling date / time				27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-011	EB2131032-012	EB2131032-013	EB2131032-014	EB2131032-015
Result				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	480	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	920	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	440	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.6	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.2	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.6	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.6	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2214_211027	BH2215_211027	QC100_211027	BH2309_211028	BH2216_211028
Sampling date / time					27-Oct-2021 00:00	27-Oct-2021 00:00	27-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-011	EB2131032-012	EB2131032-013	EB2131032-014	EB2131032-015
				Result	Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%	82.0	78.6	79.6	78.8	89.7	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%	70.5	69.8	68.6	69.5	80.9	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%	68.4	72.7	71.3	60.5	79.4	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%	65.7	65.1	70.2	65.5	89.9	
Anthracene-d10	1719-06-8	1.0	%	78.3	79.1	78.4	74.9	102	
4-Terphenyl-d14	1718-51-0	1.0	%	84.2	87.4	87.8	80.1	98.8	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	121	94.7	103	104	98.3	
Toluene-D8	2037-26-5	2	%	93.6	95.8	94.2	94.2	95.7	
4-Bromofluorobenzene	460-00-4	2	%	102	110	111	110	111	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_211028	BH2345_211028	BH2248_211028	QC300_211028	QC400_211028
Sampling date / time					28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-016	EB2131032-017	EB2131032-018	EB2131032-019	EB2131032-020
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.28	8.05	8.56	6.47	5.88
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		0.90	1.13	5.08	0.12	0.12
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		852	1710	728	<1	<1
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		617	1420	428	<10	<10
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		411	920	118	<1	<1
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	29	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		295	480	217	5	5
Total Alkalinity as CaCO3	----	1	mg/L		295	480	246	5	5
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		8	4	<1	<1	<1
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		128	367	93	<1	<1
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		69	169	21	<1	<1
Magnesium	7439-95-4	1	mg/L		58	121	16	<1	<1
Sodium	7440-23-5	1	mg/L		42	79	127	<1	<1
Potassium	7440-09-7	1	mg/L		2	5	1	<1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		0.016	0.020	0.133	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		0.050	0.153	0.036	----	----
Nickel	7440-02-0	0.001	mg/L		0.002	0.002	<0.001	----	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_211028	BH2345_211028	BH2248_211028	QC300_211028	QC400_211028
Sampling date / time				28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2131032-016	EB2131032-017	EB2131032-018	EB2131032-019	EB2131032-020	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Zinc	7440-66-6	0.005	mg/L	0.009	0.006	0.007	----	----	
Iron	7439-89-6	0.05	mg/L	0.06	0.17	0.08	----	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.05	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.018	0.027	0.162	<0.001	<0.001	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	0.0004	0.0002	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.001	0.003	0.001	<0.001	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.002	0.003	0.003	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.002	0.003	0.003	<0.001	<0.001	
Manganese	7439-96-5	0.001	mg/L	0.072	0.222	0.044	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.004	0.008	0.006	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.007	0.022	0.014	<0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	0.76	2.37	1.16	<0.05	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	0.2	0.2	<0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	<0.01	<0.01	<0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.34	0.81	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_211028	BH2345_211028	BH2248_211028	QC300_211028	QC400_211028
Sampling date / time					28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-016	EB2131032-017	EB2131032-018	EB2131032-019	EB2131032-020
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.34	0.82	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.1	0.2	0.2	<0.1	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	1.0	0.2	<0.1	<0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	0.14	0.05	<0.01	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		9.67	20.0	7.54	0.10	0.10
ø Total Cations	----	0.01	meq/L		10.1	22.0	7.91	<0.01	<0.01
ø Ionic Balance	----	0.01	%		2.14	4.60	2.43	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2343_211028	BH2345_211028	BH2248_211028	QC300_211028	QC400_211028
Sampling date / time				28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-016	EB2131032-017	EB2131032-018	EB2131032-019	EB2131032-020
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2343_211028	BH2345_211028	BH2248_211028	QC300_211028	QC400_211028
Sampling date / time				28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	EB2131032-016	EB2131032-017	EB2131032-018	EB2131032-019	EB2131032-020
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_211028	BH2345_211028	BH2248_211028	QC300_211028	QC400_211028
Sampling date / time					28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00	28-Oct-2021 00:00
Compound	CAS Number	LOR	Unit		EB2131032-016	EB2131032-017	EB2131032-018	EB2131032-019	EB2131032-020
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		91.1	87.6	73.3	57.0	69.7
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		84.6	79.9	67.4	57.3	69.5
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		79.9	73.6	66.9	60.1	65.0
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		90.6	87.0	76.1	75.0	79.0
Anthracene-d10	1719-06-8	1.0	%		99.1	93.7	83.0	79.0	84.6
4-Terphenyl-d14	1718-51-0	1.0	%		98.4	92.2	82.6	71.7	81.4
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		99.9	104	95.8	97.4	115
Toluene-D8	2037-26-5	2	%		96.5	95.8	96.4	96.3	95.6
4-Bromofluorobenzene	460-00-4	2	%		108	114	109	108	115



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH2344_211028	----	----	----	----
Sampling date / time				28-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2131032-021	-----	-----	-----	-----
Result				----	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.33	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.67	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1080	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	672	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	516	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	17	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	456	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	473	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	98	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	96	----	----	----	----
Magnesium	7439-95-4	1	mg/L	67	----	----	----	----
Sodium	7440-23-5	1	mg/L	87	----	----	----	----
Potassium	7440-09-7	1	mg/L	2	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.095	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	----	----	----	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2344_211028	---	----	---	----
Sampling date / time				28-Oct-2021 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	EB2131032-021	-----	-----	-----	-----	
				Result	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.005	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.22	----	----	----	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----	
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----	
Barium	7440-39-3	0.001	mg/L	0.072	----	----	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	0.013	----	----	----	----	
Chromium	7440-47-3	0.001	mg/L	0.015	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.015	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.422	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.057	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	0.003	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	0.01	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.054	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	15.5	----	----	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	----	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	----	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	----	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.03	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	BH2344_211028	----	----	----	----
Sampling date / time				28-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2131032-021	-----	-----	-----	-----
Result				----	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued								
Nitrite + Nitrate as N	----	0.01	mg/L	0.03	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	0.6	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.62	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	----	----	----	----
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	12.3	----	----	----	----
ø Total Cations	----	0.01	meq/L	14.1	----	----	----	----
ø Ionic Balance	----	0.01	%	6.88	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
^ Total Polychlorinated biphenyls	----	1	µg/L	<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

BH2344_211028

Sampling date / time								
28-Oct-2021 00:00				----	----	----	----	----
Compound	CAS Number	LOR	Unit					
EB2131032-021				-----	-----	-----	-----	-----
Result				----	----	----	----	----

EP068A: Organochlorine Pesticides (OC) - Continued

4,4'-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----

EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup

C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----

EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup

>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
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Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

BH2344_211028

Sampling date / time								
28-Oct-2021 00:00				----	----	----	----	----
Compound	CAS Number	LOR	Unit					
EB2131032-021				-----	-----	-----	-----	-----
Result				----	----	----	----	----

EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued

>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----

EP075(SIM)B: Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----

EP080/071: Total Petroleum Hydrocarbons

C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
------------------	------	----	------	-----	------	------	------	------

EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions

C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----

EP080: BTEXN

Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2344_211028	----	----	----	----
Sampling date / time					28-Oct-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2131032-021	-----	-----	-----	-----
					Result	----	----	----	----
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		79.4	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		72.2	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		67.6	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		81.0	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		87.8	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		86.1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		93.8	----	----	----	----
Toluene-D8	2037-26-5	2	%		97.6	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		108	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	37	138
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	45	139
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	45	139
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: EB2131032	Page	: 1 of 21
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 01-Nov-2021
Order number	: 60553814_3100.V01-B2G Variatio	Date Analysis Commenced	: 01-Nov-2021
C-O-C number	: ----	Issue Date	: 09-Nov-2021
Sampler	: BIANCA BURKE, KEEGAN McGUFFIE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 21		
No. of samples analysed	: 21		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan	Senior Organic Chemist - PFAS	Brisbane Organics, Stafford, QLD
Timothy Creagh	2IC Organic Chemist	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 3998550)									
EB2130746-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	9.21	9.21	0.0	0% - 20%
EB2130840-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.47	8.49	0.2	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 3998554)									
EB2131032-005	BH2233_211026	EA005-P: pH Value	----	0.01	pH Unit	8.07	8.13	0.7	0% - 20%
EB2131032-016	BH2343_211028	EA005-P: pH Value	----	0.01	pH Unit	8.28	8.29	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3998551)									
EB2130746-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6660	6630	0.5	0% - 20%
EB2130840-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2650	2630	0.8	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3998555)									
EB2131032-005	BH2233_211026	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	987	966	2.2	0% - 20%
EB2131032-016	BH2343_211028	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	852	857	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3989052)									
EB2130653-009	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2090	2080	0.0	0% - 20%
EB2130653-018	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	221	216	2.1	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3989053)									
EB2131032-004	BH2201_211026	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	715	710	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3992265)									
EB2130845-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	356	356	0.0	0% - 20%
EB2129591-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	5460	5880	7.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3992269)									
EB2131032-008	BH2203_211027	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	782	758	3.1	0% - 20%
EB2131032-018	BH2248_211028	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	428	439	2.5	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3998553)									
EB2130746-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	404	398	1.3	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	992	980	1.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1400	1380	1.2	0% - 20%
EB2130840-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	27	29	7.0	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	332	331	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	359	360	0.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3998556)									
EB2131032-005	BH2233_211026	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	155	154	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	155	154	0.0	0% - 20%
EB2131032-016	BH2343_211028	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	295	291	1.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	295	291	1.3	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3997451)									
EB2131032-001	BH2347_211025	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	6	0.0	No Limit
EB2131032-011	BH2214_211027	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	142	143	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3997452)									
EB2131032-001	BH2347_211025	ED045G: Chloride	16887-00-6	1	mg/L	234	236	0.9	0% - 20%
EB2131032-011	BH2214_211027	ED045G: Chloride	16887-00-6	1	mg/L	4170	4220	1.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3998287)									
EB2131032-010	BH2210_211027	ED093F: Calcium	7440-70-2	1	mg/L	16	17	8.9	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	56	58	2.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2140	2150	0.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	13	0.0	0% - 50%
EB2131032-001	BH2347_211025	ED093F: Calcium	7440-70-2	1	mg/L	66	66	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	69	71	2.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	70	72	3.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3998286)									
EB2131032-010	BH2210_211027	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.141	0.144	2.5	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3998286) - continued									
EB2131032-010	BH2210_211027	EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.266	0.281	5.4	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.38	0.37	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.20	0.24	15.7	No Limit
EB2131032-001	BH2347_211025	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.094	0.098	3.5	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.144	0.145	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.54	0.54	0.0	0% - 50%
EG020T: Total Metals by ICP-MS (QC Lot: 3995158)									
EB2129521-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0003	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.656	0.654	0.3	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.006	0.005	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	1.45	1.45	0.1	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.057	0.058	0.0	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.08	0.08	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.24	0.18	27.1	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3995158) - continued									
EB2129521-013	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.009	0.009	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.515	0.536	4.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.007	0.005	40.2	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.062	0.058	7.0	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.098	0.098	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.007	0.006	28.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.062	0.060	3.2	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.32	0.31	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.65	1.67	1.2	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 3995159)									
EB2131032-003	BH2217_211026	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0004	73.8	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.011	0.009	20.3	0% - 50%
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.670	0.624	7.1	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.063	0.066	4.0	0% - 20%
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.077	0.074	4.1	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.218	0.209	4.5	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.023	0.020	11.8	0% - 20%
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	1.62	1.59	1.7	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.083	0.074	11.1	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.273	0.258	5.5	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	0.06	0.05	21.4	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	40.0	41.1	2.6	0% - 20%
EB2131032-012	BH2215_211027	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.143	0.144	0.8	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.006	36.2	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.020	0.020	0.0	0% - 50%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	1.10	1.08	1.6	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3995159) - continued									
EB2131032-012	BH2215_211027	EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.009	0.009	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.007	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.07	0.06	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	6.35	6.57	3.4	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 3998288)									
EB2131032-011	BH2214_211027	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2131032-001	BH2347_211025	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3995155)									
EB2129521-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2129521-015	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3995156)									
EB2131032-003	BH2217_211026	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2131032-013	QC100_211027	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 3998552)									
EB2130746-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	2.8	2.7	0.0	0% - 20%
EB2130840-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.7	1.8	0.0	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 3998557)									
EB2131032-005	BH2233_211026	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EB2131032-016	BH2343_211028	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3997368)									
EB2131032-001	BH2347_211025	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.09	0.0	No Limit
EB2131032-011	BH2214_211027	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.87	2.84	0.9	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 3997449)									
EB2131032-001	BH2347_211025	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2131032-011	BH2214_211027	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3997369)									
EB2131032-001	BH2347_211025	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
EB2131032-011	BH2214_211027	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.02	66.9	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3995167)									
EB2131032-001	BH2347_211025	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.0	No Limit
EB2131032-011	BH2214_211027	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	8.5	8.4	1.6	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3995166)									
EB2131032-001	BH2347_211025	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.09	17.0	No Limit
EB2131032-011	BH2214_211027	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.15	1.15	0.0	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3997450)									
EB2131032-001	BH2347_211025	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.05	0.06	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 3997450) - continued									
EB2131032-011	BH2214_211027	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3995149)									
EB2131032-018	BH2248_211028	EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3995150)									
EB2131032-018	BH2248_211028	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4`-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4`-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4`-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3995150)									
EB2131032-018	BH2248_211028	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3995150) - continued									
EB2131032-018	BH2248_211028	EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 3995151)									
EB2131032-018	BH2248_211028	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 3995151)									
EB2131032-018	BH2248_211028	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3988480)									
EB2130472-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<50.0	<50.0	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<50.0	<50.0	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<100	<100	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<100	<100	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<100	<100	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3995148)									
EB2131032-018	BH2248_211028	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3995148) - continued									
EB2131032-018	BH2248_211028	EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
	EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit	
	EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3996468)									
EB2131032-001	BH2347_211025	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2131032-011	BH2214_211027	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3996471)									
EB2130826-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2130826-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3996468)									
EB2131032-001	BH2347_211025	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2131032-011	BH2214_211027	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3996471)									
EB2130826-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2130826-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 3996468)									
EB2131032-001	BH2347_211025	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2131032-011	BH2214_211027	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit	

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 Work Order : EB2131032
 Client : AECOM AUSTRALIA PTY LTD
 Project : INLAND RAIL



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 3996471)									
EB2130826-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2130826-011	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 3998550)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102
				----	7 pH Unit	100	98.0	102
EA005P: pH by PC Titrator (QCLot: 3998554)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 3998551)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	102	91.0	107
				<1	24800 µS/cm	101	91.0	107
EA010P: Conductivity by PC Titrator (QCLot: 3998555)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	96.5	91.0	107
				<1	12890 µS/cm	101	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3989052)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	99.8	88.0	112
				<10	293 mg/L	100	88.0	112
				<10	2000 mg/L	99.9	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3989053)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	99.7	88.0	112
				<10	293 mg/L	105	88.0	112
				<10	2000 mg/L	100	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3992265)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	99.1	88.0	112
				<10	293 mg/L	108	88.0	112
				<10	2000 mg/L	100	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3992269)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	98.9	88.0	112
				<10	293 mg/L	107	88.0	112
				<10	2000 mg/L	98.4	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 3998553)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	104	80.0	120
ED037P: Alkalinity by PC Titrator (QCLot: 3998556)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.6	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3997451)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.6	85.0	118
				<1	100 mg/L	91.2	85.0	118



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
ED045G: Chloride by Discrete Analyser (QCLot: 3997452)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.3	90.0	115
				<1	1000 mg/L	103	90.0	115
ED093F: Dissolved Major Cations (QCLot: 3998287)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	110	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.0	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.8	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.9	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3998286)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.2	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	103	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.3	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	107	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	108	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 3995158)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	102	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	101	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.5	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	99.3	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.9	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.5	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.8	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.2	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	101	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	102	82.0	128



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3995158) - continued								
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	82.0	118
EG020T: Total Metals by ICP-MS (QCLot: 3995159)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.9	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.2	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.8	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.9	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.9	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.3	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.6	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	101	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.2	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 3998288)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3995155)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	105	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3995156)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 3998552)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	106	80.0	117
EK040P: Fluoride by PC Titrator (QCLot: 3998557)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	101	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3997368)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	105	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 3997449)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.7	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3997369)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	90.8	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3995167)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.6	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3995166)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	104	79.2	105



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 3997450)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	106	81.7	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3988484)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	82.2	55.0	131
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3995149)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	98.2	55.0	131
EP068A: Organochlorine Pesticides (OC) (QCLot: 3988483)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	88.0	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	82.8	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	97.7	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	92.0	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	84.1	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	83.0	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	80.3	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	86.0	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	84.6	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	89.5	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	84.6	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	81.9	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	78.4	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	80.3	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	75.8	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	74.8	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	74.0	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	81.0	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	71.3	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	86.1	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	79.4	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	µg/L	<0.5	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 3995150)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	85.7	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	78.4	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	80.6	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	87.2	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	79.2	58.6	120



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EP068A: Organochlorine Pesticides (OC) (QCLot: 3995150) - continued								
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	75.2	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	68.2	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	75.5	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	71.7	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	71.0	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	73.1	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	77.1	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	67.4	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	79.6	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	75.7	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	66.4	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	73.9	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	78.0	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	61.8	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	81.7	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	72.8	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3988483)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	73.3	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	75.7	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	# 4.6	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	70.2	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	91.3	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	86.4	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	72.4	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	76.7	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	78.7	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	77.4	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	72.3	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	81.4	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	64.8	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	77.7	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	68.9	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	76.6	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	69.0	39.1	129



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3988483) - continued								
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	70.3	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	85.0	27.5	146
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3995150)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	77.0	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	71.2	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	# 4.3	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	65.6	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	81.9	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	78.3	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	71.4	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	79.2	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	78.2	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	71.2	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	76.3	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	78.0	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	70.1	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	68.6	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	73.0	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	66.3	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	58.3	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	61.8	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	76.7	27.5	146
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 3988482)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	85.3	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	92.2	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 3995151)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	83.8	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	72.3	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 3988482)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	88.2	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	93.0	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 3995151)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	77.4	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	74.4	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3997452)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 3997452) - continued							
EB2131032-002	BH2218_211025	ED045G: Chloride	16887-00-6	400 mg/L	103	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3998286)							
EB2131032-002	BH2218_211025	EG020A-F: Arsenic	7440-38-2	1 mg/L	98.4	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	92.5	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	96.6	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.9	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	87.3	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	88.8	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	89.2	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	91.8	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	98.3	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.9	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	92.4	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	101	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3995158)							
EB2129521-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	102	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	97.5	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	100	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	95.7	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	96.1	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	95.0	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	94.3	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	92.5	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	97.5	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	93.0	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	100	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	96.3	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 3995159)							
EB2131032-004	BH2201_211026	EG020A-T: Arsenic	7440-38-2	1 mg/L	97.9	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	100	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	101	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.3	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.9	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	96.3	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	99.4	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	95.5	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	99.2	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.1	70.0	130

Matrix Spike (MS) Report

<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Acceptable Limits (%)</i>	
<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3995150) - continued							
EB2131032-018	BH2248_211028	EP068: Diazinon	333-41-5	10 µg/L	109	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	90.8	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	76.2	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	77.8	47.3	127
		EP068: Prothiofos	34643-46-4	10 µg/L	74.2	45.5	128
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 3995151)							
EB2131032-018	BH2248_211028	EP071SG: C10 - C14 Fraction	----	1070 µg/L	81.2	32.0	124
		EP071SG: C15 - C28 Fraction	----	1770 µg/L	78.3	33.0	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 3995151)							
EB2131032-018	BH2248_211028	EP071SG: >C10 - C16 Fraction	----	1560 µg/L	78.6	34.0	121
		EP071SG: >C16 - C34 Fraction	----	1190 µg/L	82.0	30.0	117
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3995148)							
EB2131032-018	BH2248_211028	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	86.0	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	111	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3996468)							
EB2131032-002	BH2218_211025	EP080: C6 - C9 Fraction	----	40 µg/L	99.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3996471)							
EB2130826-002	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	92.0	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3996468)							
EB2131032-002	BH2218_211025	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	108	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3996471)							
EB2130826-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	102	70.0	130
EP080: BTEXN (QCLot: 3996468)							
EB2131032-002	BH2218_211025	EP080: Benzene	71-43-2	10 µg/L	95.7	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	92.4	70.0	130
EP080: BTEXN (QCLot: 3996471)							
EB2130826-002	Anonymous	EP080: Benzene	71-43-2	10 µg/L	89.7	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	95.0	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2131032	Page	: 1 of 25
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 01-Nov-2021
Site	: ----	Issue Date	: 09-Nov-2021
Sampler	: BIANCA BURKE, KEEGAN MCGUFFIE	No. of samples received	: 21
Order number	: 60553814_3100.V01-B2G Variatio	No. of samples analysed	: 21

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Matrix Spike outliers occur.**
- Laboratory Control outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP068B: Organophosphorus Pesticides (OP)	QC-3988483-002	----	Monocrotophos	6923-22-4	4.6 %	5.00-32.6%	Recovery less than lower control limit
EP068B: Organophosphorus Pesticides (OP)	QC-3995150-002	----	Monocrotophos	6923-22-4	4.3 %	5.00-32.6%	Recovery less than lower control limit

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH2347_211025,	BH2218_211025	----	----	----	06-Nov-2021	25-Oct-2021	12
Clear Plastic Bottle - Natural							
BH2217_211026,	BH2201_211026,	----	----	----	06-Nov-2021	26-Oct-2021	11
BH2233_211026,	BH2234_211026,						
BH2235_211026							
Clear Plastic Bottle - Natural							
BH2203_211027,	BH2206_211027,	----	----	----	06-Nov-2021	27-Oct-2021	10
BH2210_211027,	BH2214_211027,						
BH2215_211027,	QC100_211027						
Clear Plastic Bottle - Natural							
BH2216_211028,	BH2343_211028,	----	----	----	06-Nov-2021	28-Oct-2021	9
BH2345_211028,	BH2248_211028,						
QC300_211028,	QC400_211028,						
BH2344_211028							
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural							
BH2347_211025,	BH2218_211025	----	----	----	03-Nov-2021	01-Nov-2021	2
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Natural							
QC300_211028,	QC400_211028	----	----	----	05-Nov-2021	04-Nov-2021	1
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
QC300_211028,	QC400_211028	----	----	----	05-Nov-2021	04-Nov-2021	1
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural							
BH2347_211025,	BH2218_211025	----	----	----	08-Nov-2021	26-Oct-2021	13
Clear Plastic Bottle - Natural							
BH2217_211026,	BH2201_211026,	----	----	----	08-Nov-2021	27-Oct-2021	12
BH2233_211026,	BH2234_211026,						
BH2235_211026							



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK055G: Ammonia as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	----	----	----	08-Nov-2021	28-Oct-2021	11
Clear Plastic Bottle - Natural BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2343_211028, BH2248_211028, QC400_211028	----	----	----	08-Nov-2021	29-Oct-2021	10
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural BH2347_211025, BH2218_211025	----	----	----	08-Nov-2021	27-Oct-2021	12
Clear Plastic Bottle - Natural BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026	----	----	----	08-Nov-2021	28-Oct-2021	11
Clear Plastic Bottle - Natural BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	----	----	----	08-Nov-2021	29-Oct-2021	10
Clear Plastic Bottle - Natural BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2343_211028, BH2248_211028, QC400_211028	----	----	----	08-Nov-2021	30-Oct-2021	9
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser						
Clear Plastic Bottle - Natural BH2347_211025, BH2218_211025	----	----	----	08-Nov-2021	27-Oct-2021	12
Clear Plastic Bottle - Natural BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026	----	----	----	08-Nov-2021	28-Oct-2021	11
Clear Plastic Bottle - Natural BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	----	----	----	08-Nov-2021	29-Oct-2021	10
Clear Plastic Bottle - Natural BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2343_211028, BH2248_211028, QC400_211028	----	----	----	08-Nov-2021	30-Oct-2021	9



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser						
Clear Plastic Bottle - Natural BH2347_211025, BH2218_211025	04-Nov-2021	26-Oct-2021	9	----	----	----
Clear Plastic Bottle - Natural BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026,	04-Nov-2021	27-Oct-2021	8	----	----	----
Clear Plastic Bottle - Natural BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	04-Nov-2021	28-Oct-2021	7	----	----	----
Clear Plastic Bottle - Natural BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2343_211028, BH2248_211028, QC400_211028,	04-Nov-2021	29-Oct-2021	6	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser						
Clear Plastic Bottle - Natural BH2347_211025, BH2218_211025	04-Nov-2021	27-Oct-2021	8	----	----	----
Clear Plastic Bottle - Natural BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026,	04-Nov-2021	28-Oct-2021	7	----	----	----
Clear Plastic Bottle - Natural BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	04-Nov-2021	29-Oct-2021	6	----	----	----
Clear Plastic Bottle - Natural BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2343_211028, BH2248_211028, QC400_211028,	04-Nov-2021	30-Oct-2021	5	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural BH2347_211025, BH2218_211025	----	----	----	08-Nov-2021	27-Oct-2021	12
Clear Plastic Bottle - Natural BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026,	----	----	----	08-Nov-2021	28-Oct-2021	11



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK071G: Reactive Phosphorus as P by discrete analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	----	----	----	08-Nov-2021	29-Oct-2021	10
Clear Plastic Bottle - Natural BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2343_211028, BH2248_211028, QC400_211028	----	----	----	08-Nov-2021	30-Oct-2021	9

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	2	23	8.70	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	1	22	4.55	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	1	22	4.55	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	1	27	3.70	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	1	23	4.35	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	1	22	4.55	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	1	22	4.55	5.00	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	1	27	3.70	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	06-Nov-2021	25-Oct-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	06-Nov-2021	26-Oct-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	06-Nov-2021	27-Oct-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	06-Nov-2021	28-Oct-2021	✖
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	06-Nov-2021	22-Nov-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	06-Nov-2021	23-Nov-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	06-Nov-2021	24-Nov-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	06-Nov-2021	25-Nov-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	03-Nov-2021	01-Nov-2021	✖
Clear Plastic Bottle - Natural (EA015H) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	02-Nov-2021	02-Nov-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	03-Nov-2021	03-Nov-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	03-Nov-2021	04-Nov-2021	✔
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC300_211028,	QC400_211028	28-Oct-2021	----	----	----	05-Nov-2021	04-Nov-2021	✖
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	05-Nov-2021	22-Nov-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	05-Nov-2021	23-Nov-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	05-Nov-2021	24-Nov-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_211028, BH2345_211028, BH2344_211028	BH2343_211028, BH2248_211028,	28-Oct-2021	----	----	----	05-Nov-2021	25-Nov-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	06-Nov-2021	08-Nov-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	06-Nov-2021	09-Nov-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	06-Nov-2021	10-Nov-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	06-Nov-2021	11-Nov-2021	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	08-Nov-2021	22-Nov-2021	✔
Clear Plastic Bottle - Natural (ED041G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	08-Nov-2021	23-Nov-2021	✔
Clear Plastic Bottle - Natural (ED041G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	08-Nov-2021	24-Nov-2021	✔
Clear Plastic Bottle - Natural (ED041G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	08-Nov-2021	25-Nov-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	08-Nov-2021	22-Nov-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	08-Nov-2021	23-Nov-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	08-Nov-2021	24-Nov-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	08-Nov-2021	25-Nov-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC300_211028,	QC400_211028	28-Oct-2021	----	----	----	05-Nov-2021	04-Nov-2021	✗
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	05-Nov-2021	22-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	05-Nov-2021	23-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	05-Nov-2021	24-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2216_211028, BH2345_211028, BH2344_211028	BH2343_211028, BH2248_211028,	28-Oct-2021	----	----	----	05-Nov-2021	25-Nov-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2347_211025, BH2218_211025	25-Oct-2021	----	----	----	05-Nov-2021	23-Apr-2022	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	05-Nov-2021	24-Apr-2022	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	05-Nov-2021	25-Apr-2022	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2216_211028, BH2345_211028, BH2344_211028, BH2248_211028,	28-Oct-2021	----	----	----	05-Nov-2021	26-Apr-2022	✓	
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2347_211025, BH2218_211025	25-Oct-2021	05-Nov-2021	23-Apr-2022	✓	05-Nov-2021	23-Apr-2022	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2217_211026, BH2233_211026, BH2235_211026, BH2201_211026, BH2234_211026,	26-Oct-2021	05-Nov-2021	24-Apr-2022	✓	05-Nov-2021	24-Apr-2022	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2203_211027, BH2210_211027, BH2215_211027, BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	05-Nov-2021	25-Apr-2022	✓	05-Nov-2021	25-Apr-2022	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028, BH2248_211028, QC400_211028,	28-Oct-2021	05-Nov-2021	26-Apr-2022	✓	05-Nov-2021	26-Apr-2022	✓	



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	05-Nov-2021	22-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	05-Nov-2021	23-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	05-Nov-2021	24-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2216_211028, BH2345_211028, BH2344_211028	BH2343_211028, BH2248_211028,	28-Oct-2021	----	----	----	05-Nov-2021	25-Nov-2021	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	05-Nov-2021	22-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	05-Nov-2021	23-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	05-Nov-2021	24-Nov-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	05-Nov-2021	25-Nov-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	06-Nov-2021	22-Nov-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	06-Nov-2021	23-Nov-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	06-Nov-2021	24-Nov-2021	✔
Clear Plastic Bottle - Natural (EK040P) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	06-Nov-2021	25-Nov-2021	✔
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK055G) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	08-Nov-2021	26-Oct-2021	✖
Clear Plastic Bottle - Natural (EK055G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	08-Nov-2021	27-Oct-2021	✖
Clear Plastic Bottle - Natural (EK055G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	08-Nov-2021	28-Oct-2021	✖
Clear Plastic Bottle - Natural (EK055G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	08-Nov-2021	29-Oct-2021	✖



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	08-Nov-2021	27-Oct-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	08-Nov-2021	28-Oct-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	08-Nov-2021	29-Oct-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	08-Nov-2021	30-Oct-2021	✖
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Natural (EK059G) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	08-Nov-2021	27-Oct-2021	✖
Clear Plastic Bottle - Natural (EK059G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	08-Nov-2021	28-Oct-2021	✖
Clear Plastic Bottle - Natural (EK059G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	08-Nov-2021	29-Oct-2021	✖
Clear Plastic Bottle - Natural (EK059G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	08-Nov-2021	30-Oct-2021	✖



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Natural (EK061G) BH2347_211025,	BH2218_211025	25-Oct-2021	04-Nov-2021	26-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
Clear Plastic Bottle - Natural (EK061G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	04-Nov-2021	27-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
Clear Plastic Bottle - Natural (EK061G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	04-Nov-2021	28-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
Clear Plastic Bottle - Natural (EK061G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	04-Nov-2021	29-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Natural (EK067G) BH2347_211025,	BH2218_211025	25-Oct-2021	04-Nov-2021	27-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
Clear Plastic Bottle - Natural (EK067G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	04-Nov-2021	28-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
Clear Plastic Bottle - Natural (EK067G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	04-Nov-2021	29-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔
Clear Plastic Bottle - Natural (EK067G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	04-Nov-2021	30-Oct-2021	✖	04-Nov-2021	02-Dec-2021	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2347_211025,	BH2218_211025	25-Oct-2021	----	----	----	08-Nov-2021	27-Oct-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	----	----	----	08-Nov-2021	28-Oct-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	----	----	----	08-Nov-2021	29-Oct-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	----	----	----	08-Nov-2021	30-Oct-2021	✖
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) BH2347_211025,	BH2218_211025	25-Oct-2021	01-Nov-2021	01-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP066) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	01-Nov-2021	02-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP066) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	01-Nov-2021	03-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP066) BH2309_211028		28-Oct-2021	01-Nov-2021	04-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP066) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	04-Nov-2021	04-Nov-2021	✓	04-Nov-2021	14-Dec-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) BH2347_211025,	BH2218_211025	25-Oct-2021	01-Nov-2021	01-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	01-Nov-2021	02-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	01-Nov-2021	03-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2309_211028		28-Oct-2021	01-Nov-2021	04-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	04-Nov-2021	04-Nov-2021	✓	04-Nov-2021	14-Dec-2021	✓
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) BH2347_211025,	BH2218_211025	25-Oct-2021	01-Nov-2021	01-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	01-Nov-2021	02-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	01-Nov-2021	03-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2309_211028		28-Oct-2021	01-Nov-2021	04-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP068) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	04-Nov-2021	04-Nov-2021	✓	04-Nov-2021	14-Dec-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2347_211025,	BH2218_211025	25-Oct-2021	01-Nov-2021	01-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2217_211026,	BH2201_211026,	26-Oct-2021	01-Nov-2021	02-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
BH2233_211026,	BH2234_211026,							
BH2235_211026								
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2203_211027,	BH2206_211027,	27-Oct-2021	01-Nov-2021	03-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
BH2210_211027,	BH2214_211027,							
BH2215_211027,	QC100_211027							
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2309_211028		28-Oct-2021	01-Nov-2021	04-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2216_211028,	BH2343_211028,	28-Oct-2021	04-Nov-2021	04-Nov-2021	✔	04-Nov-2021	14-Dec-2021	✔
BH2345_211028,	BH2248_211028,							
QC300_211028,	QC400_211028,							
BH2344_211028								
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2347_211025,	BH2218_211025	25-Oct-2021	01-Nov-2021	01-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2217_211026,	BH2201_211026,	26-Oct-2021	01-Nov-2021	02-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
BH2233_211026,	BH2234_211026,							
BH2235_211026								
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2203_211027,	BH2206_211027,	27-Oct-2021	01-Nov-2021	03-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
BH2210_211027,	BH2214_211027,							
BH2215_211027,	QC100_211027							
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2309_211028		28-Oct-2021	01-Nov-2021	04-Nov-2021	✔	03-Nov-2021	11-Dec-2021	✔
Amber Glass Bottle - Unpreserved (EP071SG)								
BH2216_211028,	BH2343_211028,	28-Oct-2021	04-Nov-2021	04-Nov-2021	✔	04-Nov-2021	14-Dec-2021	✔
BH2345_211028,	BH2248_211028,							
QC300_211028,	QC400_211028,							
BH2344_211028								



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2347_211025,	BH2218_211025	25-Oct-2021	01-Nov-2021	01-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	01-Nov-2021	02-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	01-Nov-2021	03-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2309_211028		28-Oct-2021	01-Nov-2021	04-Nov-2021	✓	03-Nov-2021	11-Dec-2021	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	BH2343_211028, BH2248_211028, QC400_211028,	28-Oct-2021	04-Nov-2021	04-Nov-2021	✓	04-Nov-2021	14-Dec-2021	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_211025,	BH2218_211025	25-Oct-2021	05-Nov-2021	08-Nov-2021	✓	05-Nov-2021	08-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	05-Nov-2021	09-Nov-2021	✓	05-Nov-2021	09-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	05-Nov-2021	10-Nov-2021	✓	05-Nov-2021	10-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_211028, BH2343_211028, BH2248_211028, QC400_211028,	BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	28-Oct-2021	05-Nov-2021	11-Nov-2021	✓	05-Nov-2021	11-Nov-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_211025,	BH2218_211025	25-Oct-2021	05-Nov-2021	08-Nov-2021	✓	05-Nov-2021	08-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	05-Nov-2021	09-Nov-2021	✓	05-Nov-2021	09-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	05-Nov-2021	10-Nov-2021	✓	05-Nov-2021	10-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_211028, BH2343_211028, BH2248_211028, QC400_211028,	BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	28-Oct-2021	05-Nov-2021	11-Nov-2021	✓	05-Nov-2021	11-Nov-2021	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) BH2347_211025,	BH2218_211025	25-Oct-2021	05-Nov-2021	08-Nov-2021	✓	05-Nov-2021	08-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211026, BH2233_211026, BH2235_211026	BH2201_211026, BH2234_211026,	26-Oct-2021	05-Nov-2021	09-Nov-2021	✓	05-Nov-2021	09-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2203_211027, BH2210_211027, BH2215_211027,	BH2206_211027, BH2214_211027, QC100_211027	27-Oct-2021	05-Nov-2021	10-Nov-2021	✓	05-Nov-2021	10-Nov-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_211028, BH2343_211028, BH2248_211028, QC400_211028,	BH2216_211028, BH2345_211028, QC300_211028, BH2344_211028	28-Oct-2021	05-Nov-2021	11-Nov-2021	✓	05-Nov-2021	11-Nov-2021	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	23	8.70	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	22	4.55	10.00	✗	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	22	4.55	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	7	57	12.28	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	27	3.70	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Pesticides by GCMS	EP068	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	12	57	21.05	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	57	7.02	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	23	4.35	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	22	4.55	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	22	4.55	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	0	20	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	27	3.70	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3).
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St, Stafford 4053. (Corner of Byth & Shand Streets). Phone: 07 3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date): 5 days TAT from samples reception		LABORATORY USE ONLY	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)			
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20			
ORDER NUMBER: 00553814_3100.V01-B2G Variation		COC SEQUENCE NUMBER (Circle) COC: 0 2 3 4 5 6 7 OF: 0 2 3 4 5 6 7			
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 269			
SAMPLER: B. Burke & C. Smith K.M. White		SAMPLER MOBILE: 0490 494 804		RECEIVED BY: <i>PH</i>	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default): <i>ESdat</i>		RELINQUISHED BY:	
Email Reports to: krystle.nichols@aecom.com		Email Reports to: <i>b.burke@aecom.com</i>		DATE/TIME: <i>01/12/2021 1333</i>	
Email Invoice to: krystle.nichols@aecom.com		Email Invoice to: <i>emma.loemana@aecom.com</i>		DATE/TIME:	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

ALS BASE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).														Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA006) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-03A) Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005F) pH/pCT	(EA010P) Electrical Conductivity (PCT)	TRIPAHs/BTEXN	Pesticides	PCBs	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINIS MC BRISBANE FOR ANALYSIS	
1	BH2217-211129	29/11/21	W	2N, 5P	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X		HT
2	BH2218-211129	29/11/21	W	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
3	BH2248-211130	30/11/21	"	"	"	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
4	QC100-211130	30/11/21	"	"	"	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
5	QC300-211201	1/12/21	"	2N, 4P	6	X	X	X	X	X	X	X	X		X	X	X	X	X		
6	QC400-211201	1/12/21	"	2N, 4P	6	X	X	X	X	X	X	X	X		X	X	X	X	X		
					</																

Environmental Division
Brisbane

Work Order Reference

Work Order Reference
EB2134825



Telephone - 61-7-3243 7222

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB2134825

Client : AECOM AUSTRALIA PTY LTD Contact : KRYSTLE NICHOLS Address : PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006 E-mail : krystle.nichols@aecom.com Telephone : +61 07 3553 2000 Facsimile : +61 07 3553 2050 Project : INLAND RAIL Order number : 60553814_3100.V01-B2G Variation C-O-C number : EB_OCR__20211201150100_011220 2 Site : ---- Sampler : , BIANCA BURKE, KEEGAN McGUFFIE	Laboratory : Environmental Division Brisbane Contact : Carsten Emrich Address : 2 Byth Street Stafford QLD Australia 4053 E-mail : carsten.emrich@alsglobal.com Telephone : +61 7 3552 8616 Facsimile : +61-7-3243 7218 Page : 1 of 3 Quote number : EB2020AECOMAU0008 (BN/219/20) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 01-Dec-2021 13:33	Issue Date : 01-Dec-2021
Client Requested Due Date : 08-Dec-2021	Scheduled Reporting Date : 08-Dec-2021

Delivery Details

Mode of Delivery : Client Drop Off	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 9.2°C - Ice present
Receipt Detail : Hard Esky	No. of samples received / analysed : 6 / 6

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised; as per previous submissions, total metals analysis has been assigned to samples "QC300_211201" and "QC400_211201", as only unfiltered metals containers were received. If this is incorrect, please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EK040-P Fluoride (PCT)	WATER - NT-02A Major Anions (Cl, SO ₄ , Fluoride, Alkalinity)	WATER - W-03 15 Metals (NEPM Suite)
EB2134825-001	29-Nov-2021 00:00	BH2217_211129	✓	✓	✓	✓	✓	✓	✓
EB2134825-002	29-Nov-2021 00:00	BH2218_211129	✓	✓	✓	✓	✓	✓	✓
EB2134825-003	30-Nov-2021 00:00	BH2248_211130	✓	✓	✓	✓	✓	✓	✓
EB2134825-004	30-Nov-2021 00:00	QC100_211130	✓	✓	✓	✓	✓	✓	✓
EB2134825-005	01-Dec-2021 00:00	QC300_211201	✓	✓	✓		✓	✓	
EB2134825-006	01-Dec-2021 00:00	QC400_211201	✓	✓	✓		✓	✓	

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED045G	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-08A Total Nitrogen + NO ₂ + NO ₃ + NH ₃ + Total P +	WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-07 TRH/BTEXN/PAH
EB2134825-001	29-Nov-2021 00:00	BH2217_211129	✓	✓	✓	✓	✓	✓	✓
EB2134825-002	29-Nov-2021 00:00	BH2218_211129	✓	✓	✓	✓	✓	✓	✓
EB2134825-003	30-Nov-2021 00:00	BH2248_211130	✓	✓	✓	✓	✓	✓	✓
EB2134825-004	30-Nov-2021 00:00	QC100_211130	✓	✓	✓	✓	✓	✓	✓
EB2134825-005	01-Dec-2021 00:00	QC300_211201	✓	✓	✓	✓	✓	✓	✓
EB2134825-006	01-Dec-2021 00:00	QC400_211201	✓	✓	✓	✓	✓	✓	✓

CERTIFICATE OF ANALYSIS

Work Order : **EB2134825**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Variation**
C-O-C number : **EB_OCR__20211201150100_0112202**
Sampler : **, BIANCA BURKE, KEEGAN McGUFFIE**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **6**
No. of samples analysed : **6**

Page : 1 of 15
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 01-Dec-2021 13:33
Date Analysis Commenced : 02-Dec-2021
Issue Date : 08-Dec-2021 16:16



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan	Senior Organic Chemist - PFAS	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK059G (Nitrite and Nitrate as N): Sample EB2134825_001 (BH2217_211129) was diluted due to matrix interference. LOR adjusted accordingly.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2217_211129	BH2218_211129	BH2248_211130	QC100_211130	QC300_211201
Sampling date / time					29-Nov-2021 00:00	29-Nov-2021 00:00	30-Nov-2021 00:00	30-Nov-2021 00:00	01-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2134825-001	EB2134825-002	EB2134825-003	EB2134825-004	EB2134825-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.83	7.78	8.27	8.29	5.65
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		5.58	4.88	5.10	5.22	0.12
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		771	1320	780	765	<1
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		545	732	467	449	<10
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		104	224	107	107	<1
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		193	292	298	292	1
Total Alkalinity as CaCO3	----	1	mg/L		193	292	298	292	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		34	41	<1	<1	<1
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		114	254	91	93	<1
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		27	27	18	18	<1
Magnesium	7439-95-4	1	mg/L		9	38	15	15	<1
Sodium	7440-23-5	1	mg/L		131	168	121	124	<1
Potassium	7440-09-7	1	mg/L		3	6	1	1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.003	0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	0.05	----
Barium	7440-39-3	0.001	mg/L		0.142	0.099	0.118	0.119	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	0.006	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	0.004	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		0.091	0.048	0.035	0.034	----
Nickel	7440-02-0	0.001	mg/L		0.003	0.016	<0.001	<0.001	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2217_211129	BH2218_211129	BH2248_211130	QC100_211130	QC300_211201
Sampling date / time				29-Nov-2021 00:00	29-Nov-2021 00:00	30-Nov-2021 00:00	30-Nov-2021 00:00	01-Dec-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2134825-001	EB2134825-002	EB2134825-003	EB2134825-004	EB2134825-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----	
Zinc	7440-66-6	0.005	mg/L	0.011	0.027	0.005	<0.005	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.06	0.06	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.011	0.002	<0.001	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.06	0.06	<0.05	
Barium	7440-39-3	0.001	mg/L	0.531	0.114	0.128	0.128	<0.001	
Beryllium	7440-41-7	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.090	0.010	<0.001	<0.001	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.061	0.002	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.252	0.014	<0.001	0.002	<0.001	
Manganese	7439-96-5	0.001	mg/L	1.36	0.080	0.038	0.038	<0.001	
Nickel	7440-02-0	0.001	mg/L	0.084	0.018	<0.001	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	0.022	0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.06	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.294	0.032	0.006	0.021	<0.005	
Iron	7439-89-6	0.05	mg/L	39.7	1.04	0.22	0.24	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	<0.1	<0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.04	0.10	0.10	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.05	0.15	<0.01	<0.01	0.04	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2217_211129	BH2218_211129	BH2248_211130	QC100_211130	QC300_211201
Sampling date / time					29-Nov-2021 00:00	29-Nov-2021 00:00	30-Nov-2021 00:00	30-Nov-2021 00:00	01-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2134825-001	EB2134825-002	EB2134825-003	EB2134825-004	EB2134825-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.05	0.15	<0.01	<0.01	0.04
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.8	0.2	0.2	0.2	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.8	0.4	0.2	0.2	<0.1
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.78	0.15	0.04	0.04	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.46	0.11	0.01	0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		7.78	13.8	8.52	8.46	0.02
ø Total Cations	----	0.01	meq/L		7.86	11.9	7.42	7.55	<0.01
ø Ionic Balance	----	0.01	%		0.53	7.43	6.90	5.66	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2217_211129	BH2218_211129	BH2248_211130	QC100_211130	QC300_211201
Sampling date / time				29-Nov-2021 00:00	29-Nov-2021 00:00	30-Nov-2021 00:00	30-Nov-2021 00:00	01-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2134825-001	EB2134825-002	EB2134825-003	EB2134825-004	EB2134825-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2217_211129	BH2218_211129	BH2248_211130	QC100_211130	QC300_211201
Sampling date / time				29-Nov-2021 00:00	29-Nov-2021 00:00	30-Nov-2021 00:00	30-Nov-2021 00:00	01-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2134825-001	EB2134825-002	EB2134825-003	EB2134825-004	EB2134825-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2217_211129	BH2218_211129	BH2248_211130	QC100_211130	QC300_211201
Sampling date / time					29-Nov-2021 00:00	29-Nov-2021 00:00	30-Nov-2021 00:00	30-Nov-2021 00:00	01-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2134825-001	EB2134825-002	EB2134825-003	EB2134825-004	EB2134825-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		70.7	81.6	83.4	93.9	76.3
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		61.8	73.9	73.8	81.5	81.7
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		70.5	80.6	81.8	91.6	80.9
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		25.1	30.3	26.1	31.8	29.5
2-Chlorophenol-D4	93951-73-6	1.0	%		64.1	72.8	62.8	76.3	76.3
2,4,6-Tribromophenol	118-79-6	1.0	%		69.5	76.3	66.6	74.1	75.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		58.4	62.5	58.7	74.1	67.9
Anthracene-d10	1719-06-8	1.0	%		73.0	78.4	80.2	90.9	79.8
4-Terphenyl-d14	1718-51-0	1.0	%		73.9	82.8	83.2	92.9	83.7
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		83.8	94.2	82.9	92.9	90.5
Toluene-D8	2037-26-5	2	%		95.4	98.9	101	101	103
4-Bromofluorobenzene	460-00-4	2	%		113	115	118	121	118



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	QC400_211201	----	----	----	----
Sampling date / time				01-Dec-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2134825-006	-----	-----	-----	-----
Result				----	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.60	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	0.12	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	<1	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	<10	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_211201	----	----	----	----
Sampling date / time					01-Dec-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2134825-006	-----	-----	-----	-----
Result						----	----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		0.02	----	----	----	----
ø Total Cations	----	0.01	meq/L		<0.01	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_211201	----	----	----	----
Sampling date / time					01-Dec-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2134825-006	-----	-----	-----	-----
Result						----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	----	----	----
4,4'-DDT	50-29-3	2.0	µg/L		<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	----	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				QC400_211201	----	----	----	----
Sampling date / time				01-Dec-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2134825-006	-----	-----	-----	-----
Result				----	----	----	----	----

EP068B: Organophosphorus Pesticides (OP) - Continued

Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----

EP075(SIM)B: Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----

EP080/071: Total Petroleum Hydrocarbons

C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----

EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_211201	----	----	----	----
Sampling date / time					01-Dec-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2134825-006	-----	-----	-----	-----
Result						----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		75.9	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		78.3	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		78.0	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		27.5	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		72.0	----	----	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%		71.7	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		63.4	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		76.7	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		81.3	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		99.7	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC400_211201	----	----	----	----
				Sampling date / time	01-Dec-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EB2134825-006	-----	-----	-----	-----
				Result		----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
Toluene-D8	2037-26-5	2	%		101	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		120	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	37	138
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	45	139
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	45	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2,4,6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: EB2134825	Page	: 1 of 14
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 01-Dec-2021
Order number	: 60553814_3100.V01-B2G Variation	Date Analysis Commenced	: 02-Dec-2021
C-O-C number	: EB_OCR__20211201150100_0112202	Issue Date	: 08-Dec-2021
Sampler	: , BIANCA BURKE, KEEGAN McGUFFIE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 6		
No. of samples analysed	: 6		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Thomas Donovan	Senior Organic Chemist - PFAS	Brisbane Organics, Stafford, QLD

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Laboratory Duplicate (DUP) Report

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4060389)									
EB2134730-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.64	7.63	0.1	0% - 20%
EB2134825-001	BH2217_211129	EA005-P: pH Value	----	0.01	pH Unit	7.83	7.83	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4060388)									
EB2134730-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6390	6560	2.6	0% - 20%
EB2134825-001	BH2217_211129	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	771	754	2.3	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4050144)									
EB2134825-001	BH2217_211129	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	545	535	1.9	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4052575)									
EB2134699-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	677	673	0.5	0% - 20%
EB2134832-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	23	24	4.3	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 4060391)									
EB2135115-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	25	22	11.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	25	22	11.8	0% - 20%
EB2134825-001	BH2217_211129	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	193	193	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	193	193	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4049906)									
EB2134844-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	165	163	1.5	0% - 20%
EB2134825-001	BH2217_211129	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	34	34	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4049908)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 4049908) - continued									
EB2134825-001	BH2217_211129	ED045G: Chloride	16887-00-6	1	mg/L	114	113	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4056176)									
EB2134739-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	6	6	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	11	11	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4056178)									
EB2134825-004	QC100_211130	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.119	0.118	1.4	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.034	0.035	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	0.06	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.0	No Limit
EB2134739-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.024	0.025	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.010	0.010	0.0	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.013	0.013	0.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.011	11.1	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.63	0.69	8.8	0% - 50%
EG020T: Total Metals by ICP-MS (QC Lot: 4056079)									
EB2134721-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4056079) - continued									
EB2134721-001	Anonymous	EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.022	0.023	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	1.58	1.61	1.9	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.017	0.018	0.0	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.046	0.046	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EB2134808-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.052	0.052	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.005	0.006	25.9	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.007	0.007	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.086	0.086	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.017	0.017	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	0.01	0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	6.34	6.33	0.2	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 4056177)									
EB2134832-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2134739-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4056081)									
EB2134825-001	BH2217_211129	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 4060390)									
EB2135115-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EB2134825-001	BH2217_211129	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4060693)									
EB2134770-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	11.2	11.2	0.3	0% - 20%
EB2134855-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4056816) - continued									
EB2134712-001	Anonymous	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4056817)									
EB2134712-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4054485)							
EB2134587-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4054485) - continued									
EB2134724-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4056814)									
EB2134712-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	240	170	33.5	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	100	70	28.6	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4054485)									
EB2134587-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2134724-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4056814)									
EB2134712-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	300	220	32.4	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080: BTEXN (QC Lot: 4054485)									
EB2134587-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2134724-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit	



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 4060389)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.0	102
				----	7 pH Unit	99.8	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 4060388)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	101	91.0	107
				<1	12890 µS/cm	97.0	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4050144)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	98.7	88.0	112
				<10	293 mg/L	104	88.0	112
				<10	2000 mg/L	98.8	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4052575)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	101	88.0	112
				<10	293 mg/L	109	88.0	112
				<10	2000 mg/L	96.8	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 4060391)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	110	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4049906)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.5	85.0	118
				<1	100 mg/L	94.2	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 4049908)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.2	90.0	115
				<1	1000 mg/L	102	90.0	115
ED093F: Dissolved Major Cations (QCLot: 4056176)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.6	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.5	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.0	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4056178)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.6	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.3	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.8	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.1	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.4	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.3	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.6	88.0	114

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 4056178) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.6	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.9	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.4	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.0	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.5	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.7	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.4	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.5	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 4056079)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.6	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.1	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.5	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.3	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.6	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.9	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.8	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.1	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.2	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.3	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.6	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.8	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.7	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	102	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4056177)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	88.2	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4056081)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.0	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 4060390)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	92.2	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4060693)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	95.8	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4049907)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	97.5	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4060692)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	93.8	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4053814)								



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4053814) - continued								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	78.5	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4053813)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	104	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4049905)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	98.7	81.7	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4056818)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	90.6	55.0	131
EP068A: Organochlorine Pesticides (OC) (QCLot: 4056816)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	83.5	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	79.7	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	84.7	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	84.3	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	84.3	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	83.4	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	83.4	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	84.7	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	84.8	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	89.3	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	85.1	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	86.7	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	84.2	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	88.5	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	81.0	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	78.2	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	78.9	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	83.8	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	79.3	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	87.6	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	92.1	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4056816)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	89.8	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	100	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	12.2	5.00	32.6



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4056816) - continued								
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	82.5	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	88.4	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	85.6	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	98.9	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	91.3	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	88.8	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	87.4	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	89.2	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	89.4	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	92.0	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	89.1	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	86.3	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	87.1	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	85.2	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	83.6	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	84.4	27.5	146
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4056817)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	87.8	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	102	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	90.9	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	96.1	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	87.6	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	98.4	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	105	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	102	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	114	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	91.3	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	118	55.0	132
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	91.1	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	105	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	94.9	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	92.6	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	90.3	53.0	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4054485)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	96.5	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4056814)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	81.5	51.9	126



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4056814) - continued								
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	84.0	51.4	124
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4054485)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	98.8	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTE	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4056814)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	82.9	53.2	125
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	86.6	49.5	123
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN (QCLot: 4054485)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.2	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	101	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	98.6	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	97.2	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	106	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	89.0	77.8	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4049906)							
EB2134825-002	BH2218_211129	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	85.9	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4049908)							
EB2134825-002	BH2218_211129	ED045G: Chloride	16887-00-6	400 mg/L	95.9	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4056178)							
EB2134739-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	90.0	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	89.8	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	91.0	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	92.6	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.0	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4056178) - continued							
EB2134739-002	Anonymous	EG020A-F: Cobalt	7440-48-4	1 mg/L	91.2	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	93.9	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	91.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	93.1	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.0	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	92.4	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	89.0	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4056079)							
EB2134804-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.2	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	99.3	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	99.3	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	97.9	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	100	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	102	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	102	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	101	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	100	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	101	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	95.3	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4056177)							
EB2134739-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	94.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4056081)							
EB2134825-002	BH2218_211129	EG035T: Mercury	7439-97-6	0.01 mg/L	99.4	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4060390)							
EB2134823-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	88.1	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4060693)							
EB2134825-001	BH2217_211129	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	90.8	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4049907)							
EB2134825-002	BH2218_211129	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	93.4	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4060692)							
EB2134825-001	BH2217_211129	EK059G: Nitrite + Nitrate as N	----	2 mg/L	110	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4053814)							
EB2134146-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	50 mg/L	90.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4053813)							
EB2134146-003	Anonymous	EK067G: Total Phosphorus as P	----	10 mg/L	109	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4049905)							
EB2134705-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	86.4	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4056818)							
EB2134712-002	Anonymous	EP066: Total Polychlorinated biphenyls	----	20 µg/L	95.0	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4056816)							
EB2134712-002	Anonymous	EP068: gamma-BHC	58-89-9	20 µg/L	77.6	60.2	130
		EP068: Heptachlor	76-44-8	20 µg/L	76.6	48.1	132
		EP068: Aldrin	309-00-2	20 µg/L	74.0	53.7	120
		EP068: Dieldrin	60-57-1	20 µg/L	77.4	55.3	124
		EP068: Endrin	72-20-8	20 µg/L	77.4	48.9	131
		EP068: 4.4`-DDT	50-29-3	20 µg/L	89.9	39.4	134
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4056816)							
EB2134712-002	Anonymous	EP068: Diazinon	333-41-5	10 µg/L	106	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	90.3	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	82.3	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	92.2	47.3	127
		EP068: Prothiofos	34643-46-4	10 µg/L	92.5	45.5	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4056817)							
EB2134712-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	92.6	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	103	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4054485)							
EB2134587-002	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	83.8	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4054485)							
EB2134587-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	80.8	70.0	130
EP080: BTEXN (QCLot: 4054485)							
EB2134587-002	Anonymous	EP080: Benzene	71-43-2	10 µg/L	96.1	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	99.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2134825	Page	: 1 of 13
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 01-Dec-2021
Site	: ----	Issue Date	: 08-Dec-2021
Sampler	: , BIANCA BURKE, KEEGAN McGUFFIE	No. of samples received	: 6
Order number	: 60553814_3100.V01-B2G Variation	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP080S: TPH(V)/BTEX Surrogates	EB2134825-004	QC100_211130	4-Bromofluorobenzene	460-00-4	121 %	74.2-118 %	Recovery greater than upper data quality objective
EP080S: TPH(V)/BTEX Surrogates	EB2134825-006	QC400_211201	4-Bromofluorobenzene	460-00-4	120 %	74.2-118 %	Recovery greater than upper data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural QC300_211201, QC400_211201	----	----	----	07-Dec-2021	01-Dec-2021	6
Clear Plastic Bottle - Natural BH2217_211129, BH2218_211129	----	----	----	07-Dec-2021	29-Nov-2021	8
Clear Plastic Bottle - Natural BH2248_211130, QC100_211130	----	----	----	07-Dec-2021	30-Nov-2021	7
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural BH2217_211129, BH2218_211129	----	----	----	02-Dec-2021	01-Dec-2021	1
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural BH2217_211129, BH2218_211129	----	----	----	02-Dec-2021	01-Dec-2021	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	1	15	6.67	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	01-Dec-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	29-Nov-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	30-Nov-2021	✘
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	29-Dec-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	27-Dec-2021	✔
Clear Plastic Bottle - Natural (EA010-P) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	28-Dec-2021	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	03-Dec-2021	08-Dec-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	02-Dec-2021	06-Dec-2021	✔
Clear Plastic Bottle - Natural (EA015H) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	03-Dec-2021	07-Dec-2021	✔
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	06-Dec-2021	08-Dec-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	06-Dec-2021	27-Dec-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	06-Dec-2021	28-Dec-2021	✔
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	15-Dec-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	13-Dec-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	14-Dec-2021	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	02-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	02-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Natural (ED041G) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	02-Dec-2021	28-Dec-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	02-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	02-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Natural (ED045G) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	02-Dec-2021	28-Dec-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	06-Dec-2021	08-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	06-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	06-Dec-2021	28-Dec-2021	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	06-Dec-2021	28-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	06-Dec-2021	29-May-2022	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) QC300_211201,	QC400_211201	01-Dec-2021	07-Dec-2021	30-May-2022	✓	07-Dec-2021	30-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2217_211129,	BH2218_211129	29-Nov-2021	07-Dec-2021	28-May-2022	✓	07-Dec-2021	28-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2248_211130,	QC100_211130	30-Nov-2021	07-Dec-2021	29-May-2022	✓	07-Dec-2021	29-May-2022	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	06-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	06-Dec-2021	28-Dec-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) QC300_211201, QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2217_211129, BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2248_211130, QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	28-Dec-2021	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) QC300_211201, QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2217_211129, BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Natural (EK040P) BH2248_211130, QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	28-Dec-2021	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) QC300_211201, QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2217_211129, BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2248_211130, QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	28-Dec-2021	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) QC300_211201, QC400_211201	01-Dec-2021	----	----	----	02-Dec-2021	03-Dec-2021	✓
Clear Plastic Bottle - Natural (EK057G) BH2217_211129, BH2218_211129	29-Nov-2021	----	----	----	02-Dec-2021	01-Dec-2021	✗
Clear Plastic Bottle - Natural (EK057G) BH2248_211130, QC100_211130	30-Nov-2021	----	----	----	02-Dec-2021	02-Dec-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) QC300_211201, QC400_211201	01-Dec-2021	----	----	----	07-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2217_211129, BH2218_211129	29-Nov-2021	----	----	----	07-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2248_211130, QC100_211130	30-Nov-2021	----	----	----	07-Dec-2021	28-Dec-2021	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G) QC300_211201, QC400_211201	01-Dec-2021	03-Dec-2021	29-Dec-2021	✓	03-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2217_211129, BH2218_211129	29-Nov-2021	03-Dec-2021	27-Dec-2021	✓	03-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2248_211130, QC100_211130	30-Nov-2021	03-Dec-2021	28-Dec-2021	✓	03-Dec-2021	28-Dec-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) QC300_211201,	QC400_211201	01-Dec-2021	03-Dec-2021	29-Dec-2021	✔	03-Dec-2021	29-Dec-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2217_211129,	BH2218_211129	29-Nov-2021	03-Dec-2021	27-Dec-2021	✔	03-Dec-2021	27-Dec-2021	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2248_211130,	QC100_211130	30-Nov-2021	03-Dec-2021	28-Dec-2021	✔	03-Dec-2021	28-Dec-2021	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) QC300_211201,	QC400_211201	01-Dec-2021	----	----	----	02-Dec-2021	03-Dec-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2217_211129,	BH2218_211129	29-Nov-2021	----	----	----	02-Dec-2021	01-Dec-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2248_211130,	QC100_211130	30-Nov-2021	----	----	----	02-Dec-2021	02-Dec-2021	✔
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	08-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	06-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	07-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	08-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	06-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	07-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	08-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	06-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	07-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	08-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	06-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	07-Dec-2021	✔	06-Dec-2021	15-Jan-2022	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	08-Dec-2021	✓	06-Dec-2021	15-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	06-Dec-2021	✓	06-Dec-2021	15-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	07-Dec-2021	✓	06-Dec-2021	15-Jan-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	15-Dec-2021	✓	06-Dec-2021	15-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	13-Dec-2021	✓	06-Dec-2021	13-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	14-Dec-2021	✓	06-Dec-2021	14-Dec-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	08-Dec-2021	✓	06-Dec-2021	15-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	06-Dec-2021	✓	06-Dec-2021	15-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	07-Dec-2021	✓	06-Dec-2021	15-Jan-2022	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	15-Dec-2021	✓	06-Dec-2021	15-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	13-Dec-2021	✓	06-Dec-2021	13-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	14-Dec-2021	✓	06-Dec-2021	14-Dec-2021	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) QC300_211201,	QC400_211201	01-Dec-2021	06-Dec-2021	15-Dec-2021	✓	06-Dec-2021	15-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211129,	BH2218_211129	29-Nov-2021	06-Dec-2021	13-Dec-2021	✓	06-Dec-2021	13-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2248_211130,	QC100_211130	30-Nov-2021	06-Dec-2021	14-Dec-2021	✓	06-Dec-2021	14-Dec-2021	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.09	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	13	23.08	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	6.67	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Control Samples (LCS) - Continued							
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	13	46.15	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	13	15.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Nitrite as N by Discrete Analyser	EK057G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	15	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St, Stafford 4053, (Corner of Byth & Shand Streets), Phone: 07 3243 7222

Environmental Division
Brisbane

Work Order Reference
EB2136972



Telephone : +61-7-3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date): 5 days TAT from samples reception	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		(Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20	
ORDER NUMBER: 60553814_3100.V01-B2G Variation		COC SEQUENCE NUMBER (Circle) COC: 0 2 3 4 5 6 7 OF: 0 2 3 4 5 6 7	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289	
SAMPLER: B. Burke & Bianca K.M.		SAMPLER MOBILE: 0490 494 804	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):	
Email Reports to: krystle.nichols@aecom.com		RELINQUISHED BY: B. Burke	
Email Invoice to: krystle.nichols@aecom.com		DATE/TIME: 17/12/21 17:07	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Use silica gel for TRAIPAH/BTEX		RECEIVED BY: [Signature]	
		DATE/TIME: 17/12/21 17:07	

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).														Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA008) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-08A) Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005P) pH/pCT	(EA010P) Electrical Conductivity (pCT)	W-587 Pesticides	PCBs	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS MG BRISBANE FOR ANALYSIS		
1	BH2245-211213	13/12/21	W	2N, 5P	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
2	BH2217-211214	14/12/21	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	BH2215-211214	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	BH2217-211214	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	BH2215-211214	"	"	4-5P	9	X	X	X	X	X	X	X	X	X	X	X	X	X	Extra vol 2x		
6	QC100-211214	"	"	2N, 5P	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	BH2205-211215	10-12/21	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
8	BH2206-211215	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
9	BH2216-211215	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
10	BH22617-211216	16/12/21	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
11	BH2345-211216	16/12/21	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
12	BH2309-211217	17/12/21	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
13	BH2210-211217	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
14	BH2343-211217	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
15	BH2344-211217	"	"	"	7	X	X	X	X	X	X	X	X	X	X	X	X	X			
16	QC300-211217	"	"	2N, 4P	6	X	X	X	X	X		X	X		X	X	X	X			
17	QC400-211217	"	"	"	6	X	X	X	X	X		X	X		X	X	X	X			

HT

HT

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2136972**

Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 4
Order number	: 60553814_3100.V01-B2G Variation	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BIANCA BURKE		

Dates

Date Samples Received	: 17-Dec-2021 17:07	Issue Date	: 17-Dec-2021
Client Requested Due Date	: 05-Jan-2022	Scheduled Reporting Date	: 05-Jan-2022

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 19.0/15.6°C - Ice present
Receipt Detail	: MEDIUM HARD ESKY	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised, Sample QC100 was received with a VOC vial labelled as BH2215. As the VOC vial was bagged with QC100 and all containers were accounted for sample BH2215 the vial was treated as QC100. If this is incorrect please contact client services at ALSEnviro.Brisbane@alsglobal.com**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EK040-P Fluoride (PCT)	WATER - NT-02A Major Anions (Cl, SO ₄ , Fluoride, Alkalinity)	WATER - W-03 15 Metals (NEPM Suite)
EB2136972-001	13-Dec-2021 00:00	BH2248_211213	✓	✓	✓	✓	✓	✓	✓
EB2136972-002	14-Dec-2021 00:00	BH2217_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-003	14-Dec-2021 00:00	BH2218_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-004	14-Dec-2021 00:00	BH2214_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-005	14-Dec-2021 00:00	BH2215_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-006	14-Dec-2021 00:00	QC100_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-007	15-Dec-2021 00:00	BH2203_211215	✓	✓	✓	✓	✓	✓	✓
EB2136972-008	15-Dec-2021 00:00	BH2206_211215	✓	✓	✓	✓	✓	✓	✓
EB2136972-009	15-Dec-2021 00:00	BH2216_211215	✓	✓	✓	✓	✓	✓	✓
EB2136972-010	16-Dec-2021 00:00	BH2617_211216	✓	✓	✓	✓	✓	✓	✓
EB2136972-011	16-Dec-2021 00:00	BH2345_211216	✓	✓	✓	✓	✓	✓	✓
EB2136972-012	17-Dec-2021 00:00	BH2309_211217	✓	✓	✓	✓	✓	✓	✓
EB2136972-013	17-Dec-2021 00:00	BH2210_211217	✓	✓	✓	✓	✓	✓	✓
EB2136972-014	17-Dec-2021 00:00	BH2343_211217	✓	✓	✓	✓	✓	✓	✓
EB2136972-015	17-Dec-2021 00:00	BH2344_211217	✓	✓	✓	✓	✓	✓	✓
EB2136972-016	17-Dec-2021 00:00	QC300_211217	✓	✓	✓		✓	✓	
EB2136972-017	17-Dec-2021 00:00	QC400_211217	✓	✓	✓		✓	✓	

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-08A Total Nitrogen + NO ₂ + NO ₃ + NH ₃ + Total P +	WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-13 OC/OP/PCB
EB2136972-001	13-Dec-2021 00:00	BH2248_211213	✓	✓	✓	✓	✓	✓	✓
EB2136972-002	14-Dec-2021 00:00	BH2217_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-003	14-Dec-2021 00:00	BH2218_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-004	14-Dec-2021 00:00	BH2214_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-005	14-Dec-2021 00:00	BH2215_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-006	14-Dec-2021 00:00	QC100_211214	✓	✓	✓	✓	✓	✓	✓
EB2136972-007	15-Dec-2021 00:00	BH2203_211215	✓	✓	✓	✓	✓	✓	✓



			WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P + WATER - W-03T 15 Metals (Total) (NEPM)	WATER - W-13 OC/OP/PCB
EB2136972-008	15-Dec-2021 00:00	BH2206_211215	✓	✓	✓	✓	✓
EB2136972-009	15-Dec-2021 00:00	BH2216_211215	✓	✓	✓	✓	✓
EB2136972-010	16-Dec-2021 00:00	BH2617_211216	✓	✓	✓	✓	✓
EB2136972-011	16-Dec-2021 00:00	BH2345_211216	✓	✓	✓	✓	✓
EB2136972-012	17-Dec-2021 00:00	BH2309_211217	✓	✓	✓	✓	✓
EB2136972-013	17-Dec-2021 00:00	BH2210_211217	✓	✓	✓	✓	✓
EB2136972-014	17-Dec-2021 00:00	BH2343_211217	✓	✓	✓	✓	✓
EB2136972-015	17-Dec-2021 00:00	BH2344_211217	✓	✓	✓	✓	✓
EB2136972-016	17-Dec-2021 00:00	QC300_211217	✓	✓	✓	✓	✓
EB2136972-017	17-Dec-2021 00:00	QC400_211217	✓	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - W-07 SG TRH/BTEX/NPAH with SG clean up
EB2136972-001	13-Dec-2021 00:00	BH2248_211213	✓
EB2136972-002	14-Dec-2021 00:00	BH2217_211214	✓
EB2136972-003	14-Dec-2021 00:00	BH2218_211214	✓
EB2136972-004	14-Dec-2021 00:00	BH2214_211214	✓
EB2136972-005	14-Dec-2021 00:00	BH2215_211214	✓
EB2136972-006	14-Dec-2021 00:00	QC100_211214	✓
EB2136972-007	15-Dec-2021 00:00	BH2203_211215	✓
EB2136972-008	15-Dec-2021 00:00	BH2206_211215	✓
EB2136972-009	15-Dec-2021 00:00	BH2216_211215	✓
EB2136972-010	16-Dec-2021 00:00	BH2617_211216	✓
EB2136972-011	16-Dec-2021 00:00	BH2345_211216	✓
EB2136972-012	17-Dec-2021 00:00	BH2309_211217	✓
EB2136972-013	17-Dec-2021 00:00	BH2210_211217	✓
EB2136972-014	17-Dec-2021 00:00	BH2343_211217	✓
EB2136972-015	17-Dec-2021 00:00	BH2344_211217	✓
EB2136972-016	17-Dec-2021 00:00	QC300_211217	✓
EB2136972-017	17-Dec-2021 00:00	QC400_211217	✓



The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
BH2203_211215	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2206_211215	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2214_211214	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
BH2215_211214	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
BH2216_211215	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2217_211214	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
BH2218_211214	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
BH2248_211213	Clear Plastic Bottle - Natural	----	14-Dec-2021	17-Dec-2021	✖	----	----	
QC100_211214	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
EK057G: Nitrite as N by Discrete Analyser								
BH2214_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2215_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2217_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2218_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2248_211213	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
QC100_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
EK071G: Reactive Phosphorus as P-By Discrete Analyser								
BH2214_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2215_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2217_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2218_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	
BH2248_211213	Clear Plastic Bottle - Natural	----	15-Dec-2021	17-Dec-2021	✖	----	----	
QC100_211214	Clear Plastic Bottle - Natural	----	16-Dec-2021	17-Dec-2021	✖	----	----	

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email

AP_CustomerService.ANZ@aecom.com

BIANCA BURKE

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)
- EDI Format - ESDAT (ESDAT)

Email

bianca.burke@aecom.com

Email

bianca.burke@aecom.com

Email

bianca.burke@aecom.com

Email

bianca.burke@aecom.com

Email

bianca.burke@aecom.com

Email

bianca.burke@aecom.com

Email

bianca.burke@aecom.com

KRYSTLE NICHOLS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- A4 - AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format - EQUIS V5 AECOM (EQUIS_V5_AECOM)
- EDI Format - ESDAT (ESDAT)

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

Email

krystle.nichols@aecom.com

CERTIFICATE OF ANALYSIS

Work Order : **EB2136972**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Variation**
C-O-C number : **----**
Sampler : **BIANCA BURKE**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **17**
No. of samples analysed : **17**

Page : 1 of 27
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 17-Dec-2021 17:07
Date Analysis Commenced : 18-Dec-2021
Issue Date : 07-Jan-2022 13:59



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Timothy Creagh	2IC Organic Chemist	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG020-F (Dissolved Metals by ICP-MS) were found to be higher than EG020-T (Total Metals by ICP-MS) for sample BH2214_211214 (EB2136972-004) and BH2345_211216 (EB2136972-011). This was confirmed by re-digestion and re-analysis.
- EP075(SIM) (PAH/Phenols): High LCS recovery deemed acceptable as all associated analyte results are less than LOR.
- EP068 Pesticides by GCMS : Sample "EB2136993_01" shows poor duplicate results due to sample heterogeneity. Insufficient sample for confirmation by re-extraction and re-analysis.
- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter for some samples, which may pass through the prescribed GF/C paper.
- EK067G (Total Phosphorous as P): Some samples were diluted due to matrix interference. LOR adjusted accordingly.
- Ionic Balance out of acceptable limits due to analytes not quantified in this report.
- EG035T (Total Mercury): Positive mercury results have been confirmed by re-extraction and re-analysis.
- It is recognised that EG020T (Total Metals) is less than EG020F (Dissolved Metals) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2248_211213	BH2217_211214	BH2218_211214	BH2214_211214	BH2215_211214
Sampling date / time					13-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2136972-001	EB2136972-002	EB2136972-003	EB2136972-004	EB2136972-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.94	7.48	7.15	7.17	6.79
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		5.23	5.86	4.88	36.1	33.9
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		763	768	989	9940	15900
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		448	510	707	5710	11000
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		115	94	167	888	1600
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		283	206	224	467	294
Total Alkalinity as CaCO3	----	1	mg/L		283	206	224	467	294
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	32	31	211	330
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		105	121	206	3300	5970
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		18	23	19	100	138
Magnesium	7439-95-4	1	mg/L		17	9	29	155	304
Sodium	7440-23-5	1	mg/L		129	131	145	2470	3110
Potassium	7440-09-7	1	mg/L		1	2	6	11	17
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.004	0.002	0.006	0.002
Boron	7440-42-8	0.05	mg/L		0.08	<0.05	<0.05	0.10	0.10
Barium	7440-39-3	0.001	mg/L		0.132	0.129	0.084	0.443	0.130
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	0.020	0.005	0.016
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.012	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.039	0.118	0.189	2.78	0.914
Nickel	7440-02-0	0.001	mg/L		<0.001	0.002	0.019	0.004	0.007

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2248_211213	BH2217_211214	BH2218_211214	BH2214_211214	BH2215_211214
Sampling date / time				13-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2136972-001	EB2136972-002	EB2136972-003	EB2136972-004	EB2136972-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	0.020	0.011	0.006	
Iron	7439-89-6	0.05	mg/L	0.06	<0.05	0.12	4.57	3.71	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.005	0.005	0.005	0.002	
Boron	7440-42-8	0.05	mg/L	0.06	<0.05	<0.05	0.07	0.06	
Barium	7440-39-3	0.001	mg/L	0.168	0.168	0.150	0.338	0.125	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.001	0.009	0.056	0.005	0.021	
Chromium	7440-47-3	0.001	mg/L	0.003	0.008	0.019	0.002	0.007	
Copper	7440-50-8	0.001	mg/L	0.002	0.030	0.076	0.004	0.003	
Manganese	7439-96-5	0.001	mg/L	0.051	0.235	0.533	1.97	0.863	
Nickel	7440-02-0	0.001	mg/L	0.005	0.010	0.044	0.006	0.014	
Lead	7439-92-1	0.001	mg/L	<0.001	0.003	0.009	<0.001	0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.01	0.03	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.010	0.024	0.089	0.011	0.018	
Iron	7439-89-6	0.05	mg/L	1.10	4.96	12.8	4.35	6.59	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.4	0.5	0.2	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.22	0.06	0.04	1.14	0.10	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	0.11	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.89	0.31	2.85	0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2248_211213	BH2217_211214	BH2218_211214	BH2214_211214	BH2215_211214
Sampling date / time					13-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2136972-001	EB2136972-002	EB2136972-003	EB2136972-004	EB2136972-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.01	0.89	0.31	2.96	0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	1.8	0.8	2.7	<0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.3	2.7	1.1	5.7	<0.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	1.14	0.26	0.46	0.24
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.51	0.08	0.08	0.06
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		8.62	8.20	10.9	107	181
ø Total Cations	----	0.01	meq/L		7.93	7.64	9.80	125	168
ø Ionic Balance	----	0.01	%		4.12	3.52	5.48	8.03	3.88
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2248_211213	BH2217_211214	BH2218_211214	BH2214_211214	BH2215_211214
Sampling date / time				13-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-001	EB2136972-002	EB2136972-003	EB2136972-004	EB2136972-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2248_211213	BH2217_211214	BH2218_211214	BH2214_211214	BH2215_211214
Sampling date / time				13-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-001	EB2136972-002	EB2136972-003	EB2136972-004	EB2136972-005
Result				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2248_211213	BH2217_211214	BH2218_211214	BH2214_211214	BH2215_211214
Sampling date / time					13-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00	14-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2136972-001	EB2136972-002	EB2136972-003	EB2136972-004	EB2136972-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		74.3	146	111	136	134
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		74.5	116	90.3	111	107
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		80.8	118	91.0	114	106
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		26.6	35.5	22.7	28.8	32.5
2-Chlorophenol-D4	93951-73-6	1.0	%		68.3	89.5	57.9	83.0	81.4
2,4,6-Tribromophenol	118-79-6	1.0	%		58.4	94.8	76.3	102	97.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		66.2	70.8	45.5	69.7	65.9
Anthracene-d10	1719-06-8	1.0	%		88.2	108	83.2	107	102
4-Terphenyl-d14	1718-51-0	1.0	%		105	120	93.6	119	114
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		99.5	93.8	93.6	110	106
Toluene-D8	2037-26-5	2	%		99.6	96.6	96.6	99.6	100
4-Bromofluorobenzene	460-00-4	2	%		105	105	104	105	105



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC100_211214	BH2203_211215	BH2206_211215	BH2216_211215	BH2617_211216
Sampling date / time					14-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	16-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2136972-006	EB2136972-007	EB2136972-008	EB2136972-009	EB2136972-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.78	6.76	6.39	7.60	7.24
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		34.1	1.14	6.50	15.9	1.47
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		16400	1660	462	4040	416
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		11400	1580	313	2390	289
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		1600	915	33	341	140
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		281	131	50	826	181
Total Alkalinity as CaCO3	----	1	mg/L		281	131	50	826	181
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		345	825	12	83	13
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		6050	9	122	981	18
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		139	330	5	64	38
Magnesium	7439-95-4	1	mg/L		305	22	5	44	11
Sodium	7440-23-5	1	mg/L		3140	79	86	675	40
Potassium	7440-09-7	1	mg/L		17	5	5	5	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	0.004	0.002	0.002	<0.001
Boron	7440-42-8	0.05	mg/L		0.10	0.13	<0.05	0.28	0.11
Barium	7440-39-3	0.001	mg/L		0.130	0.063	0.230	0.044	0.166
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.016	0.003	<0.001	0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	0.009	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.003
Manganese	7439-96-5	0.001	mg/L		0.912	0.346	0.042	0.162	0.001
Nickel	7440-02-0	0.001	mg/L		0.006	0.008	0.003	0.002	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC100_211214	BH2203_211215	BH2206_211215	BH2216_211215	BH2617_211216
Sampling date / time				14-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	16-Dec-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2136972-006	EB2136972-007	EB2136972-008	EB2136972-009	EB2136972-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.008	0.007	0.010	<0.005	0.008	
Iron	7439-89-6	0.05	mg/L	3.67	6.16	1.94	0.15	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	0.004	0.002	0.003	<0.001	
Boron	7440-42-8	0.05	mg/L	0.06	0.10	<0.05	0.21	0.08	
Barium	7440-39-3	0.001	mg/L	0.131	0.067	0.242	0.041	0.164	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.021	0.004	<0.001	0.002	<0.001	
Chromium	7440-47-3	0.001	mg/L	0.007	0.011	<0.001	0.002	<0.001	
Copper	7440-50-8	0.001	mg/L	0.010	0.001	<0.001	0.005	0.005	
Manganese	7439-96-5	0.001	mg/L	0.888	0.358	0.045	0.165	0.003	
Nickel	7440-02-0	0.001	mg/L	0.012	0.008	0.003	0.004	<0.001	
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.018	<0.005	<0.005	0.015	<0.005	
Iron	7439-89-6	0.05	mg/L	6.27	6.04	3.60	0.75	<0.05	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	0.2	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.03	0.02	0.10	0.04	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01	<0.01	<0.01	0.01	1.43	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC100_211214	BH2203_211215	BH2206_211215	BH2216_211215	BH2617_211216
Sampling date / time					14-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	16-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2136972-006	EB2136972-007	EB2136972-008	EB2136972-009	EB2136972-010
					Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.01	<0.01	<0.01	0.01	1.43
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.5	1.2	0.1	0.4	0.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.5	1.2	0.1	0.4	1.7
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.23	0.01	<0.01	0.07	0.31
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.04	<0.01	<0.01	0.02	0.28
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		183	20.0	4.69	45.9	4.39
ø Total Cations	----	0.01	meq/L		169	21.8	4.53	36.3	4.59
ø Ionic Balance	----	0.01	%		4.09	4.28	1.74	11.7	2.20
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				QC100_211214	BH2203_211215	BH2206_211215	BH2216_211215	BH2617_211216
Sampling date / time				14-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	16-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-006	EB2136972-007	EB2136972-008	EB2136972-009	EB2136972-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				QC100_211214	BH2203_211215	BH2206_211215	BH2216_211215	BH2617_211216
Sampling date / time				14-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	16-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-006	EB2136972-007	EB2136972-008	EB2136972-009	EB2136972-010
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				QC100_211214	BH2203_211215	BH2206_211215	BH2216_211215	BH2617_211216
Sampling date / time				14-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	15-Dec-2021 00:00	16-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-006	EB2136972-007	EB2136972-008	EB2136972-009	EB2136972-010
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	125	105	112	91.0	97.4
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	119	93.2	93.5	81.6	80.4
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	123	97.5	99.9	81.6	82.2
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	32.2	31.2	31.1	29.4	31.5
2-Chlorophenol-D4	93951-73-6	1.0	%	88.3	78.4	82.1	71.8	89.6
2,4,6-Tribromophenol	118-79-6	1.0	%	100	92.6	94.2	78.4	119
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	75.4	86.4	90.7	80.5	81.3
Anthracene-d10	1719-06-8	1.0	%	111	89.7	92.6	78.6	93.5
4-Terphenyl-d14	1718-51-0	1.0	%	125	93.6	93.6	82.7	102
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	103	101	100	102	95.2
Toluene-D8	2037-26-5	2	%	98.5	106	102	102	100
4-Bromofluorobenzene	460-00-4	2	%	102	105	99.4	100	112



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2345_211216	BH2309_211217	BH2210_211217	BH2343_211217	BH2344_211217
Sampling date / time				16-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-011	EB2136972-012	EB2136972-013	EB2136972-014	EB2136972-015
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.26	6.45	7.76	7.42	8.14
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.22	17.7	57.2	0.82	1.71
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1960	1210	10200	3760	1090
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	1400	754	5890	2950	653
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	957	38	304	1850	513
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	629	76	910	440	533
Total Alkalinity as CaCO3	----	1	mg/L	629	76	910	440	533
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	8	133	32	4
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	373	406	3220	1090	89
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	164	7	16	212	85
Magnesium	7439-95-4	1	mg/L	133	5	64	320	73
Sodium	7440-23-5	1	mg/L	87	251	2290	81	89
Potassium	7440-09-7	1	mg/L	4	2	14	3	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.010	0.002	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	0.06	<0.05	0.43	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.021	0.130	0.150	0.053	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.001	0.012	<0.001	0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.003	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.005	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.277	0.123	0.271	0.178	0.186
Nickel	7440-02-0	0.001	mg/L	0.003	0.004	<0.001	0.007	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2345_211216	BH2309_211217	BH2210_211217	BH2343_211217	BH2344_211217
Sampling date / time				16-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-011	EB2136972-012	EB2136972-013	EB2136972-014	EB2136972-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	0.006	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.005	0.016	<0.005	0.008	<0.005	
Iron	7439-89-6	0.05	mg/L	0.54	12.6	1.27	<0.05	0.16	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.010	0.004	<0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.31	<0.05	<0.05	
Barium	7440-39-3	0.001	mg/L	0.028	0.155	0.218	0.053	0.018	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.003	0.016	0.004	0.002	0.003	
Chromium	7440-47-3	0.001	mg/L	0.004	0.005	0.007	0.001	0.004	
Copper	7440-50-8	0.001	mg/L	0.002	0.016	0.003	<0.001	0.003	
Manganese	7439-96-5	0.001	mg/L	0.215	0.135	0.288	0.183	0.212	
Nickel	7440-02-0	0.001	mg/L	0.009	0.006	0.008	0.008	0.012	
Lead	7439-92-1	0.001	mg/L	0.001	0.012	0.003	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.036	0.010	<0.005	0.006	
Iron	7439-89-6	0.05	mg/L	2.94	12.4	4.73	0.73	3.56	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	1.8	<0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.05	0.18	<0.01	0.04	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.06	<0.01	<0.01	0.13	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.58	0.01	<0.01	5.69	0.05	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2345_211216	BH2309_211217	BH2210_211217	BH2343_211217	BH2344_211217
Sampling date / time					16-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2136972-011	EB2136972-012	EB2136972-013	EB2136972-014	EB2136972-015
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.64	0.01	<0.01	5.82	0.05
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.2	1.1	0.4	0.4	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.8	1.1	0.4	6.2	0.6
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.14	0.46	0.11	0.03	0.40
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.03	<0.01	<0.01	0.04
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		23.2	13.1	112	40.2	13.2
ø Total Cations	----	0.01	meq/L		23.0	11.7	106	40.5	14.2
ø Ionic Balance	----	0.01	%		0.34	5.66	2.64	0.38	3.39
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2345_211216	BH2309_211217	BH2210_211217	BH2343_211217	BH2344_211217
Sampling date / time				16-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-011	EB2136972-012	EB2136972-013	EB2136972-014	EB2136972-015
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2345_211216	BH2309_211217	BH2210_211217	BH2343_211217	BH2344_211217
Sampling date / time				16-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-011	EB2136972-012	EB2136972-013	EB2136972-014	EB2136972-015
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2345_211216	BH2309_211217	BH2210_211217	BH2343_211217	BH2344_211217
Sampling date / time				16-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00	17-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2136972-011	EB2136972-012	EB2136972-013	EB2136972-014	EB2136972-015
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	94.6	76.7	83.3	79.3	86.2
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	87.6	71.3	72.9	72.8	75.1
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	80.8	70.3	79.4	73.3	77.7
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	31.5	29.4	31.6	29.8	31.0
2-Chlorophenol-D4	93951-73-6	1.0	%	89.9	76.9	75.5	74.2	74.8
2,4,6-Tribromophenol	118-79-6	1.0	%	118	91.7	78.3	78.8	71.2
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	82.8	83.3	85.6	80.8	85.7
Anthracene-d10	1719-06-8	1.0	%	91.4	89.5	94.5	84.2	91.6
4-Terphenyl-d14	1718-51-0	1.0	%	104	85.7	93.1	82.8	89.6
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	98.6	97.9	78.7	80.0	80.6
Toluene-D8	2037-26-5	2	%	100	100	102	98.5	96.4
4-Bromofluorobenzene	460-00-4	2	%	114	105	101	108	108



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_211217	QC400_211217	----	----	----
Sampling date / time					17-Dec-2021 00:00	17-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2136972-016	EB2136972-017	-----	-----	-----
				Result	Result		----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.14	5.87	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		0.12	0.12	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		<1	<1	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		<10	<10	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	<1	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		2	1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		2	1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	<1	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	<1	----	----	----
Sodium	7440-23-5	1	mg/L		<1	<1	----	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_211217	QC400_211217	----	----	----
Sampling date / time					17-Dec-2021 00:00	17-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2136972-016	EB2136972-017	-----	-----	-----
					Result	Result	----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	<0.01	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.10	<0.01	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.10	<0.01	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.1	<0.1	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		0.04	0.02	----	----	----
ø Total Cations	----	0.01	meq/L		<0.01	<0.01	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_211217	QC400_211217	----	----	----
Sampling date / time					17-Dec-2021 00:00	17-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2136972-016	EB2136972-017	-----	-----	-----
					Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_211217	QC400_211217	----	----	----
Sampling date / time					17-Dec-2021 00:00	17-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2136972-016	EB2136972-017	-----	-----	-----
				Result	Result		----	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5		----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5		----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5		----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5		----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5		----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5		----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5		----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5		----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50		----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100		----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50		----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50		----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100		----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100		----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100		----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100		----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100		----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0		----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0		----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0		----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0		----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0		----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0		----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0		----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0		----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0		----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5		----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_211217	QC400_211217	----	----	----
Sampling date / time					17-Dec-2021 00:00	17-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2136972-016	EB2136972-017	-----	-----	-----
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		83.8	74.5	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		85.0	74.6	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		82.6	72.5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		33.0	29.7	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		83.4	76.6	----	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%		79.4	71.0	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		88.1	81.5	----	----	----
Anthracene-d10	1719-06-8	1.0	%		92.3	84.6	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		96.2	87.2	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_211217	QC400_211217	----	----	----
Sampling date / time					17-Dec-2021 00:00	17-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2136972-016	EB2136972-017	-----	-----	-----
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		82.8	77.8	----	----	----
Toluene-D8	2037-26-5	2	%		104	96.4	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		114	105	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	37	138
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	45	139
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	45	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2,4,6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: EB2136972	Page	: 1 of 37
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 17-Dec-2021
Order number	: 60553814_3100.V01-B2G Variation	Date Analysis Commenced	: 18-Dec-2021
C-O-C number	: ----	Issue Date	: 07-Jan-2022
Sampler	: BIANCA BURKE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 17		
No. of samples analysed	: 17		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Timothy Creagh	2IC Organic Chemist	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4099393)									
EB2136855-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.46	8.45	0.1	0% - 20%
EB2136932-011	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.94	7.96	0.3	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 4099396)									
EB2136972-013	BH2210_211217	EA005-P: pH Value	----	0.01	pH Unit	7.76	7.77	0.1	0% - 20%
EB2136972-015	BH2344_211217	EA005-P: pH Value	----	0.01	pH Unit	8.14	8.17	0.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4099390)									
EB2136855-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	7900	8040	1.7	0% - 20%
EB2136932-011	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	15800	15800	0.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4099397)									
EB2136972-013	BH2210_211217	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10200	10400	1.0	0% - 20%
EB2136972-015	BH2344_211217	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1090	1090	0.0	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4087844)									
EB2136664-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	572	567	0.9	0% - 20%
EB2136972-007	BH2203_211215	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1580	1550	1.8	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4099392)									
EB2136855-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	184	181	1.4	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2520	2520	0.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2710	2700	0.0	0% - 20%
EB2136932-011	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	878	878	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	878	878	0.0	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4099394)									
EB2136972-013	BH2210_211217	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	910	907	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	910	907	0.3	0% - 20%
EB2136972-015	BH2344_211217	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	533	534	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	533	534	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4085525)									
EB2136966-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	38	39	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4085536)									
EB2136855-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	10	0.0	No Limit
EB2136972-005	BH2215_211214	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	330	319	3.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4085541)									
EB2136972-017	QC400_211217	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4085528)									
EB2136966-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	301	299	0.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4085537)									
EB2136855-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1630	1640	0.7	0% - 20%
EB2136972-005	BH2215_211214	ED045G: Chloride	16887-00-6	1	mg/L	5970	5850	2.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4085540)									
EB2136972-017	QC400_211217	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 4092646)									
EB2136499-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	394	394	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1100	1090	1.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9170	9180	0.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	328	330	0.3	0% - 20%
EB2136499-014	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	331	331	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	894	892	0.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7460	7330	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	266	266	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4094606)									
EB2136972-001	BH2248_211213	ED093F: Calcium	7440-70-2	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	17	17	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	129	132	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
EB2136972-011	BH2345_211216	ED093F: Calcium	7440-70-2	1	mg/L	164	163	0.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	133	136	2.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	87	88	1.5	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4094606) - continued									
EB2136972-011	BH2345_211216	ED093F: Potassium	7440-09-7	1	mg/L	4	5	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4094605)									
EB2136972-001	BH2248_211213	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.132	0.133	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.039	0.040	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.08	0.07	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	0.06	0.0	No Limit
EB2136972-011	BH2345_211216	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.021	0.021	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.277	0.276	0.4	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.54	0.54	0.0	0% - 50%
EG020T: Total Metals by ICP-MS (QC Lot: 4092449)									
EB2136950-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.025	0.022	11.4	0% - 20%

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4092449) - continued									
EB2136950-001	Anonymous	EG020A-T: Lead	7439-92-1	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.265	0.258	2.5	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.011	0.008	32.4	0% - 50%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.040	0.032	22.5	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.97	1.94	1.5	0% - 20%
EB2136972-009	BH2216_211215	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.041	0.040	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.005	0.004	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.165	0.159	3.6	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.002	39.5	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.015	0.013	13.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.21	0.21	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.75	0.73	2.8	0% - 50%
		EG035F: Dissolved Mercury by FIMS (QC Lot: 4094607)							
EB2136972-001	BH2248_211213	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2136972-011	BH2345_211216	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4092450)									
EB2135790-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2136897-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4092451)									
EB2136972-005	BH2215_211214	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2136972-015	BH2344_211217	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 4099391)									
EB2136855-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.0	No Limit
EB2136932-011	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.1	1.1	0.0	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 4099395)									
EB2136972-013	BH2210_211217	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.8	1.8	0.0	0% - 50%
EB2136972-015	BH2344_211217	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4099265)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4099265) - continued									
EB2136972-001	BH2248_211213	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.22	0.22	0.0	0% - 20%
EB2136972-011	BH2345_211216	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4085527)									
EB2136966-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4085538)									
EB2136972-005	BH2215_211214	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2136972-017	QC400_211217	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4099266)									
EB2136972-001	BH2248_211213	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	0.0	No Limit
EB2136972-011	BH2345_211216	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.64	0.64	0.0	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4104228)									
EB2136972-001	BH2248_211213	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.0	No Limit
EB2136972-011	BH2345_211216	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4104227)									
EB2136972-001	BH2248_211213	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.0	No Limit
EB2136972-011	BH2345_211216	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.14	0.14	0.0	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4085526)									
EB2136966-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	4.13	4.16	0.6	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4085535)									
EB2136855-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.56	0.54	2.3	0% - 50%
EB2136972-005	BH2215_211214	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.06	0.05	18.2	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4085539)									
EB2136972-017	QC400_211217	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4088779)									
EB2136972-005	BH2215_211214	EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4093033)									
ET2106249-001	Anonymous	EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4088780)									
EB2136972-005	BH2215_211214	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4088780) - continued									
EB2136972-005	BH2215_211214	EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4089761)									
EB2136652-044	Anonymous	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4089877)									
EB2136993-001	Anonymous	EP068: alpha-BHC	319-84-6	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4089877) - continued									
EB2136993-001	Anonymous	EP068: Aldrin	309-00-2	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: 4,4`-DDE	72-55-9	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<52.5	<52.5	0.0	No Limit
		EP068: 4,4`-DDD	72-54-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<4.0	30.9	154	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: 4,4`-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4093034)									
ET2106249-001	Anonymous	EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4`-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4`-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: 4,4`-DDT	50-29-3	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4088780)									
EB2136972-005	BH2215_211214	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4088780) - continued									
EB2136972-005	BH2215_211214	EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4089761)									
EB2136652-044	Anonymous	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4089877)									
EB2136993-001	Anonymous	EP068: Dichlorvos	62-73-7	0.5	µg/L	12.6	10.4	19.6	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<1.5	<1.6	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4089877) - continued									
EB2136993-001	Anonymous	EP068: Dimethoate	60-51-5	0.5	µg/L	422	387	8.7	0% - 20%
		EP068: Diazinon	333-41-5	0.5	µg/L	<5.0	<5.0	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	8.0	7.0	13.3	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	167	# 136	20.1	0% - 20%
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<1.5	<1.6	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 4093034)									
ET2106249-001	Anonymous	EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	<2.0	0.0	No Limit
		EP068: Parathion	56-38-2	2	µg/L	<2.0	<2.0	0.0	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4088778)									
EB2136534-021	Anonymous	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4088778) - continued									
EB2136534-021	Anonymous	EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EB2136972-005	BH2215_211214	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4089760)									
EB2136729-001	Anonymous	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EB2136651-001	Anonymous	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4089876)									
EB2136849-001	Anonymous	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QC Lot: 4093035)									
ET2106249-001	Anonymous	EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4088778)									
EB2136534-021	Anonymous	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EB2136972-005	BH2215_211214	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4089760)									
EB2136729-001	Anonymous	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EB2136651-001	Anonymous	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4089876)									
EB2136849-001	Anonymous	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4093035)									
ET2106249-001	Anonymous	EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QC Lot: 4093035) - continued									
ET2106249-001	Anonymous	EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4088781)									
EB2136972-005	BH2215_211214	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4089763)									
EB2136651-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4089763) - continued									
EB2136652-044	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4089875)									
EB2136849-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4093031)									
ET2106249-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4093031) - continued									
ET2106249-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4093116)									
EB2136571-021	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2136603-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	2720	2640	3.1	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4095484)									
EB2136594-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2136596-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4099165)									
EB2135232-012	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2136949-014	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4102682)									
EB2136668-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2136972-011	BH2345_211216	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4104156)									
EB2136846-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB2136972-017	QC400_211217	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4093116)									
EB2136571-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2136603-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	2320	2250	2.9	0% - 50%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4095484)									
EB2136594-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2136596-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4099165)									
EB2135232-012	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4099165) - continued									
EB2136949-014	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4102682)									
EB2136668-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2136972-011	BH2345_211216	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4104156)									
EB2136846-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EB2136972-017	QC400_211217	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 4093116)									
EB2136571-021	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2136603-005	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	1340	1270	4.8	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	263	275	4.3	0% - 20%
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	29	30	0.0	0% - 50%
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	24	24	0.0	0% - 50%
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP080: BTEXN (QC Lot: 4095484)									
EB2136594-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2136596-007	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP080: BTEXN (QC Lot: 4099165)									
EB2135232-012	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4099165) - continued									
EB2135232-012	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB2136949-014	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EP080: BTEXN (QC Lot: 4102682)									
EB2136668-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
EB2136972-011	BH2345_211216	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
EP080: BTEXN (QC Lot: 4104156)									
EB2136846-001	Anonymous	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
EB2136972-017	QC400_211217	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4104156) - continued									
EB2136972-017	QC400_211217	EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA005P: pH by PC Titrator (QCLot: 4099393)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.0	102
				----	7 pH Unit	99.8	98.0	102
EA005P: pH by PC Titrator (QCLot: 4099396)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 4099390)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	220 µS/cm	99.0	91.0	107
				<1	12890 µS/cm	95.8	91.0	107
EA010P: Conductivity by PC Titrator (QCLot: 4099397)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	100	91.0	107
				<1	24800 µS/cm	94.5	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4087844)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	101	88.0	112
				<10	293 mg/L	104	88.0	112
				<10	2000 mg/L	99.7	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 4099392)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	112	80.0	120
ED037P: Alkalinity by PC Titrator (QCLot: 4099394)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4085525)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	91.5	85.0	118
				<1	100 mg/L	89.7	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4085536)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	89.6	85.0	118
				<1	100 mg/L	89.6	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4085541)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	89.2	85.0	118
				<1	100 mg/L	89.6	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 4085528)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.2	90.0	115
				<1	1000 mg/L	100	90.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 4085537)								



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
					LCS		Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
ED045G: Chloride by Discrete Analyser (QCLot: 4085537) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	93.6	90.0	115
				<1	1000 mg/L	107	90.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 4085540)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.0	90.0	115
				<1	1000 mg/L	108	90.0	115
ED093F: Dissolved Major Cations (QCLot: 4092646)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	108	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.4	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.2	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.0	70.0	130
ED093F: Dissolved Major Cations (QCLot: 4094606)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	106	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4094605)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	104	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.3	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.8	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.3	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.8	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.7	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.5	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.0	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.6	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	105	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.9	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.5	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	108	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.2	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 4092449)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.8	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	101	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.6	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	104	89.0	115

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020T: Total Metals by ICP-MS (QCLot: 4092449) - continued								
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.1	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.2	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.4	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.4	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.2	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4094607)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.8	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4092450)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	88.5	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4092451)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.8	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 4099391)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	0.5 mg/L	91.4	80.0	117
EK040P: Fluoride by PC Titrator (QCLot: 4099395)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	93.1	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4099265)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	100	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4085527)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	93.9	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4085538)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	95.6	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4099266)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	95.8	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4104228)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	90.2	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104227)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.45 mg/L	104	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4085526)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	91.7	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4085535)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	94.6	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4085539)								



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4085539) - continued								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	97.0	81.7	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4088158)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	72.8	55.0	131
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4088779)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	111	55.0	131
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4089762)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	105	55.0	131
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4089878)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	87.3	55.0	131
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4093033)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	92.1	55.0	131
EP068A: Organochlorine Pesticides (OC) (QCLot: 4088157)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	93.3	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	85.7	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	99.6	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	97.0	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	83.3	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	79.8	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	77.6	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	80.2	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	78.8	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	83.1	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	78.6	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	83.1	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	80.4	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	85.0	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	77.3	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	72.8	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	74.4	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	81.2	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	70.1	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	81.3	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	79.8	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068A: Organochlorine Pesticides (OC) (QCLot: 4088780)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	100	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	100	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	95.4	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	100	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	99.5	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	112	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	101	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	106	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	105	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	96.1	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	104	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	102	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	101	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	113	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	95.3	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	103	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	110	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	96.8	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	105	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	111	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	96.5	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 4089761)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	102	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	82.8	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	98.2	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	102	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	103	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	110	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	99.3	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	106	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	107	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	100	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	106	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	105	55.3	124



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4089761) - continued								
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	103	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	111	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	96.8	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	97.4	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	104	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	95.6	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	95.0	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	107	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	103	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60- 57-1	0.5	µg/L	<0.5	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 4089877)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	114	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	112	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	115	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	117	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	106	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	108	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	109	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	108	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	109	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	92.2	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	110	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	110	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	111	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	111	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	113	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	96.4	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	101	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	108	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	99.6	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	104	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	116	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.5	µg/L	<0.5	----	----	----	----



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4089877) - continued								
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 4093034)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	110	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	103	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	121	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	120	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	102	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	93.6	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	96.4	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	98.1	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	96.1	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	110	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	96.6	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	102	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	95.4	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	103	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	94.5	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	86.6	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	89.4	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	94.1	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	82.9	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	97.5	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	87.6	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4088157)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	80.6	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	92.9	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	8.1	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	82.8	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	93.9	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	86.0	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	79.8	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	88.8	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	87.1	53.4	133



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4088157) - continued								
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	83.7	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	79.1	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	83.0	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	78.7	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	83.6	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	75.4	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	83.4	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	82.5	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	81.4	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	84.0	27.5	146
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4088780)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	108	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	121	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	20.4	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	101	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	96.3	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	108	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	114	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	115	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	114	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	103	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	113	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	121	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	104	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	101	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	143	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	123	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	98.1	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	111	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	106	27.5	146
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4089761)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	99.2	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	105	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	7.3	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	89.3	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	97.9	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	106	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	107	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	113	47.5	135



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit	Result					
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4089761) - continued								
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	113	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	105	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	107	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	118	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	96.1	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	99.9	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	123	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	124	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	90.7	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	95.8	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	99.8	27.5	146
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4089877)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	103	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	109	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	14.6	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	101	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	113	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	105	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	102	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	106	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	110	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	101	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	102	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	107	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	97.7	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	107	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	82.8	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	106	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	95.7	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	96.0	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	98.5	27.5	146
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4093034)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	94.9	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	96.4	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	5.2	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	99.2	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	107	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	101	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	92.6	45.2	139



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4093034) - continued								
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	96.9	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	101	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	97.9	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	90.5	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	97.6	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	80.7	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	102	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	81.4	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	98.4	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	89.8	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	89.8	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	72.6	27.5	146
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4088154)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	64.1	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	66.6	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4088778)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	51.0	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	50.2	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4089760)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	44.2	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	65.8	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4089876)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	76.0	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	66.9	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4093035)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	63.9	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	59.0	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4088154)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	68.6	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	62.4	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4088778)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	50.3	34.0	121



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4088778) - continued								
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	52.1	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4089760)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	50.7	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	71.3	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4089876)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	72.3	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	67.7	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4093035)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	62.0	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	58.8	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4088155)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	82.9	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	90.0	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	81.9	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	82.8	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	84.1	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	89.3	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	93.8	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	93.8	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	91.9	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	95.8	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	84.6	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	84.4	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	91.4	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	100	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	100	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	94.6	53.0	131
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4088781)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	89.3	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	90.9	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	92.4	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	91.7	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	94.0	51.0	127



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4088781) - continued								
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	99.2	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	98.2	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	99.7	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	98.8	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	96.4	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	94.2	55.0	132
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	96.4	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	96.2	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	95.1	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	95.2	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	94.2	53.0	131
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4089763)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	83.0	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	97.6	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	89.4	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	102	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	102	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	108	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	104	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	106	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	105	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	101	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	111	55.0	132
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	95.5	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	106	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	104	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	104	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	104	53.0	131
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4089875)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	# 119	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	122	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	# 131	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	# 140	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	# 133	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	# 142	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	# 132	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	# 133	54.0	126

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4089875) - continued								
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	127	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	# 133	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	# 139	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	# 137	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	# 137	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	# 152	52.0	133
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	# 152	48.0	137
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	# 144	53.0	131
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4093031)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	85.3	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	99.2	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	86.6	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	93.5	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	87.7	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	95.2	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	99.3	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	98.3	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	106	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	91.4	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	96.1	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	99.0	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	106	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	102	52.0	133
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	98.8	48.0	137
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	103	53.0	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4093116)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	107	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4095484)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	107	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4099165)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	106	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4102682)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	109	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4104156)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	89.1	66.8	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4093116)								



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4093116) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	109	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4095484)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	105	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4099165)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	106	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4102682)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	103	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4104156)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	98.1	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080: BTEXN (QCLot: 4093116)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	104	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	108	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	108	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	111	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	109	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	102	77.8	116
EP080: BTEXN (QCLot: 4095484)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	106	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	107	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	108	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	108	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080: BTEXN (QCLot: 4095484) - continued								
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	99.1	77.8	116
EP080: BTEXN (QCLot: 4099165)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	108	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	106	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	103	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	107	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	109	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	107	77.8	116
EP080: BTEXN (QCLot: 4102682)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	105	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	101	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	98.4	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	99.2	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	103	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	90.3	77.8	116
EP080: BTEXN (QCLot: 4104156)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	105	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	108	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	109	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	111	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	112	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	114	77.8	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4085525)							
EB2136966-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	79.6	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4085536)							
EB2136855-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	200 mg/L	112	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4085528)							
EB2136966-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	106	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4085537)							
EB2136855-002	Anonymous	ED045G: Chloride	16887-00-6	4000 mg/L	109	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4094605)							
EB2136972-002	BH2217_211214	EG020A-F: Arsenic	7440-38-2	1 mg/L	109	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	110	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	107	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	108	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	105	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	104	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	106	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	110	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	110	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	106	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	108	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	105	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4092449)							
EB2136972-001	BH2248_211213	EG020A-T: Arsenic	7440-38-2	1 mg/L	110	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	93.2	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	107	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	109	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	104	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	107	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	108	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	101	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	106	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	105	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	99.5	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	107	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4094607)							
EB2136972-002	BH2217_211214	EG035F: Mercury	7439-97-6	0.01 mg/L	96.7	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4092450)							
EB2135790-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	92.5	70.0	130

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4092451)							
EB2136972-006	QC100_211214	EG035T: Mercury	7439-97-6	0.01 mg/L	83.2	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4099391)							
EB2136855-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	89.4	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4099395)							
EB2136972-006	QC100_211214	EK040P: Fluoride	16984-48-8	5 mg/L	81.6	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4099265)							
EB2136972-002	BH2217_211214	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	91.1	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4085527)							
EB2136966-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	98.1	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4085538)							
EB2136971-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	97.4	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4099266)							
EB2136972-002	BH2217_211214	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	129	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4104228)							
EB2136972-002	BH2217_211214	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	97.5	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104227)							
EB2136972-002	BH2217_211214	EK067G: Total Phosphorus as P	----	2 mg/L	106	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4085526)							
EB2136966-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	# Not Determined	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4085535)							
EB2136855-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	4 mg/L	98.2	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4088779)							
EB2136972-005	BH2215_211214	EP066: Total Polychlorinated biphenyls	----	20 µg/L	99.9	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4093033)							
ET2106249-001	Anonymous	EP066: Total Polychlorinated biphenyls	----	20 µg/L	95.0	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 4088780)							
EB2136972-005	BH2215_211214	EP068: gamma-BHC	58-89-9	20 µg/L	79.8	60.2	130
		EP068: Heptachlor	76-44-8	20 µg/L	89.4	48.1	132
		EP068: Aldrin	309-00-2	20 µg/L	75.9	53.7	120
		EP068: Dieldrin	60-57-1	20 µg/L	83.0	55.3	124
		EP068: Endrin	72-20-8	20 µg/L	84.7	48.9	131
		EP068: 4,4'-DDT	50-29-3	20 µg/L	87.6	39.4	134
EP068A: Organochlorine Pesticides (OC) (QCLot: 4089761)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4089761) - continued							
EB2136652-045	Anonymous	EP068: gamma-BHC	58-89-9	20 µg/L	86.7	60.2	130
		EP068: Heptachlor	76-44-8	20 µg/L	99.9	48.1	132
		EP068: Aldrin	309-00-2	20 µg/L	84.7	53.7	120
		EP068: Dieldrin	60-57-1	20 µg/L	83.7	55.3	124
		EP068: Endrin	72-20-8	20 µg/L	85.2	48.9	131
		EP068: 4,4`-DDT	50-29-3	20 µg/L	95.1	39.4	134
EP068A: Organochlorine Pesticides (OC) (QCLot: 4093034)							
ET2106249-001	Anonymous	EP068: gamma-BHC	58-89-9	20 µg/L	91.3	60.2	130
		EP068: Heptachlor	76-44-8	20 µg/L	73.3	48.1	132
		EP068: Aldrin	309-00-2	20 µg/L	71.1	53.7	120
		EP068: Dieldrin	60-57-1	20 µg/L	73.1	55.3	124
		EP068: Endrin	72-20-8	20 µg/L	73.9	48.9	131
		EP068: 4,4`-DDT	50-29-3	20 µg/L	65.4	39.4	134
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4088780)							
EB2136972-005	BH2215_211214	EP068: Diazinon	333-41-5	10 µg/L	104	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	98.5	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	92.2	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	87.2	47.3	127
		EP068: Prothiofos	34643-46-4	10 µg/L	104	45.5	128
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4089761)							
EB2136652-045	Anonymous	EP068: Diazinon	333-41-5	10 µg/L	111	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	104	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	92.4	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	87.6	47.3	127
		EP068: Prothiofos	34643-46-4	10 µg/L	110	45.5	128
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4093034)							
ET2106249-001	Anonymous	EP068: Diazinon	333-41-5	10 µg/L	113	55.6	141
		EP068: Chlorpyrifos-methyl	5598-13-0	10 µg/L	89.6	58.4	130
		EP068: Pirimphos-ethyl	23505-41-1	10 µg/L	70.6	49.8	131
		EP068: Bromophos-ethyl	4824-78-6	10 µg/L	83.8	47.3	127
		EP068: Prothiofos	34643-46-4	10 µg/L	79.9	45.5	128
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4088778)							
EB2136534-022	Anonymous	EP071SG: C10 - C14 Fraction	----	1070 µg/L	120	32.0	124
		EP071SG: C15 - C28 Fraction	----	1770 µg/L	104	33.0	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4093035)							
EB2137278-009	Anonymous	EP071SG: C10 - C14 Fraction	----	1070 µg/L	66.3	32.0	124
		EP071SG: C15 - C28 Fraction	----	1770 µg/L	62.8	33.0	117



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4088778)							
EB2136534-022	Anonymous	EP071SG: >C10 - C16 Fraction	----	1560 µg/L	116	34.0	121
		EP071SG: >C16 - C34 Fraction	----	1190 µg/L	109	30.0	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4093035)							
EB2137278-009	Anonymous	EP071SG: >C10 - C16 Fraction	----	1560 µg/L	64.8	34.0	121
		EP071SG: >C16 - C34 Fraction	----	1190 µg/L	64.8	30.0	117
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4088781)							
EB2136972-005	BH2215_211214	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	77.9	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	99.6	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4089763)							
EB2136652-045	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	90.3	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	110	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4093031)							
ET2106249-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 µg/L	92.2	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 µg/L	106	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4093116)							
EB2136571-022	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	89.6	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4095484)							
EB2136594-002	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	96.9	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4099165)							
EB2136565-009	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	84.9	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4102682)							
EB2136788-001	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	# Not Determined	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4104156)							
EB2136855-001	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	120	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4093116)							
EB2136571-022	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	77.6	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4095484)							
EB2136594-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	80.0	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4099165)							
EB2136565-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	72.8	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4102682)							
EB2136788-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	# Not Determined	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4104156)							
EB2136855-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	123	70.0	130
EP080: BTEXN (QCLot: 4093116)							
EB2136571-022	Anonymous	EP080: Benzene	71-43-2	10 µg/L	92.9	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	100	70.0	130
EP080: BTEXN (QCLot: 4095484)							
EB2136594-002	Anonymous	EP080: Benzene	71-43-2	10 µg/L	100	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	99.4	70.0	130
EP080: BTEXN (QCLot: 4099165)							
EB2136565-009	Anonymous	EP080: Benzene	71-43-2	10 µg/L	99.1	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	95.7	70.0	130
EP080: BTEXN (QCLot: 4102682)							
EB2136788-001	Anonymous	EP080: Benzene	71-43-2	10 µg/L	105	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	103	70.0	130
EP080: BTEXN (QCLot: 4104156)							
EB2136855-001	Anonymous	EP080: Benzene	71-43-2	10 µg/L	103	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	105	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2136972	Page	: 1 of 24
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 17-Dec-2021
Site	: ----	Issue Date	: 07-Jan-2022
Sampler	: BIANCA BURKE	No. of samples received	: 17
Order number	: 60553814_3100.V01-B2G Variation	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- Duplicate outliers exist - please see following pages for full details.
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP068B: Organophosphorus Pesticides (OP)	EB2136993--001	Anonymous	Chlorpyrifos	2921-88-2	20.1 %	0% - 20%	RPD exceeds LOR based limits
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Naphthalene	91-20-3	119 %	50.0-110%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Acenaphthene	83-32-9	131 %	55.0-114%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Fluorene	86-73-7	140 %	55.0-119%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Phenanthrene	85-01-8	133 %	51.0-127%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Anthracene	120-12-7	142 %	55.0-127%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Fluoranthene	206-44-0	132 %	55.0-127%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Pyrene	129-00-0	133 %	54.0-126%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Chrysene	218-01-9	133 %	51.0-129%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Benzo(b+j)fluoranthene	205-99-2 205-82-3	139 %	55.0-132%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Benzo(k)fluoranthene	207-08-9	137 %	58.0-128%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Benzo(a)pyrene	50-32-8	137 %	55.0-131%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Indeno(1.2.3.cd)pyrene	193-39-5	152 %	52.0-133%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Dibenz(a,h)anthracene	53-70-3	152 %	48.0-137%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4089875-002	----	Benzo(g,h,i)perylene	191-24-2	144 %	53.0-131%	Recovery greater than upper control limit
Matrix Spike (MS) Recoveries							
EK071G: Reactive Phosphorus as P by discrete analysis	EB2136966--002	Anonymous	Reactive Phosphorus as P	14265-44-2	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Petroleum Hydrocarbons	EB2136788--001	Anonymous	C6 - C9 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EB2136788--001	Anonymous	C6 - C10 Fraction	C6_C10	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.



Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP066S: PCB Surrogate	EB2136972-002	BH2217_211214	Decachlorobiphenyl	2051-24-3	146 %	37.0-138 %	Recovery greater than upper data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural BH2248_211213		----	----	----	29-Dec-2021	14-Dec-2021	15
Clear Plastic Bottle - Natural BH2217_211214, BH2214_211214, QC100_211214		BH2218_211214, BH2215_211214,		----	29-Dec-2021	15-Dec-2021	14
Clear Plastic Bottle - Natural BH2203_211215, BH2216_211215		BH2206_211215,		----	29-Dec-2021	16-Dec-2021	13
Clear Plastic Bottle - Natural BH2617_211216,		BH2345_211216		----	29-Dec-2021	17-Dec-2021	12
Clear Plastic Bottle - Natural BH2309_211217, BH2343_211217, QC300_211217,		BH2210_211217, BH2344_211217, QC400_211217		----	29-Dec-2021	18-Dec-2021	11
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural BH2248_211213		----	----	----	29-Dec-2021	27-Dec-2021	2
Clear Plastic Bottle - Natural BH2217_211214, BH2214_211214, QC100_211214		BH2218_211214, BH2215_211214,		----	29-Dec-2021	28-Dec-2021	1
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural BH2248_211213		----	----	----	18-Dec-2021	15-Dec-2021	3
Clear Plastic Bottle - Natural BH2217_211214, BH2214_211214, QC100_211214		BH2218_211214, BH2215_211214,		----	18-Dec-2021	16-Dec-2021	2
Clear Plastic Bottle - Natural BH2203_211215, BH2216_211215		BH2206_211215,		----	18-Dec-2021	17-Dec-2021	1



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural BH2248_211213	----	----	----	18-Dec-2021	15-Dec-2021	3
Clear Plastic Bottle - Natural BH2217_211214, BH2214_211214, QC100_211214	----	----	----	18-Dec-2021	16-Dec-2021	2
Clear Plastic Bottle - Natural BH2203_211215, BH2216_211215	----	----	----	18-Dec-2021	17-Dec-2021	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	5	53	9.43	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	2	47	4.26	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2248_211213		13-Dec-2021	----	----	----	29-Dec-2021	14-Dec-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	29-Dec-2021	15-Dec-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	29-Dec-2021	16-Dec-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	29-Dec-2021	17-Dec-2021	✘
Clear Plastic Bottle - Natural (EA005-P) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	----	----	----	29-Dec-2021	18-Dec-2021	✘
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2248_211213		13-Dec-2021	----	----	----	29-Dec-2021	10-Jan-2022	✔
Clear Plastic Bottle - Natural (EA010-P) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	29-Dec-2021	11-Jan-2022	✔
Clear Plastic Bottle - Natural (EA010-P) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	29-Dec-2021	12-Jan-2022	✔
Clear Plastic Bottle - Natural (EA010-P) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	29-Dec-2021	13-Jan-2022	✔
Clear Plastic Bottle - Natural (EA010-P) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	----	----	----	29-Dec-2021	14-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2248_211213		13-Dec-2021	----	----	----	20-Dec-2021	20-Dec-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	20-Dec-2021	21-Dec-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	20-Dec-2021	22-Dec-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	20-Dec-2021	23-Dec-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	----	----	----	20-Dec-2021	24-Dec-2021	✓
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC300_211217,	QC400_211217	17-Dec-2021	----	----	----	22-Dec-2021	24-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2248_211213		13-Dec-2021	----	----	----	30-Dec-2021	10-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	30-Dec-2021	11-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	30-Dec-2021	12-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	30-Dec-2021	13-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2309_211217, BH2343_211217,	BH2210_211217, BH2344_211217	17-Dec-2021	----	----	----	30-Dec-2021	14-Jan-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH2248_211213	13-Dec-2021	----	----	----	29-Dec-2021	27-Dec-2021	✖
Clear Plastic Bottle - Natural (ED037-P) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	29-Dec-2021	28-Dec-2021	✖
Clear Plastic Bottle - Natural (ED037-P) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	29-Dec-2021	29-Dec-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2617_211216,	BH2345_211216 16-Dec-2021	----	----	----	29-Dec-2021	30-Dec-2021	✔
Clear Plastic Bottle - Natural (ED037-P) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	----	----	----	29-Dec-2021	31-Dec-2021	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH2248_211213	13-Dec-2021	----	----	----	18-Dec-2021	10-Jan-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	18-Dec-2021	11-Jan-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	18-Dec-2021	12-Jan-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2617_211216,	BH2345_211216 16-Dec-2021	----	----	----	18-Dec-2021	13-Jan-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	----	----	----	18-Dec-2021	14-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2248_211213		13-Dec-2021	----	----	----	18-Dec-2021	10-Jan-2022	✔
Clear Plastic Bottle - Natural (ED045G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	18-Dec-2021	11-Jan-2022	✔
Clear Plastic Bottle - Natural (ED045G) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	18-Dec-2021	12-Jan-2022	✔
Clear Plastic Bottle - Natural (ED045G) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	18-Dec-2021	13-Jan-2022	✔
Clear Plastic Bottle - Natural (ED045G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	----	----	----	18-Dec-2021	14-Jan-2022	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC300_211217,	QC400_211217	17-Dec-2021	----	----	----	22-Dec-2021	24-Dec-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2248_211213		13-Dec-2021	----	----	----	30-Dec-2021	10-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	30-Dec-2021	11-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	30-Dec-2021	12-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	30-Dec-2021	13-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2309_211217, BH2343_211217,	BH2210_211217, BH2344_211217	17-Dec-2021	----	----	----	30-Dec-2021	14-Jan-2022	✔



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2248_211213	13-Dec-2021	----	----	----	30-Dec-2021	11-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	30-Dec-2021	12-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	30-Dec-2021	13-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2617_211216,	BH2345_211216 16-Dec-2021	----	----	----	30-Dec-2021	14-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2309_211217, BH2343_211217,	BH2210_211217, BH2344_211217 17-Dec-2021	----	----	----	30-Dec-2021	15-Jun-2022	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2248_211213	13-Dec-2021	31-Dec-2021	11-Jun-2022	✓	31-Dec-2021	11-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	31-Dec-2021	12-Jun-2022	✓	31-Dec-2021	12-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	31-Dec-2021	13-Jun-2022	✓	31-Dec-2021	13-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2617_211216,	BH2345_211216 16-Dec-2021	31-Dec-2021	14-Jun-2022	✓	31-Dec-2021	14-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	31-Dec-2021	15-Jun-2022	✓	31-Dec-2021	15-Jun-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2248_211213	13-Dec-2021	----	----	----	04-Jan-2022	10-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	04-Jan-2022	11-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	04-Jan-2022	12-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2617_211216,	BH2345_211216 16-Dec-2021	----	----	----	04-Jan-2022	13-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2309_211217, BH2343_211217,	BH2210_211217, BH2344_211217 17-Dec-2021	----	----	----	04-Jan-2022	14-Jan-2022	✔
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2248_211213	13-Dec-2021	----	----	----	04-Jan-2022	10-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	04-Jan-2022	11-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	04-Jan-2022	12-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2617_211216,	BH2345_211216 16-Dec-2021	----	----	----	04-Jan-2022	13-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	----	----	----	04-Jan-2022	14-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2248_211213		13-Dec-2021	----	----	----	29-Dec-2021	10-Jan-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	29-Dec-2021	11-Jan-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	29-Dec-2021	12-Jan-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	29-Dec-2021	13-Jan-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	----	----	----	29-Dec-2021	14-Jan-2022	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2248_211213		13-Dec-2021	----	----	----	24-Dec-2021	10-Jan-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	----	----	----	24-Dec-2021	11-Jan-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	----	----	----	24-Dec-2021	12-Jan-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2617_211216,	BH2345_211216	16-Dec-2021	----	----	----	24-Dec-2021	13-Jan-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	----	----	----	24-Dec-2021	14-Jan-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) BH2248_211213	13-Dec-2021	----	----	----	18-Dec-2021	15-Dec-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	18-Dec-2021	16-Dec-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	18-Dec-2021	17-Dec-2021	✖
Clear Plastic Bottle - Natural (EK057G) BH2617_211216, BH2345_211216	16-Dec-2021	----	----	----	18-Dec-2021	18-Dec-2021	✔
Clear Plastic Bottle - Natural (EK057G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	----	----	----	18-Dec-2021	19-Dec-2021	✔
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2248_211213	13-Dec-2021	----	----	----	24-Dec-2021	10-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	24-Dec-2021	11-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	24-Dec-2021	12-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2617_211216, BH2345_211216	16-Dec-2021	----	----	----	24-Dec-2021	13-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	----	----	----	24-Dec-2021	14-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2248_211213		13-Dec-2021	04-Jan-2022	10-Jan-2022	✔	04-Jan-2022	10-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	04-Jan-2022	11-Jan-2022	✔	04-Jan-2022	11-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	04-Jan-2022	12-Jan-2022	✔	04-Jan-2022	12-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2617_211216,	BH2345_211216	16-Dec-2021	04-Jan-2022	13-Jan-2022	✔	04-Jan-2022	13-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	04-Jan-2022	14-Jan-2022	✔	04-Jan-2022	14-Jan-2022	✔
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2248_211213		13-Dec-2021	04-Jan-2022	10-Jan-2022	✔	04-Jan-2022	10-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	04-Jan-2022	11-Jan-2022	✔	04-Jan-2022	11-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	04-Jan-2022	12-Jan-2022	✔	04-Jan-2022	12-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2617_211216,	BH2345_211216	16-Dec-2021	04-Jan-2022	13-Jan-2022	✔	04-Jan-2022	13-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	04-Jan-2022	14-Jan-2022	✔	04-Jan-2022	14-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) BH2248_211213	13-Dec-2021	----	----	----	18-Dec-2021	15-Dec-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	----	----	----	18-Dec-2021	16-Dec-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	----	----	----	18-Dec-2021	17-Dec-2021	✖
Clear Plastic Bottle - Natural (EK071G) BH2617_211216,	BH2345_211216 16-Dec-2021	----	----	----	18-Dec-2021	18-Dec-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	----	----	----	18-Dec-2021	19-Dec-2021	✔
EP066: Polychlorinated Biphenyls (PCB)							
Amber Glass Bottle - Unpreserved (EP066) BH2248_211213	13-Dec-2021	20-Dec-2021	20-Dec-2021	✔	20-Dec-2021	29-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	21-Dec-2021	21-Dec-2021	✔	23-Dec-2021	30-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	22-Dec-2021	22-Dec-2021	✔	22-Dec-2021	31-Jan-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2617_211216,	BH2345_211216 16-Dec-2021	23-Dec-2021	23-Dec-2021	✔	29-Dec-2021	01-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	22-Dec-2021	24-Dec-2021	✔	30-Dec-2021	31-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) BH2248_211213		13-Dec-2021	20-Dec-2021	20-Dec-2021	✓	20-Dec-2021	29-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	21-Dec-2021	21-Dec-2021	✓	23-Dec-2021	30-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	22-Dec-2021	22-Dec-2021	✓	22-Dec-2021	31-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2617_211216,	BH2345_211216	16-Dec-2021	23-Dec-2021	23-Dec-2021	✓	29-Dec-2021	01-Feb-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	22-Dec-2021	24-Dec-2021	✓	30-Dec-2021	31-Jan-2022	✓
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) BH2248_211213		13-Dec-2021	20-Dec-2021	20-Dec-2021	✓	20-Dec-2021	29-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	21-Dec-2021	21-Dec-2021	✓	23-Dec-2021	30-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	22-Dec-2021	22-Dec-2021	✓	22-Dec-2021	31-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2617_211216,	BH2345_211216	16-Dec-2021	23-Dec-2021	23-Dec-2021	✓	29-Dec-2021	01-Feb-2022	✓
Amber Glass Bottle - Unpreserved (EP068) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	22-Dec-2021	24-Dec-2021	✓	30-Dec-2021	31-Jan-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2248_211213	13-Dec-2021	20-Dec-2021	20-Dec-2021	✓	20-Dec-2021	29-Jan-2022	✓	
Amber Glass Bottle - Unpreserved (EP071SG) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	21-Dec-2021	21-Dec-2021	✓	23-Dec-2021	30-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	22-Dec-2021	22-Dec-2021	✓	22-Dec-2021	31-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2617_211216,	BH2345_211216	16-Dec-2021	23-Dec-2021	23-Dec-2021	✓	29-Dec-2021	01-Feb-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	22-Dec-2021	24-Dec-2021	✓	30-Dec-2021	31-Jan-2022	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2248_211213		13-Dec-2021	20-Dec-2021	20-Dec-2021	✓	20-Dec-2021	29-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	21-Dec-2021	21-Dec-2021	✓	23-Dec-2021	30-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	22-Dec-2021	22-Dec-2021	✓	22-Dec-2021	31-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2617_211216,	BH2345_211216	16-Dec-2021	23-Dec-2021	23-Dec-2021	✓	29-Dec-2021	01-Feb-2022	✓
Amber Glass Bottle - Unpreserved (EP071SG) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	22-Dec-2021	24-Dec-2021	✓	30-Dec-2021	31-Jan-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2248_211213	13-Dec-2021	20-Dec-2021	20-Dec-2021	✓	20-Dec-2021	29-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	21-Dec-2021	21-Dec-2021	✓	23-Dec-2021	30-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	22-Dec-2021	22-Dec-2021	✓	22-Dec-2021	31-Jan-2022	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2617_211216, BH2345_211216	16-Dec-2021	23-Dec-2021	23-Dec-2021	✓	29-Dec-2021	01-Feb-2022	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	22-Dec-2021	24-Dec-2021	✓	30-Dec-2021	31-Jan-2022	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) BH2248_211213	13-Dec-2021	22-Dec-2021	27-Dec-2021	✓	22-Dec-2021	27-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214, 14-Dec-2021	24-Dec-2021	28-Dec-2021	✓	24-Dec-2021	28-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2203_211215, BH2216_211215	BH2206_211215, 15-Dec-2021	29-Dec-2021	29-Dec-2021	✓	29-Dec-2021	29-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2617_211216, BH2345_211216	16-Dec-2021	30-Dec-2021	30-Dec-2021	✓	30-Dec-2021	30-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217 17-Dec-2021	31-Dec-2021	31-Dec-2021	✓	31-Dec-2021	31-Dec-2021	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) BH2248_211213		13-Dec-2021	22-Dec-2021	27-Dec-2021	✓	22-Dec-2021	27-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	24-Dec-2021	28-Dec-2021	✓	24-Dec-2021	28-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	29-Dec-2021	29-Dec-2021	✓	29-Dec-2021	29-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2617_211216,	BH2345_211216	16-Dec-2021	30-Dec-2021	30-Dec-2021	✓	30-Dec-2021	30-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	31-Dec-2021	31-Dec-2021	✓	31-Dec-2021	31-Dec-2021	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) BH2248_211213		13-Dec-2021	22-Dec-2021	27-Dec-2021	✓	22-Dec-2021	27-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2217_211214, BH2214_211214, QC100_211214	BH2218_211214, BH2215_211214,	14-Dec-2021	24-Dec-2021	28-Dec-2021	✓	24-Dec-2021	28-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2203_211215, BH2216_211215	BH2206_211215,	15-Dec-2021	29-Dec-2021	29-Dec-2021	✓	29-Dec-2021	29-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2617_211216,	BH2345_211216	16-Dec-2021	30-Dec-2021	30-Dec-2021	✓	30-Dec-2021	30-Dec-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2309_211217, BH2343_211217, QC300_211217,	BH2210_211217, BH2344_211217, QC400_211217	17-Dec-2021	31-Dec-2021	31-Dec-2021	✓	31-Dec-2021	31-Dec-2021	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	3	22	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	5	53	9.43	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	6	47	12.77	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	10	90	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	6	26	23.08	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	5	53	9.43	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Control Samples (LCS) - Continued							
Pesticides by GCMS	EP068	5	35	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	5	20	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	26	11.54	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	6	26	23.08	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	5	47	10.64	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	5	90	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	26	11.54	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	5	53	9.43	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	5	35	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	5	20	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	26	11.54	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	26	11.54	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	5	47	10.64	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	5	90	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	3	53	5.66	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	3	35	8.57	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	20	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	35	5.71	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	2	47	4.26	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	5	90	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3).
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St, Stafford 4053, (Corner of Byth & Shand Streets), Phone: 07 3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS: ☒ Standard TAT (List due date): 5 days TAT from samples reception		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		COC SEQUENCE NUMBER (Circle)			
PROJECT: Inland Rail		COC: ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7			
ORDER NUMBER: 80553814_3100.V01-B2G Variation		COC: ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7			
PROJECT MANAGER: Kryštof Nichols		CONTACT PH: 0400 182 280		RECEIVED BY: SD	
SAMPLER: B. Burke & K. McGuffie		SAMPLER MOBILE: 0400 494 804		RELINQUISHED BY: SD	
COC emailed to ALS? Circle (YES (X))		EDD FORMAT (or default):		DATE/TIME: 22/12/21 14:49	
Email Reports to: krysto.nichols@aecom.com; emma.koeman@aecom.com		Email Invoice to: krysto.nichols@aecom.com		DATE/TIME:	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)														Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA009) Sodium Adsorption Ratio (Calculation)	(EA018) Total Dissolved Solids Standard Level	(NT-010) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-020) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-080) Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 16 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG008) Dissolved Metals by ICP/MS (Fe)	(EA009P) pH/PCT	(EA010P) Electrical Conductivity (PCT)	Particulates	PCBs	Comments on likely contaminant levels, citations, or samples requiring specific GC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS I MGT BRISBANE FOR ANALYSIS		
1	BA2201-211220	20/12/21	W	2u, 5P	7	x	x	x	x	x	x	x	x	x	x	x	x	x			
2	BA2233-211220	"	"	"	1	x	x	x	x	x	x	x	x	x	x	x	x	x			
3	BA2234-211220	"	"	"	1	x	x	x	x	x	x	x	x	x	x	x	x	x			
4	BA2235-211221	21/12/21	"	"	1	x	x	x	x	x	x	x	x	x	x	x	x	x			
5	HA2347-211222	22/12/21	"	"	1	x	x	x	x	x	x	x	x	x	x	x	x	x			
6	QC301-211222	"	"	2u, 4P	6	x	x	x	x	x		x	x		x	x	x	x			
7	QC401-211222	"	"	"	"	x	x	x	x	x		x	x		x	x	x	x			
TOTAL																					

Environmental Division
Brisbane
Work Order Reference
EB213743



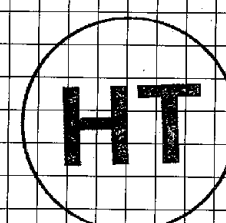
Telephone + 61-7-3243 7222

HT

Environmental Division
Brisbane
Work Order Reference
EB2137431



Telephone + 61-7-3243 7222



**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EB2137431**

Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: krystle.nichols@aecom.com	E-mail	: carsten.emrich@alsglobal.com
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Facsimile	: +61 07 3553 2050	Facsimile	: +61-7-3243 7218
Project	: INLAND RAIL	Page	: 1 of 3
Order number	: 60553814_3100.V01-B2G Variation	Quote number	: EB2020AECOMAU0008 (BN/219/20)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BIANCA BURKE		

Dates

Date Samples Received	: 22-Dec-2021 14:49	Issue Date	: 22-Dec-2021
Client Requested Due Date	: 05-Jan-2022	Scheduled Reporting Date	: 05-Jan-2022

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 16.1°C - Ice present
Receipt Detail	: MEDIUM HARD ESKY	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please note that with the upcoming public holidays, ALS will endeavour to meet holding times where possible, but is not able to guarantee that analysis will be performed within holding time. If you have any further queries, please contact the Client Services team under alsenviro.brisbane@alsglobal.com.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2137431-001	20-Dec-2021 00:00	BH2201_211220	✓	✓	✓	✓	✓	✓	✓
EB2137431-002	20-Dec-2021 00:00	BH2233_211220	✓	✓	✓	✓	✓	✓	✓
EB2137431-003	20-Dec-2021 00:00	BH2234_211220	✓	✓	✓	✓	✓	✓	✓
EB2137431-004	21-Dec-2021 00:00	BH2235_211221	✓	✓	✓	✓	✓	✓	✓
EB2137431-005	22-Dec-2021 00:00	BH2247_211222	✓	✓	✓	✓	✓	✓	✓
EB2137431-006	22-Dec-2021 00:00	QC301_211222	✓	✓	✓		✓		✓
EB2137431-007	22-Dec-2021 00:00	QC401_211222	✓	✓	✓		✓		✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +	WATER - W-07 SG TRH/BTEX/PAH with SG clean up	WATER - W-13 OC/OP/PCB
EB2137431-001	20-Dec-2021 00:00	BH2201_211220	✓	✓	✓	✓	✓	✓	✓
EB2137431-002	20-Dec-2021 00:00	BH2233_211220	✓	✓	✓	✓	✓	✓	✓
EB2137431-003	20-Dec-2021 00:00	BH2234_211220	✓	✓	✓	✓	✓	✓	✓
EB2137431-004	21-Dec-2021 00:00	BH2235_211221	✓	✓	✓	✓	✓	✓	✓
EB2137431-005	22-Dec-2021 00:00	BH2247_211222	✓	✓	✓	✓	✓	✓	✓
EB2137431-006	22-Dec-2021 00:00	QC301_211222	✓	✓	✓	✓	✓	✓	✓
EB2137431-007	22-Dec-2021 00:00	QC401_211222	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method		Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
Client Sample ID(s)	Container						
EA005-P: pH by PC Titrator							
BH2201_211220	Clear Plastic Bottle - Natural	----	20-Dec-2021	22-Dec-2021	✗	----	----
BH2233_211220	Clear Plastic Bottle - Natural	----	20-Dec-2021	22-Dec-2021	✗	----	----
BH2234_211220	Clear Plastic Bottle - Natural	----	20-Dec-2021	22-Dec-2021	✗	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EB2137431**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address : **PO BOX 1307**
FORTITUDE VALLEY QLD, AUSTRALIA 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Variation**
C-O-C number : **----**
Sampler : **BIANCA BURKE**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **7**
No. of samples analysed : **7**

Page : 1 of 15
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 22-Dec-2021 14:49
Date Analysis Commenced : 22-Dec-2021
Issue Date : 07-Jan-2022 14:00



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Timothy Creagh	2IC Organic Chemist	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenzo(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP075(SIM) - PAH/Phenols (GC/MS - SIM): High LCS recovery deemed acceptable as all associated analyte results are less than LOR.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2201_211220	BH2233_211220	BH2234_211220	BH2235_211221	BH2247_211222
Sampling date / time					20-Dec-2021 00:00	20-Dec-2021 00:00	20-Dec-2021 00:00	21-Dec-2021 00:00	22-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2137431-001	EB2137431-002	EB2137431-003	EB2137431-004	EB2137431-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		8.20	7.95	8.09	7.65	8.13
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		12.4	6.33	3.12	1.00	1.52
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1150	1740	582	199	1220
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		693	913	347	129	735
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		66	263	124	55	438
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		398	188	201	85	291
Total Alkalinity as CaCO3	----	1	mg/L		398	188	201	85	291
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		10	22	4	2	8
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		117	437	53	5	232
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		20	51	25	12	60
Magnesium	7439-95-4	1	mg/L		4	33	15	6	70
Sodium	7440-23-5	1	mg/L		233	236	80	17	73
Potassium	7440-09-7	1	mg/L		3	6	1	6	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	0.001	<0.001	0.001	0.001
Boron	7440-42-8	0.05	mg/L		0.08	0.08	0.05	0.06	0.06
Barium	7440-39-3	0.001	mg/L		0.155	0.106	0.078	0.029	0.089
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	0.003	<0.001	0.003	0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	0.002	<0.001
Copper	7440-50-8	0.001	mg/L		0.002	0.003	<0.001	0.003	<0.001
Manganese	7439-96-5	0.001	mg/L		0.001	0.436	0.113	0.236	0.087
Nickel	7440-02-0	0.001	mg/L		<0.001	0.017	0.001	0.007	0.006

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2201_211220	BH2233_211220	BH2234_211220	BH2235_211221	BH2247_211222
Sampling date / time				20-Dec-2021 00:00	20-Dec-2021 00:00	20-Dec-2021 00:00	21-Dec-2021 00:00	22-Dec-2021 00:00	
Compound	CAS Number	LOR	Unit	EB2137431-001	EB2137431-002	EB2137431-003	EB2137431-004	EB2137431-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.01	<0.01	0.02	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.005	0.005	<0.005	<0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.30	0.56	0.14	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	0.002	0.002	
Boron	7440-42-8	0.05	mg/L	0.06	0.06	<0.05	0.05	0.05	
Barium	7440-39-3	0.001	mg/L	0.163	0.182	0.080	0.108	0.088	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.002	0.017	0.002	0.011	0.002	
Chromium	7440-47-3	0.001	mg/L	0.002	0.069	0.004	0.037	<0.001	
Copper	7440-50-8	0.001	mg/L	0.006	0.022	0.002	0.016	0.007	
Manganese	7439-96-5	0.001	mg/L	0.003	0.615	0.111	0.364	0.080	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.067	0.004	0.033	0.007	
Lead	7439-92-1	0.001	mg/L	0.001	0.004	0.002	0.004	0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.06	<0.01	0.05	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.065	0.006	0.050	0.010	
Iron	7439-89-6	0.05	mg/L	1.36	35.1	2.29	24.3	0.49	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	0.2	0.1	0.2	0.3	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.68	<0.01	0.56	0.18	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.18	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	1.50	2.90	<0.01	0.03	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2201_211220	BH2233_211220	BH2234_211220	BH2235_211221	BH2247_211222
Sampling date / time					20-Dec-2021 00:00	20-Dec-2021 00:00	20-Dec-2021 00:00	21-Dec-2021 00:00	22-Dec-2021 00:00
Compound	CAS Number	LOR	Unit		EB2137431-001	EB2137431-002	EB2137431-003	EB2137431-004	EB2137431-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		1.50	3.08	<0.01	0.03	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.2	3.3	<0.1	2.1	0.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.7	6.4	<0.1	2.1	0.3
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	1.03	0.14	1.19	0.13
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.03	0.37	0.02	0.52	0.09
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		11.5	16.5	5.59	1.88	12.5
ø Total Cations	----	0.01	meq/L		11.5	15.7	5.99	1.98	11.9
ø Ionic Balance	----	0.01	%		0.34	2.67	3.39	----	2.43
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	<1	<1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2201_211220	BH2233_211220	BH2234_211220	BH2235_211221	BH2247_211222
Sampling date / time				20-Dec-2021 00:00	20-Dec-2021 00:00	20-Dec-2021 00:00	21-Dec-2021 00:00	22-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2137431-001	EB2137431-002	EB2137431-003	EB2137431-004	EB2137431-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				BH2201_211220	BH2233_211220	BH2234_211220	BH2235_211221	BH2247_211222
Sampling date / time				20-Dec-2021 00:00	20-Dec-2021 00:00	20-Dec-2021 00:00	21-Dec-2021 00:00	22-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2137431-001	EB2137431-002	EB2137431-003	EB2137431-004	EB2137431-005
				Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup - Continued								
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2201_211220	BH2233_211220	BH2234_211220	BH2235_211221	BH2247_211222
Sampling date / time				20-Dec-2021 00:00	20-Dec-2021 00:00	20-Dec-2021 00:00	21-Dec-2021 00:00	22-Dec-2021 00:00
Compound	CAS Number	LOR	Unit	EB2137431-001	EB2137431-002	EB2137431-003	EB2137431-004	EB2137431-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	1	%	89.9	89.8	96.2	77.5	105
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.5	%	73.1	72.1	85.9	71.3	97.6
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.5	%	69.2	74.0	83.2	70.4	95.1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	29.0	28.0	30.0	24.1	33.0
2-Chlorophenol-D4	93951-73-6	1.0	%	78.1	76.6	78.6	65.1	86.0
2,4,6-Tribromophenol	118-79-6	1.0	%	71.0	73.5	74.2	67.7	73.0
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	87.3	82.5	82.5	68.1	93.0
Anthracene-d10	1719-06-8	1.0	%	91.1	87.4	89.1	79.8	97.3
4-Terphenyl-d14	1718-51-0	1.0	%	90.6	88.5	93.5	80.5	99.7
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	102	96.1	101	109	106
Toluene-D8	2037-26-5	2	%	89.6	89.7	92.8	102	99.1
4-Bromofluorobenzene	460-00-4	2	%	114	111	110	107	112



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC301_211222	QC401_211222	----	----	----
Sampling date / time					22-Dec-2021 00:00	22-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2137431-006	EB2137431-007	-----	-----	-----
				Result	Result		----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.08	5.34	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		0.12	0.12	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		<1	<1	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		<10	<10	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	<1	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		5	3	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		5	3	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	<1	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	<1	----	----	----
Sodium	7440-23-5	1	mg/L		<1	<1	----	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC301_211222	QC401_211222	----	----	----
Sampling date / time					22-Dec-2021 00:00	22-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2137431-006	EB2137431-007	-----	-----	-----
				Result	Result		----	----	----
EG020T: Total Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.17	0.05	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	0.02	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	0.02	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.2	0.1	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.2	0.1	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	0.04	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		0.10	0.06	----	----	----
ø Total Cations	----	0.01	meq/L		<0.01	<0.01	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
^ Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC301_211222	QC401_211222	----	----	----
Sampling date / time					22-Dec-2021 00:00	22-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2137431-006	EB2137431-007	-----	-----	-----
					Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC301_211222	QC401_211222	----	----	----
Sampling date / time					22-Dec-2021 00:00	22-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2137431-006	EB2137431-007	-----	-----	-----
				Result	Result		----	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued									
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5		----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5		----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5		----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5		----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5		----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5		----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5		----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5		----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L	<50	<50		----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100		----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50		----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50		----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L	<100	<100		----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100		----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100		----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100		----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100		----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0		----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0		----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0		----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0		----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0		----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0		----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0		----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0		----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0		----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0		----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5		----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC301_211222	QC401_211222	----	----	----
Sampling date / time					22-Dec-2021 00:00	22-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2137431-006	EB2137431-007	-----	-----	-----
				Result	Result		----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	1	%		92.4	93.8	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		93.6	92.2	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		88.5	86.7	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		36.2	35.0	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		87.9	85.4	----	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%		72.7	71.4	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		90.0	86.5	----	----	----
Anthracene-d10	1719-06-8	1.0	%		90.8	91.4	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		95.6	92.4	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC301_211222	QC401_211222	----	----	----
Sampling date / time					22-Dec-2021 00:00	22-Dec-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2137431-006	EB2137431-007	-----	-----	-----
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		106	106	----	----	----
Toluene-D8	2037-26-5	2	%		97.2	97.8	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		112	111	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	37	138
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	45	139
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	45	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2,4,6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: EB2137431	Page	: 1 of 16
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: PO BOX 1307 FORTITUDE VALLEY QLD, AUSTRALIA 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 22-Dec-2021
Order number	: 60553814_3100.V01-B2G Variation	Date Analysis Commenced	: 22-Dec-2021
C-O-C number	: ----	Issue Date	: 07-Jan-2022
Sampler	: BIANCA BURKE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 7		
No. of samples analysed	: 7		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Timothy Creagh	2IC Organic Chemist	Brisbane Organics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4099209)									
EB2137431-003	BH2234_211220	EA005-P: pH Value	----	0.01	pH Unit	8.09	8.07	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4099210)									
EB2137431-003	BH2234_211220	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	582	583	0.2	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4096882)									
EB2137380-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	829	796	4.1	0% - 20%
EB2137407-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	<10	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 4099207)									
EB2136624-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	127	126	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	127	126	0.0	0% - 20%
EB2137431-003	BH2234_211220	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	201	203	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	201	203	1.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4094465)									
EB2137399-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EB2137399-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	378	376	0.5	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4094470)									
EB2137431-002	BH2233_211220	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	22	21	4.7	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4094468)									
EB2137399-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EB2137399-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	7060	7080	0.2	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4094505)									
EB2137431-003	BH2234_211220	ED093F: Calcium	7440-70-2	1	mg/L	25	25	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	15	14	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	80	79	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
EB2137258-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	6	6	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	3	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	48	48	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4094504)									
EB2137258-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.24	0.26	9.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4098210)									
EB2137324-012	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.130	0.130	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.114	0.112	2.1	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.013	0.012	0.0	0% - 50%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.032	0.031	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	0.01	0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.27	0.31	10.8	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	4.13	4.24	2.5	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4098210) - continued									
EB2137431-003	BH2234_211220	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.080	0.084	5.1	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.111	0.112	0.9	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.003	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	2.29	2.14	6.5	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 4094507)									
EB2137431-003	BH2234_211220	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4098215)									
EB2137324-012	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2137431-004	BH2235_211221	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 4099206)									
EB2136624-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EB2137431-003	BH2234_211220	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4100902)									
EB2135771-008	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	5.97	5.92	0.7	0% - 20%
EB2137431-001	BH2201_211220	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4094469)									
EB2137438-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2137431-002	BH2233_211220	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.18	0.18	0.0	0% - 50%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4100903)									
EB2137431-001	BH2201_211220	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.50	1.54	2.2	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4104228)									
EB2136972-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.0	No Limit
EB2136972-011	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4104229)									
EB2137431-004	BH2235_211221	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	2.1	1.9	6.8	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4104227)									
EB2136972-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.0	No Limit

EP080: BTEXN (QC Lot: 4106203)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 4106203) - continued									
EB2137273-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EB2137365-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP080: BTEXN (QC Lot: 4108066)									
EB2137431-005	BH2247_211222	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
EA005P: pH by PC Titrator (QCLot: 4099209)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 4099210)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	104	91.0	107
				<1	24800 µS/cm	98.6	91.0	107
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4096882)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	97.6	88.0	112
				<10	293 mg/L	102	88.0	112
				<10	2000 mg/L	96.2	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 4099207)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	98.1	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4094465)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.4	85.0	118
				<1	100 mg/L	98.3	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4094470)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.9	85.0	118
				<1	100 mg/L	96.9	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 4094468)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.2	90.0	115
				<1	1000 mg/L	105	90.0	115
ED093F: Dissolved Major Cations (QCLot: 4094505)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.4	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.1	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.0	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.5	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4094504)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.2	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.7	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.1	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.1	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.3	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.4	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.5	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.5	89.0	110



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4094504) - continued								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.2	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.4	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.6	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.5	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.1	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.8	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.2	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 4098210)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.4	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	102	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.0	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.2	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.3	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.1	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.0	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.4	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.7	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.8	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	112	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4094507)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.9	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4098215)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.6	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 4099206)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	94.4	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4100902)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	104	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4094469)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	95.9	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4100903)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	95.0	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4104228)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	90.2	70.1	108



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4104229)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	93.1	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104227)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.45 mg/L	104	79.2	105
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104230)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	104	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4094466)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.8	81.7	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4098125)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	100	55.0	131
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4100710)								
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	103	55.0	131
EP068A: Organochlorine Pesticides (OC) (QCLot: 4098126)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	110	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	103	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	121	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	117	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	104	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	99.3	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	102	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	107	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	106	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	116	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	106	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	111	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	104	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	112	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	108	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	88.1	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	97.2	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	104	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	83.8	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	108	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	110	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5-9/50-2	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
					LCS	Low	High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068A: Organochlorine Pesticides (OC) (QCLot: 4100707)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	95.8	60.3	131
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	89.1	45.1	126
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	93.8	63.1	128
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	95.8	60.2	130
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	82.3	58.6	120
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	84.3	53.8	118
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	83.1	53.7	120
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	86.3	57.0	122
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	87.2	56.3	121
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	95.5	56.5	123
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	86.8	55.8	122
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	85.6	55.3	124
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	85.1	52.8	122
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	87.8	48.9	131
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	92.7	50.0	121
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	80.1	46.5	123
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	84.8	42.0	122
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	81.2	49.8	130
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	80.4	39.4	134
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	86.0	51.4	129
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	90.4	45.7	139
EP068: Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.5	µg/L	<0.5	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4098126)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	102	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	110	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	# 4.5	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	103	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	113	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	104	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	100	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	104	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	107	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	104	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	91.4	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	102	49.8	131



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4098126) - continued								
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	97.2	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	112	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	79.4	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	104	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	94.6	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	92.9	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	85.4	27.5	146
EP068B: Organophosphorus Pesticides (OP) (QCLot: 4100707)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	81.0	53.2	133
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	87.9	44.2	158
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	# 3.2	5.00	32.6
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	81.5	27.6	153
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	91.4	73.0	123
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	83.2	51.6	122
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	89.1	45.2	139
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	82.8	47.5	135
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	84.7	53.4	133
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	84.4	56.3	125
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	85.1	37.1	144
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	81.8	49.8	131
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	66.8	37.0	131
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	86.5	47.3	127
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	80.5	16.0	150
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	86.4	45.5	128
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	79.6	39.1	129
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	77.9	38.4	134
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	72.1	27.5	146
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4098124)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	57.5	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	64.9	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 4100711)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	64.0	32.0	124
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	59.1	33.0	117
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4098124)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	59.7	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	67.2	30.0	117



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4098124) - continued								
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 4100711)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	61.2	34.0	121
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	60.4	30.0	117
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4098123)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	63.5	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	76.4	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	69.0	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	77.6	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	73.9	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	80.1	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	83.5	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	82.3	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	85.4	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	76.9	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	83.9	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	78.7	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	84.5	55.0	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	83.2	52.0	133
EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	80.5	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	85.3	53.0	131
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4100709)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	# 118	50.0	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	# 126	49.0	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	# 118	55.0	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	# 127	55.0	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	120	51.0	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	# 129	55.0	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	# 132	55.0	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	# 131	54.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	134	47.0	136
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	126	51.0	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	10 µg/L	# 140	55.0	132
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	128	58.0	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	# 139	55.0	131



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4100709) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	# 139	52.0	133
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	136	48.0	137
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	# 144	53.0	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4104278)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	104	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4106203)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	120	66.8	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4108066)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	180 µg/L	109	66.8	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4104278)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	103	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4106203)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	111	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4108066)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	225 µg/L	102	65.1	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
	X							
EP080: BTEXN (QCLot: 4104278)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	102	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	104	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	102	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	104	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	112	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	105	77.8	116
EP080: BTEXN (QCLot: 4106203)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.8	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.4	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.4	77.3	115
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	20 µg/L	98.3	75.8	120
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.7	80.9	115



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
EP080: BTEXN (QCLot: 4106203) - continued								
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.6	77.8	116
EP080: BTEXN (QCLot: 4108066)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	105	79.8	115
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	105	78.6	116
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	106	77.3	115
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	110	75.8	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	112	80.9	115
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.4	77.8	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4094465)							
EB2137399-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4094470)							
EB2137438-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4094468)							
EB2137399-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4094504)							
EB2137431-001	BH2201_211220	EG020A-F: Arsenic	7440-38-2	1 mg/L	110	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	123	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	109	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	110	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	108	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	108	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	111	70.0	130

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4094504) - continued							
EB2137431-001	BH2201_211220	EG020A-F: Lead	7439-92-1	1 mg/L	113	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	116	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	109	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	114	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	105	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4098210)							
EB2137324-013	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	104	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	92.0	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	97.4	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	106	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	98.5	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	99.9	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.3	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	105	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	89.7	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	99.3	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	104	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	102	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4094507)							
EB2137431-002	BH2233_211220	EG035F: Mercury	7439-97-6	0.01 mg/L	88.6	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4098215)							
EB2137324-013	Anonymous	EG035T: Mercury	7439-97-6	0.05 mg/L	79.7	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4099206)							
EB2136624-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	90.2	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4100902)							
EB2136574-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	111	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4094469)							
EB2137438-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	99.1	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4100903)							
EB2137431-002	BH2233_211220	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	# Not Determined	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4104228)							
EB2136972-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	97.5	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4104229)							
EB2137431-005	BH2247_211222	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	88.0	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104227)							

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 Work Order : EB2137431
 Client : AECOM AUSTRALIA PTY LTD
 Project : INLAND RAIL



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104227) - continued							
EB2136972-002	Anonymous	EK067G: Total Phosphorus as P	----	2 mg/L	106	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4104230)							
EB2137431-005	BH2247_211222	EK067G: Total Phosphorus as P	----	1 mg/L	109	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4094466)							
EB2137399-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	95.0	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4104278)							
EB2137380-003	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	106	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4106203)							
EB2137273-002	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	103	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4108066)							
EB2137431-006	QC301_211222	EP080: C6 - C9 Fraction	----	40 µg/L	115	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4104278)							
EB2137380-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	105	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4106203)							
EB2137273-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	98.0	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4108066)							
EB2137431-006	QC301_211222	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	99.9	70.0	130
EP080: BTEXN (QCLot: 4104278)							
EB2137380-003	Anonymous	EP080: Benzene	71-43-2	10 µg/L	106	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	111	70.0	130
EP080: BTEXN (QCLot: 4106203)							
EB2137273-002	Anonymous	EP080: Benzene	71-43-2	10 µg/L	108	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	105	70.0	130
EP080: BTEXN (QCLot: 4108066)							
EB2137431-006	QC301_211222	EP080: Benzene	71-43-2	10 µg/L	106	70.0	130
		EP080: Toluene	108-88-3	10 µg/L	106	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2137431	Page	: 1 of 16
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 22-Dec-2021
Site	: ----	Issue Date	: 07-Jan-2022
Sampler	: BIANCA BURKE	No. of samples received	: 7
Order number	: 60553814_3100.V01-B2G Variation	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- Laboratory Control outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP068B: Organophosphorus Pesticides (OP)	QC-4098126-002	----	Monocrotophos	6923-22-4	4.5 %	5.00-32.6%	Recovery less than lower control limit
EP068B: Organophosphorus Pesticides (OP)	QC-4100707-002	----	Monocrotophos	6923-22-4	3.2 %	5.00-32.6%	Recovery less than lower control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Naphthalene	91-20-3	118 %	50.0-110%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Acenaphthylene	208-96-8	126 %	49.0-124%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Acenaphthene	83-32-9	118 %	55.0-114%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Fluorene	86-73-7	127 %	55.0-119%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Anthracene	120-12-7	129 %	55.0-127%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Fluoranthene	206-44-0	132 %	55.0-127%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Pyrene	129-00-0	131 %	54.0-126%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Benzo(b+j)fluoranthene	205-99-2 205-82-3	140 %	55.0-132%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Benzo(a)pyrene	50-32-8	139 %	55.0-131%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Indeno(1.2.3.cd)pyrene	193-39-5	139 %	52.0-133%	Recovery greater than upper control limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	QC-4100709-002	----	Benzo(g,h,i)perylene	191-24-2	144 %	53.0-131%	Recovery greater than upper control limit
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB2137438--002	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB2137399--002	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB2137399--002	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EB2137431--002	BH2233_211220	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**



Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural	BH2201_211220, BH2234_211220	BH2233_211220,					
		----	----	----	24-Dec-2021	20-Dec-2021	4
Clear Plastic Bottle - Natural	BH2235_211221						
		----	----	----	24-Dec-2021	21-Dec-2021	3
Clear Plastic Bottle - Natural	BH2247_211222, QC401_211222	QC301_211222,					
		----	----	----	24-Dec-2021	22-Dec-2021	2

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	22	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	17	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	22	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	24-Dec-2021	20-Dec-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2235_211221		21-Dec-2021	----	----	----	24-Dec-2021	21-Dec-2021	✖
Clear Plastic Bottle - Natural (EA005-P) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	24-Dec-2021	22-Dec-2021	✖
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	24-Dec-2021	17-Jan-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2235_211221		21-Dec-2021	----	----	----	24-Dec-2021	18-Jan-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	24-Dec-2021	19-Jan-2022	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	23-Dec-2021	27-Dec-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2235_211221		21-Dec-2021	----	----	----	23-Dec-2021	28-Dec-2021	✓
Clear Plastic Bottle - Natural (EA015H) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	23-Dec-2021	29-Dec-2021	✓
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC301_211222,	QC401_211222	22-Dec-2021	----	----	----	23-Dec-2021	29-Dec-2021	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	23-Dec-2021	17-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2235_211221		21-Dec-2021	----	----	----	23-Dec-2021	18-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2247_211222		22-Dec-2021	----	----	----	23-Dec-2021	19-Jan-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	24-Dec-2021	03-Jan-2022	✔
Clear Plastic Bottle - Natural (ED037-P) BH2235_211221		21-Dec-2021	----	----	----	24-Dec-2021	04-Jan-2022	✔
Clear Plastic Bottle - Natural (ED037-P) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	24-Dec-2021	05-Jan-2022	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	22-Dec-2021	17-Jan-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2235_211221		21-Dec-2021	----	----	----	22-Dec-2021	18-Jan-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	22-Dec-2021	19-Jan-2022	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	22-Dec-2021	17-Jan-2022	✔
Clear Plastic Bottle - Natural (ED045G) BH2235_211221		21-Dec-2021	----	----	----	22-Dec-2021	18-Jan-2022	✔
Clear Plastic Bottle - Natural (ED045G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	22-Dec-2021	19-Jan-2022	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC301_211222,	QC401_211222	22-Dec-2021	----	----	----	23-Dec-2021	29-Dec-2021	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	23-Dec-2021	17-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2235_211221		21-Dec-2021	----	----	----	23-Dec-2021	18-Jan-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2247_211222		22-Dec-2021	----	----	----	23-Dec-2021	19-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	23-Dec-2021	18-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2235_211221		21-Dec-2021	----	----	----	23-Dec-2021	19-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2247_211222		22-Dec-2021	----	----	----	23-Dec-2021	20-Jun-2022	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	31-Dec-2021	18-Jun-2022	✓	31-Dec-2021	18-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2235_211221		21-Dec-2021	31-Dec-2021	19-Jun-2022	✓	31-Dec-2021	19-Jun-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	31-Dec-2021	20-Jun-2022	✓	31-Dec-2021	20-Jun-2022	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	23-Dec-2021	17-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2235_211221		21-Dec-2021	----	----	----	23-Dec-2021	18-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2247_211222		22-Dec-2021	----	----	----	23-Dec-2021	19-Jan-2022	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	04-Jan-2022	17-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2235_211221		21-Dec-2021	----	----	----	04-Jan-2022	18-Jan-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	04-Jan-2022	19-Jan-2022	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	24-Dec-2021	17-Jan-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2235_211221		21-Dec-2021	----	----	----	24-Dec-2021	18-Jan-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	24-Dec-2021	19-Jan-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	29-Dec-2021	17-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2235_211221		21-Dec-2021	----	----	----	29-Dec-2021	18-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	29-Dec-2021	19-Jan-2022	✔
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	22-Dec-2021	22-Dec-2021	✔
Clear Plastic Bottle - Natural (EK057G) BH2235_211221		21-Dec-2021	----	----	----	22-Dec-2021	23-Dec-2021	✔
Clear Plastic Bottle - Natural (EK057G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	22-Dec-2021	24-Dec-2021	✔
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	29-Dec-2021	17-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2235_211221		21-Dec-2021	----	----	----	29-Dec-2021	18-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	29-Dec-2021	19-Jan-2022	✔
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	04-Jan-2022	17-Jan-2022	✔	04-Jan-2022	17-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2235_211221		21-Dec-2021	04-Jan-2022	18-Jan-2022	✔	04-Jan-2022	18-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	04-Jan-2022	19-Jan-2022	✔	04-Jan-2022	19-Jan-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	04-Jan-2022	17-Jan-2022	✔	04-Jan-2022	17-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2235_211221		21-Dec-2021	04-Jan-2022	18-Jan-2022	✔	04-Jan-2022	18-Jan-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	04-Jan-2022	19-Jan-2022	✔	04-Jan-2022	19-Jan-2022	✔
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	----	----	----	22-Dec-2021	22-Dec-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2235_211221		21-Dec-2021	----	----	----	22-Dec-2021	23-Dec-2021	✔
Clear Plastic Bottle - Natural (EK071G) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	----	----	----	22-Dec-2021	24-Dec-2021	✔
EP066: Polychlorinated Biphenyls (PCB)								
Amber Glass Bottle - Unpreserved (EP066) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	24-Dec-2021	27-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2235_211221		21-Dec-2021	24-Dec-2021	28-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP066) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	29-Dec-2021	29-Dec-2021	✔	31-Dec-2021	07-Feb-2022	✔
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	24-Dec-2021	27-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2235_211221		21-Dec-2021	24-Dec-2021	28-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	29-Dec-2021	29-Dec-2021	✔	31-Dec-2021	07-Feb-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	24-Dec-2021	27-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2235_211221		21-Dec-2021	24-Dec-2021	28-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP068) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	29-Dec-2021	29-Dec-2021	✔	31-Dec-2021	07-Feb-2022	✔
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	24-Dec-2021	27-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP071SG) BH2235_211221		21-Dec-2021	24-Dec-2021	28-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP071SG) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	29-Dec-2021	29-Dec-2021	✔	31-Dec-2021	07-Feb-2022	✔
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
Amber Glass Bottle - Unpreserved (EP071SG) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	24-Dec-2021	27-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP071SG) BH2235_211221		21-Dec-2021	24-Dec-2021	28-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP071SG) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	29-Dec-2021	29-Dec-2021	✔	31-Dec-2021	07-Feb-2022	✔
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	24-Dec-2021	27-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2235_211221		21-Dec-2021	24-Dec-2021	28-Dec-2021	✔	29-Dec-2021	02-Feb-2022	✔
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	29-Dec-2021	29-Dec-2021	✔	31-Dec-2021	07-Feb-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	31-Dec-2021	03-Jan-2022	✔	31-Dec-2021	03-Jan-2022	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2235_211221		21-Dec-2021	04-Jan-2022	04-Jan-2022	✔	04-Jan-2022	04-Jan-2022	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	05-Jan-2022	05-Jan-2022	✔	05-Jan-2022	05-Jan-2022	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	31-Dec-2021	03-Jan-2022	✔	31-Dec-2021	03-Jan-2022	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2235_211221		21-Dec-2021	04-Jan-2022	04-Jan-2022	✔	04-Jan-2022	04-Jan-2022	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	05-Jan-2022	05-Jan-2022	✔	05-Jan-2022	05-Jan-2022	✔
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) BH2201_211220, BH2234_211220	BH2233_211220,	20-Dec-2021	31-Dec-2021	03-Jan-2022	✔	31-Dec-2021	03-Jan-2022	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2235_211221		21-Dec-2021	04-Jan-2022	04-Jan-2022	✔	04-Jan-2022	04-Jan-2022	✔
Amber VOC Vial - Sulfuric Acid (EP080) BH2247_211222, QC401_211222	QC301_211222,	22-Dec-2021	05-Jan-2022	05-Jan-2022	✔	05-Jan-2022	05-Jan-2022	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	22	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	17	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	28	10.71	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	7	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	5	45	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Pesticides by GCMS	EP068	2	17	11.76	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	28	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	19	15.79	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	2	7	28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	22	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	17	11.76	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	8	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	2	7	28.57	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	22	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	17	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	28	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	7	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3).
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 8/1 Burma Road Pooraka SA 5095
Ph: 08 8162 5130 E: adelaide@alsglobal.comBRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.comGLADSTONE 48 Callimorda Drive Gladstone QLD 4680
Ph: 07 4970 7944 E: ALSEnviro.Gladstone@alsglobal.comMACKAY Unit 2/20 Calender Drive Paget QLD 4740
Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.comMELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 9549 9600 E: samples.melbourne@alsglobal.comMURDOCH 1/29 Sydney Road Murdoch NSW 2855
Ph: 02 6372 6735 E: murdoch.mel@alsglobal.comNEWCASTLE 5/595 Malabar Road Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.comNOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4428 2063 E: nowra@alsglobal.comPERTH 10 Rod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.comSYDNEY 277-289 Woodpark Road Smithfield NSW 2104
Ph: 02 9339 6633 E: samples.sydney@alsglobal.comEnvironmental Division
BrisbaneWork Order Reference
EB2206768

Telephone: + 61-7-3243 7222

2500

N/A
N/A

CLIENT: AECON	TURNAROUND REQUIREMENTS: ☒ Standard TAT (List due date):		FOR
OFFICE: Brisbane	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):		Cust
PROJECT: Inland Rail	PROJECT NO.:	ALS QUOTE NO.: BN/218/20	Free
ORDER NUMBER: 6055384-8100	PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	recei
PROJECT MANAGER: Krystle Nichols	CONTACT PH: 0499907354	COC SEQUENCE NUMBER (Circle)	Ranc
SAMPLER: K. McGuffie	SAMPLER MOBILE:	COC: ① 2 3 4 5 6 7	Othe
COC Emailed to ALS? (☒ / NO)	EDD FORMAT (or default):	OF: 1 ② 3 4 5 6 7	
Email Reports to (will default to PM if no other addresses are listed): krystle.nichols@aecon.com	RELINQUISHED BY: K. McGuffie	RECEIVED BY: SD	RELINQU
Email Invoice to (will default to PM if no other addresses are listed): emma.boemant@aecon.com	DATE/TIME: 6:40pm 11/3/22	DATE/TIME: 11/03/22 18:48	DATE/TIN

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (filtered bottle required).										Additional Information			
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA006	EA015H	NT-01D	NT-02A	NT-08A	W-03	EA020T	W-03T	EA020F	EA005P	EA010P	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.	
1	QC300-220311	11/3/22	W	3 Plastic	3	x	x	x	x	x	x	x	x		x	x			
2	QC500-220311	11/3/22	W	"	"	x	x	x	x	x	x	x	x		x	x			
3	QC100-220311	10/3/22	W	4 Plastic	4	x	x	x	x	x	x	x	x	x	x	x			
4	BH234A-220308	8/3/22	"	4 Plastic 3 Glass	7	x	x	x	x	x	x	x	x	x	x	x	x	TRH on Hold only	
5	BH2345-220308	8/3/22	"	4 Plastic	4	x	x	x	x	x	x	x	x	x	x	x			
6	BH2343-220308	"	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
7	BH267-220309	9/3/22	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
8	BH2216-220309	"	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
9	BH2203-220309	"	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
10	BH2206-220309	"	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
11	BH2309-220310	10/3/22	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
12	BH2216-220310	"	"	"	"	x	x	x	x	x	x	x	x	x	x	x			
TOTAL																			

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; Li = Lugio's Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB2206768

Client : AECOM AUSTRALIA PTY LTD Contact : KRYSTLE NICHOLS Address : BRISBANE E-mail : krystle.nichols@aecom.com Telephone : +61 07 3553 2000 Facsimile : +61 07 3553 2050 Project : INLAND RAIL Order number : 60553814_3100 C-O-C number : ---- Site : ---- Sampler : KEEGAN MCGUFFIE	Laboratory : Environmental Division Brisbane Contact : Carsten Emrich Address : 2 Byth Street Stafford QLD Australia 4053 E-mail : carsten.emrich@alsglobal.com Telephone : +61 7 3552 8616 Facsimile : +61-7-3243 7218 Page : 1 of 5 Quote number : EB2020AECOMAU0008 (BN/219/20) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 11-Mar-2022 19:48	Issue Date : 11-Mar-2022
Client Requested Due Date : 22-Mar-2022	Scheduled Reporting Date : 22-Mar-2022

Delivery Details

Mode of Delivery : Client Drop Off	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 2.2°C - Ice present
Receipt Detail : MEDIUM HARD ESKY	No. of samples received / analysed : 15 / 15

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised that as neither of the 60mL Nitric red sample containers for "BH2217_220310" (ALS #15) were marked as filtered, both containers will be reported as unfiltered. If you would like to discuss this further, please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.**
- **Please be advised that while one of the sample containers for sample "BH2217_220310" (ALS #15) was received with a blank container label, however as the samples were all bagged in individual sets ALS will report this container as part of "BH2217_220310". Please keep this in mind when reviewing your results.**
- **As requested on the received Chain of Custody, TRH analysis has not been assigned to sample "BH2347_220308" (ALS #4) at this time. If you would like to discuss this further, please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.**
- **Please note where you have asked for 'Dissolved' metals and no Field filtered bottle is submitted, the laboratory will filter an aliquot from the non-preserved plastic (ALS Green label) container for this analysis, however this is a non-compliant container/process and should be taken into consideration when reviewing the metals data. Additional charges will be incurred for laboratory filtration.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

- Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
QC300_220311	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC500_220311	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
BH2217_220310	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
QC300_220311	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC500_220311	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
BH2217_220310	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2206768-001	11-Mar-2022 00:00	QC300_220311	✓	✓	✓	✓	✓	✓	✓
EB2206768-002	11-Mar-2022 00:00	QC500_220311	✓	✓	✓	✓	✓	✓	✓
EB2206768-003	10-Mar-2022 00:00	QC100_220311	✓	✓	✓	✓	✓	✓	✓
EB2206768-004	08-Mar-2022 00:00	BH2347_220308	✓	✓	✓	✓	✓	✓	✓
EB2206768-005	08-Mar-2022 00:00	BH2345_220308	✓	✓	✓	✓	✓	✓	✓
EB2206768-006	08-Mar-2022 00:00	BH2343_220308	✓	✓	✓	✓	✓	✓	✓
EB2206768-007	09-Mar-2022 00:00	BH2617_220309	✓	✓	✓	✓	✓	✓	✓
EB2206768-008	09-Mar-2022 00:00	BH2216_220309	✓	✓	✓	✓	✓	✓	✓
EB2206768-009	09-Mar-2022 00:00	BH2203_220309	✓	✓	✓	✓	✓	✓	✓
EB2206768-010	09-Mar-2022 00:00	BH2206_220309	✓	✓	✓	✓	✓	✓	✓
EB2206768-011	10-Mar-2022 00:00	BH2309_220310	✓	✓	✓	✓	✓	✓	✓
EB2206768-012	10-Mar-2022 00:00	BH2210_220310	✓	✓	✓	✓	✓	✓	✓
EB2206768-013	10-Mar-2022 00:00	BH2214_220310	✓	✓	✓	✓	✓	✓	✓
EB2206768-014	10-Mar-2022 00:00	BH2215_220310	✓	✓	✓	✓	✓	✓	✓
EB2206768-015	10-Mar-2022 00:00	BH2217_220310	✓	✓	✓	✓	✓	✓	✓



Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +
EB2206768-001	11-Mar-2022 00:00	QC300_220311	✓		✓	✓
EB2206768-002	11-Mar-2022 00:00	QC500_220311	✓		✓	✓
EB2206768-003	10-Mar-2022 00:00	QC100_220311	✓	✓	✓	✓
EB2206768-004	08-Mar-2022 00:00	BH2347_220308	✓	✓	✓	✓
EB2206768-005	08-Mar-2022 00:00	BH2345_220308	✓	✓	✓	✓
EB2206768-006	08-Mar-2022 00:00	BH2343_220308	✓	✓	✓	✓
EB2206768-007	09-Mar-2022 00:00	BH2617_220309	✓	✓	✓	✓
EB2206768-008	09-Mar-2022 00:00	BH2216_220309	✓	✓	✓	✓
EB2206768-009	09-Mar-2022 00:00	BH2203_220309	✓	✓	✓	✓
EB2206768-010	09-Mar-2022 00:00	BH2206_220309	✓	✓	✓	✓
EB2206768-011	10-Mar-2022 00:00	BH2309_220310	✓	✓	✓	✓
EB2206768-012	10-Mar-2022 00:00	BH2210_220310	✓	✓	✓	✓
EB2206768-013	10-Mar-2022 00:00	BH2214_220310	✓	✓	✓	✓
EB2206768-014	10-Mar-2022 00:00	BH2215_220310	✓	✓	✓	✓
EB2206768-015	10-Mar-2022 00:00	BH2217_220310	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
BH2203_220309	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2206_220309	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2216_220309	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2343_220308	Clear Plastic Bottle - Natural	----	10-Mar-2022	11-Mar-2022	✗	----	----	
BH2345_220308	Clear Plastic Bottle - Natural	----	10-Mar-2022	11-Mar-2022	✗	----	----	
BH2347_220308	Clear Plastic Bottle - Natural	----	10-Mar-2022	11-Mar-2022	✗	----	----	
BH2617_220309	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
EK057G: Nitrite as N by Discrete Analyser								
BH2343_220308	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2345_220308	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2347_220308	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
EK071G: Reactive Phosphorus as P-By Discrete Analyser								
BH2343_220308	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2345_220308	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	
BH2347_220308	Clear Plastic Bottle - Natural	----	11-Mar-2022	11-Mar-2022	✗	----	----	

CERTIFICATE OF ANALYSIS

Work Order : **EB2206768**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address :
 BRISBANE
Telephone : +61 07 3553 2000
Project : INLAND RAIL
Order number : 60553814_3100
C-O-C number : ----
Sampler : KEEGAN McGUFFIE
Site : ----
Quote number : BN/219/20
No. of samples received : 15
No. of samples analysed : 15

Page : 1 of 11
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053

Telephone : +61 7 3552 8616
Date Samples Received : 11-Mar-2022 19:48
Date Analysis Commenced : 15-Mar-2022
Issue Date : 22-Mar-2022 13:54



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK061G (Total Kjeldahl Nitrogen as N): Some samples were diluted due to matrix interference. LOR adjusted accordingly.
- TDS by method EA-015 may bias high for sample 9(BH2203_220309) due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- It has been noted that EK057G (Nitrite as N) is greater than EK059G (Nitrite and Nitrate as N) for some samples, however this difference is within the limits of experimental variation.
- EG035T (Total Mercury): Positive mercury results have been confirmed by re-extraction and re-analysis.
- It is recognised that EG020T (Total Metals by ICP-MS) is less than EG020F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for sample BH2203_220309 (EB2206768-009). This has been confirmed by re-digestion and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				QC300_220311	QC500_220311	QC100_220311	BH2347_220308	BH2345_220308
Sampling date / time				11-Mar-2022 00:00	11-Mar-2022 00:00	10-Mar-2022 00:00	08-Mar-2022 00:00	08-Mar-2022 00:00
Compound	CAS Number	LOR	Unit	EB2206768-001	EB2206768-002	EB2206768-003	EB2206768-004	EB2206768-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.51	5.28	7.10	8.01	7.73
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	0.12	0.12	34.0	1.60	1.24
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24	16000	1170	2000
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	<10	16	11200	758	1360
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	<1	1380	436	896
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	<1	272	295	625
Total Alkalinity as CaCO3	----	1	mg/L	5	<1	272	295	625
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	3	348	8	6
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	<1	<1	5670	218	327
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	123	59	151
Magnesium	7439-95-4	1	mg/L	<1	<1	261	70	126
Sodium	7440-23-5	1	mg/L	<1	<1	2910	77	85
Potassium	7440-09-7	1	mg/L	<1	<1	16	<1	5
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.002	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.10	0.06	0.07
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.174	0.089	0.023
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.014	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	1.15	0.010	0.009
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.007	0.004	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_220311	QC500_220311	QC100_220311	BH2347_220308	BH2345_220308
Sampling date / time				11-Mar-2022 00:00	11-Mar-2022 00:00	10-Mar-2022 00:00	08-Mar-2022 00:00	08-Mar-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2206768-001	EB2206768-002	EB2206768-003	EB2206768-004	EB2206768-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	0.018	<0.005	
Iron	7439-89-6	0.05	mg/L	----	----	2.14	0.05	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.003	0.001	<0.001	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.10	0.06	0.06	
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.189	0.095	0.045	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.018	<0.001	0.005	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.002	<0.001	0.009	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	0.003	0.005	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	1.12	0.012	0.140	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.008	0.005	0.015	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.005	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.006	0.021	0.015	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	3.31	0.12	6.25	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0017	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	<0.1	0.3	0.2	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.03	<0.01	0.08	<0.01	<0.01	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.02	<0.01	0.11	2.20	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_220311	QC500_220311	QC100_220311	BH2347_220308	BH2345_220308
Sampling date / time					11-Mar-2022 00:00	11-Mar-2022 00:00	10-Mar-2022 00:00	08-Mar-2022 00:00	08-Mar-2022 00:00
Compound	CAS Number	LOR	Unit		EB2206768-001	EB2206768-002	EB2206768-003	EB2206768-004	EB2206768-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	0.02	<0.01	0.11	2.20
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	<0.5	<0.1	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	<0.5	0.1	2.4
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	0.22	0.13	0.42
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	0.08	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		0.10	0.06	173	12.2	21.8
∅ Total Cations	----	0.01	meq/L		<0.01	<0.01	155	12.0	21.7
∅ Ionic Balance	----	0.01	%		----	----	5.51	0.64	0.24



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2343_220308	BH2617_220309	BH2216_220309	BH2203_220309	BH2206_220309
Sampling date / time				08-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00
Compound	CAS Number	LOR	Unit	EB2206768-006	EB2206768-007	EB2206768-008	EB2206768-009	EB2206768-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.68	7.47	7.97	6.98	6.79
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	0.87	1.51	16.3	1.66	5.24
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	5290	377	3180	1610	861
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	4080	262	1850	1390	501
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	2600	119	272	634	108
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	562	174	745	128	91
Total Alkalinity as CaCO3	----	1	mg/L	562	174	745	128	91
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	68	7	42	757	22
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1420	10	635	10	212
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	198	33	53	221	20
Magnesium	7439-95-4	1	mg/L	512	9	34	20	14
Sodium	7440-23-5	1	mg/L	102	38	620	96	125
Potassium	7440-09-7	1	mg/L	2	3	5	6	14
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.003	0.003	0.002
Boron	7440-42-8	0.05	mg/L	<0.05	0.10	0.18	0.10	<0.05
Barium	7440-39-3	0.001	mg/L	0.013	0.226	0.058	0.057	0.329
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.001	0.004	0.003
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.007	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.003	0.007	0.164	0.562	0.039
Nickel	7440-02-0	0.001	mg/L	0.004	<0.001	0.002	0.005	0.041

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_220308	BH2617_220309	BH2216_220309	BH2203_220309	BH2206_220309
Sampling date / time				08-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2206768-006	EB2206768-007	EB2206768-008	EB2206768-009	EB2206768-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	0.005	0.010	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.22	11.2	4.26	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.004	0.004	0.004	
Boron	7440-42-8	0.05	mg/L	<0.05	0.10	0.23	0.13	0.05	
Barium	7440-39-3	0.001	mg/L	0.015	0.249	0.070	0.070	0.357	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.004	0.004	0.003	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.005	0.009	0.025	
Copper	7440-50-8	0.001	mg/L	<0.001	0.002	0.008	<0.001	0.002	
Manganese	7439-96-5	0.001	mg/L	0.018	0.017	0.243	0.437	0.040	
Nickel	7440-02-0	0.001	mg/L	0.006	<0.001	0.004	0.007	0.042	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.002	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	0.018	<0.005	0.009	
Iron	7439-89-6	0.05	mg/L	0.39	0.11	2.92	8.52	6.32	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.3	0.1	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.05	0.05	0.08	0.23	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.07	<0.01	<0.01	0.03	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	22.8	1.14	<0.01	<0.01	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_220308	BH2617_220309	BH2216_220309	BH2203_220309	BH2206_220309
Sampling date / time					08-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00	09-Mar-2022 00:00
Compound	CAS Number	LOR	Unit		EB2206768-006	EB2206768-007	EB2206768-008	EB2206768-009	EB2206768-010
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		22.9	1.14	<0.01	0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.7	0.2	0.2	1.0	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		24.6	1.3	0.2	1.0	0.2
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.07	0.18	0.09	0.03	0.08
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	0.06	0.01	<0.01	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		52.7	3.90	33.7	18.6	8.26
∅ Total Cations	----	0.01	meq/L		56.5	4.12	32.5	17.0	7.94
∅ Ionic Balance	----	0.01	%		3.49	2.65	1.71	4.49	1.92



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2309_220310	BH2210_220310	BH2214_220310	BH2215_220310	BH2217_220310
Sampling date / time					10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00
Compound	CAS Number	LOR	Unit		EB2206768-011	EB2206768-012	EB2206768-013	EB2206768-014	EB2206768-015
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.37	8.02	7.55	7.27	7.69
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		32.2	58.2	37.9	34.3	6.78
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		3690	10300	13100	16000	806
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2100	5750	7890	11200	520
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		84	273	919	1400	95
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		325	841	597	278	230
Total Alkalinity as CaCO3	----	1	mg/L		325	841	597	278	230
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	143	229	357	36
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		991	3040	4140	5380	86
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		9	17	106	124	20
Magnesium	7439-95-4	1	mg/L		15	56	159	264	11
Sodium	7440-23-5	1	mg/L		679	2210	2640	2950	152
Potassium	7440-09-7	1	mg/L		3	13	11	16	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.005	0.002	0.006	0.002	0.003
Boron	7440-42-8	0.05	mg/L		0.06	0.36	0.09	0.09	<0.05
Barium	7440-39-3	0.001	mg/L		0.395	0.134	0.508	0.177	0.101
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.008	<0.001	0.003	0.014	<0.001
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.003	<0.001	<0.001	<0.001	0.001
Manganese	7439-96-5	0.001	mg/L		0.343	0.251	3.29	1.16	0.002
Nickel	7440-02-0	0.001	mg/L		0.002	0.004	<0.001	0.007	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2309_220310	BH2210_220310	BH2214_220310	BH2215_220310	BH2217_220310
Sampling date / time				10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2206768-011	EB2206768-012	EB2206768-013	EB2206768-014	EB2206768-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.005	<0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	14.8	1.32	5.29	2.14	<0.05	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.010	0.003	0.007	0.002	0.003	
Boron	7440-42-8	0.05	mg/L	0.06	0.34	0.09	0.10	<0.05	
Barium	7440-39-3	0.001	mg/L	0.627	0.184	0.574	0.195	0.134	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.013	0.002	0.007	0.018	0.002	
Chromium	7440-47-3	0.001	mg/L	0.011	0.004	0.017	0.002	0.002	
Copper	7440-50-8	0.001	mg/L	0.026	0.003	0.006	0.001	0.006	
Manganese	7439-96-5	0.001	mg/L	0.368	0.259	3.18	1.16	0.027	
Nickel	7440-02-0	0.001	mg/L	0.008	0.006	0.008	0.009	0.004	
Lead	7439-92-1	0.001	mg/L	0.025	0.002	0.003	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.04	<0.01	0.02	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.060	0.010	0.020	0.006	0.011	
Iron	7439-89-6	0.05	mg/L	23.8	3.68	13.5	3.20	0.75	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	1.8	0.2	<0.1	0.4	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.02	1.18	0.11	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.03	<0.01	0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	0.47	<0.01	0.66	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2309_220310	BH2210_220310	BH2214_220310	BH2215_220310	BH2217_220310
Sampling date / time					10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00	10-Mar-2022 00:00
Compound	CAS Number	LOR	Unit		EB2206768-011	EB2206768-012	EB2206768-013	EB2206768-014	EB2206768-015
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.02	<0.01	0.48	<0.01	0.66
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.5	<0.1	2.1	<0.5	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.5	<0.1	2.6	<0.5	0.7
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.07	0.14	0.66	0.23	0.56
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	<0.01	<0.01	<0.01	0.49
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		34.4	106	133	165	7.77
∅ Total Cations	----	0.01	meq/L		31.3	102	133	157	8.57
∅ Ionic Balance	----	0.01	%		4.80	1.74	<0.01	2.52	4.87

QUALITY CONTROL REPORT

Work Order	: EB2206768	Page	: 1 of 11
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: BRISBANE	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 11-Mar-2022
Order number	: 60553814_3100	Date Analysis Commenced	: 15-Mar-2022
C-O-C number	: ----	Issue Date	: 22-Mar-2022
Sampler	: KEEGAN McGUFFIE		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 15		
No. of samples analysed	: 15		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4230548)									
EB2206767-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.85	6.83	0.3	0% - 20%
EB2206768-006	BH2343_220308	EA005-P: pH Value	----	0.01	pH Unit	7.68	7.69	0.1	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 4230553)									
EB2206768-015	BH2217_220310	EA005-P: pH Value	----	0.01	pH Unit	7.69	7.79	1.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4230546)									
EB2206767-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	192	190	0.8	0% - 20%
EB2206768-006	BH2343_220308	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	5290	5280	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4230551)									
EB2206768-015	BH2217_220310	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	806	804	0.2	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4228093)									
EB2206597-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	8090	8160	0.9	0% - 20%
EB2206479-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	575	589	2.5	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4228096)									
EB2206768-002	QC500_220311	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	16	18	5.9	No Limit
EB2206768-011	BH2309_220310	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2100	2090	0.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4230547)									
EB2206767-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	11	11	0.0	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	11	11	0.0	0% - 50%
EB2206768-006	BH2343_220308	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	562	553	1.7	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4230547) - continued									
EB2206768-006	BH2343_220308	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	562	553	1.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4230552)									
EB2206768-015	BH2217_220310	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	230	235	2.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	230	235	2.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4237201)									
EB2206768-001	QC300_220311	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EB2206768-011	BH2309_220310	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4237202)									
EB2206768-001	QC300_220311	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EB2206768-011	BH2309_220310	ED045G: Chloride	16887-00-6	1	mg/L	991	990	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4231493)									
EB2206660-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	1990	1980	0.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	14	14	0.0	0% - 50%
EB2206768-008	BH2216_220309	ED093F: Calcium	7440-70-2	1	mg/L	53	54	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	34	34	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	620	618	0.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4231490)									
EB2206531-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.002	<0.001	84.7	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.13	<0.05	87.3	No Limit
EB2206660-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4231490) - continued									
EB2206660-001	Anonymous	EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	2.72	2.74	0.9	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.034	0.033	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	2.20	2.42	9.1	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.30	0.30	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4231494)									
EB2206768-011	BH2309_220310	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.395	0.392	0.8	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.004	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.343	0.340	0.9	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	0.01	0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	14.8	14.7	0.6	0% - 20%
EB2206768-008	BH2216_220309	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.058	0.058	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.164	0.165	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4231494) - continued									
EB2206768-008	BH2216_220309	EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.18	0.19	9.6	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.22	0.22	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 4231967)									
EB2206768-001	QC300_220311	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit		
EB2206768-010	BH2206_220309	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.357	0.349	2.3	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.025	0.025	0.0	0% - 20%
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.040	0.039	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.042	0.041	0.0	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.009	0.011	16.6	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.05	<0.05	0.0	No Limit
EG020A-T: Iron	7439-89-6	0.05	mg/L	6.32	6.07	4.0	0% - 20%		
EG035F: Dissolved Mercury by FIMS (QC Lot: 4231491)									
EB2206531-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2206768-008	BH2216_220309	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4231495)									
EB2206768-011	BH2309_220310	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

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 Work Order : EB2206768
 Client : AECOM AUSTRALIA PTY LTD
 Project : INLAND RAIL



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4232036)									
EB2206752-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2206768-009	BH2203_220309	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 4230549)									
EB2206768-006	BH2343_220308	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EB2206768-015	BH2217_220310	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4237187)									
EB2206768-001	QC300_220311	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.0	No Limit
EB2206768-011	BH2309_220310	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4237203)									
EB2206768-001	QC300_220311	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2206768-011	BH2309_220310	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.03	0.03	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4237186)									
EB2206768-001	QC300_220311	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2206768-011	BH2309_220310	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.01	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4235384)									
EB2205949-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	80.6	80.4	0.3	0% - 20%
EB2206768-008	BH2216_220309	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4235385)									
EB2205949-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	40.8	40.4	1.0	0% - 20%
EB2206768-008	BH2216_220309	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	0.09	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4237204)									
EB2206768-001	QC300_220311	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2206768-011	BH2309_220310	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.02	0.02	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
EA005P: pH by PC Titrator (QCLot: 4230548)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98.0	102
				----	7 pH Unit	99.8	98.0	102
EA005P: pH by PC Titrator (QCLot: 4230553)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98.0	102
				----	7 pH Unit	99.8	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 4230546)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	100	95.0	105
				<1	24800 µS/cm	96.3	95.0	105
EA010P: Conductivity by PC Titrator (QCLot: 4230551)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	99.4	95.0	105
				<1	12890 µS/cm	96.1	95.0	105
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4228093)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	100	88.0	112
				<10	293 mg/L	108	88.0	112
				<10	2000 mg/L	95.8	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 4228096)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2460 mg/L	97.7	88.0	112
				<10	293 mg/L	108	88.0	112
				<10	2000 mg/L	96.1	80.9	118
ED037P: Alkalinity by PC Titrator (QCLot: 4230547)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	101	80.0	120
ED037P: Alkalinity by PC Titrator (QCLot: 4230552)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	107	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4237201)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.0	118
				<1	100 mg/L	98.6	85.0	118
ED045G: Chloride by Discrete Analyser (QCLot: 4237202)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	91.4	90.0	115
				<1	1000 mg/L	99.5	90.0	115
ED093F: Dissolved Major Cations (QCLot: 4231493)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.7	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.5	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.5	70.0	130



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
ED093F: Dissolved Major Cations (QCLot: 4231493) - continued								
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.7	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4231490)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	104	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.8	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.1	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.6	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.2	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.5	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.5	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.0	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	99.4	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.7	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.8	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.0	82.0	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 4231494)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.0	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.5	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.7	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	99.7	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.9	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	87.0	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 4231967)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	98.9	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	106	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.6	88.0	111



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
							Low	High
CAS Number	LOR	Unit						
EG020T: Total Metals by ICP-MS (QCLot: 4231967) - continued								
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	113	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.8	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.5	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	104	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.0	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.1	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4231491)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.3	84.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4231495)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.4	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4232036)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.2	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 4230549)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	95.5	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4237187)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	94.8	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4237203)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.0	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4237186)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	93.4	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4235384)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.2	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4235385)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	100.0	79.2	105
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4237204)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.7	81.7	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4237201)							
EB2206768-002	QC500_220311	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	98.0	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4237202)							
EB2206768-002	QC500_220311	ED045G: Chloride	16887-00-6	400 mg/L	99.1	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4231490)							
EB2206531-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	105	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	89.1	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	102	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	98.7	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	91.8	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	92.4	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	93.7	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.1	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	# Not Determined	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	92.5	70.0	130
	EG020A-F: Vanadium	7440-62-2	1 mg/L	94.4	70.0	130	
	EG020A-F: Zinc	7440-66-6	1 mg/L	91.6	70.0	130	
EG020F: Dissolved Metals by ICP-MS (QCLot: 4231494)							
EB2206768-009	BH2203_220309	EG020A-F: Arsenic	7440-38-2	1 mg/L	106	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	97.2	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	105	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	101	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	103	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	105	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	106	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	102	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	105	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	104	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	105	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	100	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4231967)							
EB2206768-002	QC500_220311	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.9	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	104	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	99.4	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	99.4	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	93.3	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	102	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	99.6	70.0	130

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 Work Order : EB2206768
 Client : AECOM AUSTRALIA PTY LTD
 Project : INLAND RAIL



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 4231967) - continued							
EB2206768-002	QC500_220311	EG020A-T: Lead	7439-92-1	1 mg/L	99.5	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	93.3	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.6	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	92.8	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	102	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4231491)							
EB2206531-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	79.0	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4231495)							
EB2206768-012	BH2210_220310	EG035F: Mercury	7439-97-6	0.01 mg/L	88.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4232036)							
EB2206752-002	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	92.5	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4230549)							
EB2206767-007	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	100	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4237187)							
EB2206768-002	QC500_220311	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	111	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4237203)							
EB2206768-002	QC500_220311	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	112	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4237186)							
EB2206768-002	QC500_220311	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	102	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4235384)							
EB2206571-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	94.1	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4235385)							
EB2206571-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	105	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4237204)							
EB2206768-002	QC500_220311	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	108	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2206768	Page	: 1 of 15
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 11-Mar-2022
Site	: ----	Issue Date	: 22-Mar-2022
Sampler	: KEEGAN McGUFFIE	No. of samples received	: 15
Order number	: 60553814_3100	No. of samples analysed	: 15

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	EB2206531--001	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue	
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural BH2347_220308, BH2343_220308	BH2345_220308,	----	----	----	16-Mar-2022	09-Mar-2022	7
Clear Plastic Bottle - Natural BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	----	----	----	16-Mar-2022	10-Mar-2022	6
Clear Plastic Bottle - Natural QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	----	----	----	16-Mar-2022	11-Mar-2022	5
Clear Plastic Bottle - Natural QC300_220311,	QC500_220311	----	----	----	16-Mar-2022	12-Mar-2022	4
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Natural BH2217_220310		----	----	----	19-Mar-2022	17-Mar-2022	2
Clear Plastic Bottle - Natural QC300_220311,	QC500_220311	----	----	----	19-Mar-2022	18-Mar-2022	1
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural BH2217_220310		----	----	----	19-Mar-2022	17-Mar-2022	2
Clear Plastic Bottle - Natural QC300_220311,	QC500_220311	----	----	----	19-Mar-2022	18-Mar-2022	1
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural BH2347_220308, BH2343_220308	BH2345_220308,	----	----	----	19-Mar-2022	10-Mar-2022	9
Clear Plastic Bottle - Natural BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	----	----	----	19-Mar-2022	11-Mar-2022	8



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural QC100_220311, BH2309_220310, BH2210_220310, BH2214_220310, BH2215_220310, BH2217_220310	----	----	----	19-Mar-2022	12-Mar-2022	7
Clear Plastic Bottle - Natural QC300_220311, QC500_220311	----	----	----	19-Mar-2022	13-Mar-2022	6
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural BH2347_220308, BH2345_220308, BH2343_220308	----	----	----	19-Mar-2022	10-Mar-2022	9
Clear Plastic Bottle - Natural BH2617_220309, BH2216_220309, BH2203_220309, BH2206_220309	----	----	----	19-Mar-2022	11-Mar-2022	8
Clear Plastic Bottle - Natural QC100_220311, BH2309_220310, BH2210_220310, BH2214_220310, BH2215_220310, BH2217_220310	----	----	----	19-Mar-2022	12-Mar-2022	7
Clear Plastic Bottle - Natural QC300_220311, QC500_220311	----	----	----	19-Mar-2022	13-Mar-2022	6

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	16-Mar-2022	09-Mar-2022	✖
Clear Plastic Bottle - Natural (EA005-P) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	16-Mar-2022	10-Mar-2022	✖
Clear Plastic Bottle - Natural (EA005-P) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	16-Mar-2022	11-Mar-2022	✖
Clear Plastic Bottle - Natural (EA005-P) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	16-Mar-2022	12-Mar-2022	✖
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	16-Mar-2022	05-Apr-2022	✔
Clear Plastic Bottle - Natural (EA010-P) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	16-Mar-2022	06-Apr-2022	✔
Clear Plastic Bottle - Natural (EA010-P) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	16-Mar-2022	07-Apr-2022	✔
Clear Plastic Bottle - Natural (EA010-P) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	16-Mar-2022	08-Apr-2022	✔
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	15-Mar-2022	15-Mar-2022	✔
Clear Plastic Bottle - Natural (EA015H) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	15-Mar-2022	16-Mar-2022	✔
Clear Plastic Bottle - Natural (EA015H) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	15-Mar-2022	17-Mar-2022	✔
Clear Plastic Bottle - Natural (EA015H) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	15-Mar-2022	18-Mar-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) BH2217_220310		10-Mar-2022	----	----	----	19-Mar-2022	17-Mar-2022	✘
Clear Plastic Bottle - Natural (ED093F) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	18-Mar-2022	✘
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	05-Apr-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	06-Apr-2022	✔
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) QC100_220311, BH2210_220310, BH2215_220310	BH2309_220310, BH2214_220310,	10-Mar-2022	----	----	----	19-Mar-2022	07-Apr-2022	✔
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	16-Mar-2022	22-Mar-2022	✔
Clear Plastic Bottle - Natural (ED037-P) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	16-Mar-2022	23-Mar-2022	✔
Clear Plastic Bottle - Natural (ED037-P) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	16-Mar-2022	24-Mar-2022	✔
Clear Plastic Bottle - Natural (ED037-P) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	16-Mar-2022	25-Mar-2022	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	05-Apr-2022	✔
Clear Plastic Bottle - Natural (ED041G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	06-Apr-2022	✔
Clear Plastic Bottle - Natural (ED041G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	19-Mar-2022	07-Apr-2022	✔
Clear Plastic Bottle - Natural (ED041G) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	08-Apr-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Natural (ED045G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Natural (ED045G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	19-Mar-2022	07-Apr-2022	✓
Clear Plastic Bottle - Natural (ED045G) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	08-Apr-2022	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) BH2217_220310		10-Mar-2022	----	----	----	19-Mar-2022	17-Mar-2022	✗
Clear Plastic Bottle - Natural (ED093F) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	18-Mar-2022	✗
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) QC100_220311, BH2210_220310, BH2215_220310	BH2309_220310, BH2214_220310,	10-Mar-2022	----	----	----	19-Mar-2022	07-Apr-2022	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-F) BH2217_220310		10-Mar-2022	----	----	----	19-Mar-2022	06-Sep-2022	✓
Clear Plastic Bottle - Natural (EG020A-F) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	07-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	04-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	05-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) QC100_220311, BH2210_220310, BH2215_220310	BH2309_220310, BH2214_220310,	10-Mar-2022	----	----	----	19-Mar-2022	06-Sep-2022	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	18-Mar-2022	04-Sep-2022	✓	18-Mar-2022	04-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	18-Mar-2022	05-Sep-2022	✓	18-Mar-2022	05-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	18-Mar-2022	06-Sep-2022	✓	18-Mar-2022	06-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) QC300_220311,	QC500_220311	11-Mar-2022	18-Mar-2022	07-Sep-2022	✓	18-Mar-2022	07-Sep-2022	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035F) BH2217_220310		10-Mar-2022	----	----	----	21-Mar-2022	07-Apr-2022	✓
Clear Plastic Bottle - Natural (EG035F) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	21-Mar-2022	08-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	21-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	21-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) QC100_220311, BH2210_220310, BH2215_220310	BH2309_220310, BH2214_220310,	10-Mar-2022	----	----	----	21-Mar-2022	07-Apr-2022	✓
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	18-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	18-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	18-Mar-2022	07-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	18-Mar-2022	08-Apr-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	16-Mar-2022	05-Apr-2022	✔
Clear Plastic Bottle - Natural (EK040P) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	16-Mar-2022	06-Apr-2022	✔
Clear Plastic Bottle - Natural (EK040P) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	16-Mar-2022	07-Apr-2022	✔
Clear Plastic Bottle - Natural (EK040P) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	16-Mar-2022	08-Apr-2022	✔
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	05-Apr-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	06-Apr-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	19-Mar-2022	07-Apr-2022	✔
Clear Plastic Bottle - Sulfuric Acid (EK055G) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	08-Apr-2022	✔
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	10-Mar-2022	✖
Clear Plastic Bottle - Natural (EK057G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	11-Mar-2022	✖
Clear Plastic Bottle - Natural (EK057G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	19-Mar-2022	12-Mar-2022	✖
Clear Plastic Bottle - Natural (EK057G) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	13-Mar-2022	✖



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	19-Mar-2022	07-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	08-Apr-2022	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	18-Mar-2022	05-Apr-2022	✓	18-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	18-Mar-2022	06-Apr-2022	✓	18-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	18-Mar-2022	07-Apr-2022	✓	18-Mar-2022	07-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) QC300_220311,	QC500_220311	11-Mar-2022	18-Mar-2022	08-Apr-2022	✓	18-Mar-2022	08-Apr-2022	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	18-Mar-2022	05-Apr-2022	✓	18-Mar-2022	05-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	18-Mar-2022	06-Apr-2022	✓	18-Mar-2022	06-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	18-Mar-2022	07-Apr-2022	✓	18-Mar-2022	07-Apr-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) QC300_220311,	QC500_220311	11-Mar-2022	18-Mar-2022	08-Apr-2022	✓	18-Mar-2022	08-Apr-2022	✓

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 Work Order : EB2206768
 Client : AECOM AUSTRALIA PTY LTD
 Project : INLAND RAIL



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2347_220308, BH2343_220308	BH2345_220308,	08-Mar-2022	----	----	----	19-Mar-2022	10-Mar-2022	✘
Clear Plastic Bottle - Natural (EK071G) BH2617_220309, BH2203_220309,	BH2216_220309, BH2206_220309	09-Mar-2022	----	----	----	19-Mar-2022	11-Mar-2022	✘
Clear Plastic Bottle - Natural (EK071G) QC100_220311, BH2210_220310, BH2215_220310,	BH2309_220310, BH2214_220310, BH2217_220310	10-Mar-2022	----	----	----	19-Mar-2022	12-Mar-2022	✘
Clear Plastic Bottle - Natural (EK071G) QC300_220311,	QC500_220311	11-Mar-2022	----	----	----	19-Mar-2022	13-Mar-2022	✘



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	3	24	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	24	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	30	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	33	12.12	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	3	22	13.64	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	24	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	24	16.67	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	22	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	32	18.75	15.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	24	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Page : 15 of 15
Work Order : EB2206768
Client : AECOM AUSTRALIA PTY LTD
Project : INLAND RAIL



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)



CHAIN OF CUSTODY

Submitted to: Australian Laboratory Services (Brisbane)
2 Byth St. Stafford 4055. (Corner of Byth & Strand Streets). Phone: 07 3243 7222

SCANNED

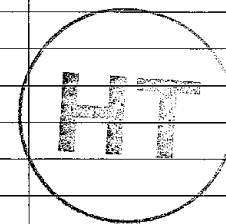
Environmental Division
Brisbane
Work Order Reference
EB2211383



Telephone : + 61-7-3243 7222

CLIENT: AECOM Australia		TURNAROUND REQUIREMENTS : ☒ Standard TAT (List due date): 5 days TAT from samples reception		FOR LABORATORY USE ONLY (Circle)	
OFFICE: Brisbane - Level 8, 540 Wickham Street Fortitude Valley QLD 4006		Standard TAT may be longer for some tests e.g. Ultra Trace Organics		Custody Seal Integrity	
PROJECT: Inland Rail		ALS QUOTE NO.: BN/219/20		Free ice / frozen ice block to prevent upthrusting?	
ORDER NUMBER: 60553814_3100.V01-B2G Variation		COC SEQUENCE NUMBER (Circle)		Random Sample Temperature on Receipt	
PROJECT MANAGER: Krystle Nichols		CONTACT PH: 0400 182 289		Other comment	
SAMPLER: K. McGuffie & J. Suchting		SAMPLER MOBILE: 0400 182 289		RECEIVED BY: <i>MS</i>	
COC emailed to ALS? Circle (YES / NO)		EDD FORMAT (or default):		RELINQUISHED BY:	
Email Reports to: emma.koeman@aecom.com; keegan.mcguffie@aecom.com		DATE/TIME: 12:39 pm		DATE/TIME: 12:50	
Email Invoice to: emma.koeman@aecom.com		DATE/TIME: 26/4/22		DATE/TIME:	
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

ALS USE ONLY		SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).														EQUIPMENT	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	(EA006) Sodium Adsorption Ratio (Calculation)	(EA015H) Total Dissolved Solids Standard Level	(NT-01D) Major Cations (Ca, Mg, Na, K) + Hardness	(NT-02A) Major Anions (Cl, SO4, Fluoride, Alkalinity)	(NT-08A) Total Nitrogen + NO2 + NO3 + NH3 + Total P + Reactive P	(W-03) 15 Metals Total (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020T) Total Metals by ICP/MS (inc. digestion) (Fe)	(W-03T) 15 Metals (NEPM Suite) (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, B, Ba, Be, Co, Mn, Se, V)	(EG020F) Dissolved Metals by ICP/MS (Fe)	(EA005P) pH/PCOT	(EA010P) Electrical Conductivity (PCT)	TRIPHAH/BEYN	Pesticides	PCBs	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. PLEASE APPLY ALS ANALYTICAL SUITE CODES AS PER PROJECT SPECIFIC QUOTE PLEASE SEND ANY SAMPLE MARKED WITH # TO EUROFINS NOT BRISBANE FOR ANALYSIS		
1	BH2347-220419	19/4/22	W	Unpreserved Diluted 2N H2SO4	4	X	X	X	X	X	X	X	X	X	X	X	X					
2	BH2345-220419	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
3	BH2617-220420	20/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
4	BH2216-220420	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
5	BH2210-220420	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
6	BH2309-220420	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
7	BH2205-220421	21/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
8	BH2206-220421	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
9	BH2201-220421	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
10	BH2213-220421	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
11	BH2235-220422	22/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
12	BH2234-220422	22/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
13	BH2233-220422	22/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
14	BH2214-220423	23/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
15	BH2215-220423	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
16	BH2213-220423	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
17	BH2344-220423	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
18	BH2248-220423	"	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
19	BH2217-220424	24/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
20	QC00-220423	23/4/22	W	"	4	X	X	X	X	X	X	X	X	X	X	X	X					
21	QC300-220424	24/4/22	W	INITE, SULPH, IAN	3	X	X	X	X	X	X	X	X	X	X	X	X					
22	QC500-220424	24/4/22	W	"	3	X	X	X	X	X	X	X	X	X	X	X	X					
23	BH2218-220421	21/4/22	W	"	4	Andi																
TOTAL																						



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EB2211383

Client : AECOM AUSTRALIA PTY LTD Contact : KRYSTLE NICHOLS Address : 8/540 WICKHAM STREET FORTITUDE VALLEY 4006 E-mail : krystle.nichols@aecom.com Telephone : +61 07 3553 2000 Facsimile : +61 07 3553 2050 Project : INLAND RAIL Order number : 60553814_3100.V01-B2G Variation C-O-C number : ---- Site : ---- Sampler : K. McGuffie & J. Suchting	Laboratory : Environmental Division Brisbane Contact : Carsten Emrich Address : 2 Byth Street Stafford QLD Australia 4053 E-mail : carsten.emrich@alsglobal.com Telephone : +61 7 3552 8616 Facsimile : +61-7-3243 7218 Page : 1 of 5 Quote number : EB2020AECOMAU0008 (BN/219/20) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 26-Apr-2022 12:50	Issue Date : 26-Apr-2022
Client Requested Due Date : 04-May-2022	Scheduled Reporting Date : 04-May-2022

Delivery Details

Mode of Delivery : Client Drop Off	Security Seal : Not Available
No. of coolers/boxes : 2	Temperature : 5.0/3.1°C - Ice present
Receipt Detail : MEDIUM HARD ESKIES	No. of samples received / analysed : 23 / 23

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please be advised that an extra sample "BH2218_220421" was received in addition to the samples listed on the Chain of Custody. This sample has been added to the end of the work order as per phone directive (K.McGuffie 26/04/22 16:55), ALS will assign the same analysis as samples #1 through to 20. If you wish to discuss this further please contact ALS Brisbane Client Services Department at ALSEnviro.Brisbane@alsglobal.com.**
- **Please note where you have asked for 'Dissolved' metals, the laboratory will filter an aliquot from the non-preserved plastic (ALS Green label) container for this analysis on samples "QC300_220424" and "QC500_220424" as no filtered nitric-acid (ALS Red label, field filtered) was received for either sample, however this is a non-compliant container/process and should be taken into consideration when reviewing the metals data. Additional charges will be incurred for laboratory filtration.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
QC300_220424	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC500_220424	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
QC300_220424	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
QC500_220424	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA005P pH (PCT)	WATER - EA006 Sodium Adsorption Ratio	WATER - EA010P Electrical Conductivity (PCT)	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-03T 15 Metals (Total) (NEPM)
EB2211383-001	19-Apr-2022 00:00	BH2347_220419	✓	✓	✓	✓	✓	✓	✓
EB2211383-002	19-Apr-2022 00:00	BH2345_220419	✓	✓	✓	✓	✓	✓	✓
EB2211383-003	20-Apr-2022 00:00	BH2617_220420	✓	✓	✓	✓	✓	✓	✓
EB2211383-004	20-Apr-2022 00:00	BH2216_220420	✓	✓	✓	✓	✓	✓	✓
EB2211383-005	20-Apr-2022 00:00	BH2210_220420	✓	✓	✓	✓	✓	✓	✓
EB2211383-006	20-Apr-2022 00:00	BH2309_220420	✓	✓	✓	✓	✓	✓	✓
EB2211383-007	21-Apr-2022 00:00	BH2203_220421	✓	✓	✓	✓	✓	✓	✓
EB2211383-008	21-Apr-2022 00:00	BH2206_220421	✓	✓	✓	✓	✓	✓	✓
EB2211383-009	21-Apr-2022 00:00	BH2201_220421	✓	✓	✓	✓	✓	✓	✓
EB2211383-010	21-Apr-2022 00:00	BH2213_220421	✓	✓	✓	✓	✓	✓	✓
EB2211383-011	22-Apr-2022 00:00	BH2235_220422	✓	✓	✓	✓	✓	✓	✓
EB2211383-012	22-Apr-2022 00:00	BH2234_220422	✓	✓	✓	✓	✓	✓	✓
EB2211383-013	22-Apr-2022 00:00	BH2233_220422	✓	✓	✓	✓	✓	✓	✓
EB2211383-014	23-Apr-2022 00:00	BH2214_220423	✓	✓	✓	✓	✓	✓	✓
EB2211383-015	23-Apr-2022 00:00	BH2215_220423	✓	✓	✓	✓	✓	✓	✓
EB2211383-016	23-Apr-2022 00:00	BH2343_220423	✓	✓	✓	✓	✓	✓	✓
EB2211383-017	23-Apr-2022 00:00	BH2344_220423	✓	✓	✓	✓	✓	✓	✓
EB2211383-018	23-Apr-2022 00:00	BH2248_220423	✓	✓	✓	✓	✓	✓	✓
EB2211383-019	24-Apr-2022 00:00	BH2217_220424	✓	✓	✓	✓	✓	✓	✓
EB2211383-020	23-Apr-2022 00:00	QC100_220423	✓	✓	✓	✓	✓	✓	✓
EB2211383-021	24-Apr-2022 00:00	QC300_220424	✓	✓	✓		✓	✓	✓
EB2211383-022	24-Apr-2022 00:00	QC500_220424	✓	✓	✓		✓	✓	✓
EB2211383-023	21-Apr-2022 00:00	BH2218_220421	✓	✓	✓	✓	✓	✓	✓



Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &	WATER - NT-01D Major Cations (Ca, Mg, Na, K) + Hardness	WATER - NT-02A Major Anions (Cl, SO4, Fluoride, Alkalinity)	WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P +
EB2211383-001	19-Apr-2022 00:00	BH2347_220419	✓	✓	✓	✓	✓
EB2211383-002	19-Apr-2022 00:00	BH2345_220419	✓	✓	✓	✓	✓
EB2211383-003	20-Apr-2022 00:00	BH2617_220420	✓	✓	✓	✓	✓
EB2211383-004	20-Apr-2022 00:00	BH2216_220420	✓	✓	✓	✓	✓
EB2211383-005	20-Apr-2022 00:00	BH2210_220420	✓	✓	✓	✓	✓
EB2211383-006	20-Apr-2022 00:00	BH2309_220420	✓	✓	✓	✓	✓
EB2211383-007	21-Apr-2022 00:00	BH2203_220421	✓	✓	✓	✓	✓
EB2211383-008	21-Apr-2022 00:00	BH2206_220421	✓	✓	✓	✓	✓
EB2211383-009	21-Apr-2022 00:00	BH2201_220421	✓	✓	✓	✓	✓
EB2211383-010	21-Apr-2022 00:00	BH2213_220421	✓	✓	✓	✓	✓
EB2211383-011	22-Apr-2022 00:00	BH2235_220422	✓	✓	✓	✓	✓
EB2211383-012	22-Apr-2022 00:00	BH2234_220422	✓	✓	✓	✓	✓
EB2211383-013	22-Apr-2022 00:00	BH2233_220422	✓	✓	✓	✓	✓
EB2211383-014	23-Apr-2022 00:00	BH2214_220423	✓	✓	✓	✓	✓
EB2211383-015	23-Apr-2022 00:00	BH2215_220423	✓	✓	✓	✓	✓
EB2211383-016	23-Apr-2022 00:00	BH2343_220423	✓	✓	✓	✓	✓
EB2211383-017	23-Apr-2022 00:00	BH2344_220423	✓	✓	✓	✓	✓
EB2211383-018	23-Apr-2022 00:00	BH2248_220423	✓	✓	✓	✓	✓
EB2211383-019	24-Apr-2022 00:00	BH2217_220424	✓	✓	✓	✓	✓
EB2211383-020	23-Apr-2022 00:00	QC100_220423	✓	✓	✓	✓	✓
EB2211383-021	24-Apr-2022 00:00	QC300_220424	✓	✓	✓	✓	✓
EB2211383-022	24-Apr-2022 00:00	QC500_220424	✓	✓	✓	✓	✓
EB2211383-023	21-Apr-2022 00:00	BH2218_220421	✓	✓	✓	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator								
BH2201_220421	Clear Plastic Bottle - Natural	----	21-Apr-2022	26-Apr-2022	✗	----	----	
BH2203_220421	Clear Plastic Bottle - Natural	----	21-Apr-2022	26-Apr-2022	✗	----	----	
BH2206_220421	Clear Plastic Bottle - Natural	----	21-Apr-2022	26-Apr-2022	✗	----	----	
BH2210_220420	Clear Plastic Bottle - Natural	----	20-Apr-2022	26-Apr-2022	✗	----	----	
BH2213_220421	Clear Plastic Bottle - Natural	----	21-Apr-2022	26-Apr-2022	✗	----	----	
BH2214_220423	Clear Plastic Bottle - Natural	----	23-Apr-2022	26-Apr-2022	✗	----	----	
BH2215_220423	Clear Plastic Bottle - Natural	----	23-Apr-2022	26-Apr-2022	✗	----	----	
BH2216_220420	Clear Plastic Bottle - Natural	----	20-Apr-2022	26-Apr-2022	✗	----	----	
BH2217_220424	Clear Plastic Bottle - Natural	----	24-Apr-2022	26-Apr-2022	✗	----	----	
BH2218_220421	Clear Plastic Bottle - Natural	----	21-Apr-2022	26-Apr-2022	✗	----	----	
BH2233_220422	Clear Plastic Bottle - Natural	----	22-Apr-2022	26-Apr-2022	✗	----	----	
BH2234_220422	Clear Plastic Bottle - Natural	----	22-Apr-2022	26-Apr-2022	✗	----	----	
BH2235_220422	Clear Plastic Bottle - Natural	----	22-Apr-2022	26-Apr-2022	✗	----	----	

[illegible]

CERTIFICATE OF ANALYSIS

Work Order : **EB2211383**
Client : **AECOM AUSTRALIA PTY LTD**
Contact : **KRYSTLE NICHOLS**
Address : **8/540 WICKHAM STREET**
FORTITUDE VALLEY 4006
Telephone : **+61 07 3553 2000**
Project : **INLAND RAIL**
Order number : **60553814_3100.V01-B2G Variation**
C-O-C number : **----**
Sampler : **K. McGuffie & J. Suchting**
Site : **----**
Quote number : **BN/219/20**
No. of samples received : **23**
No. of samples analysed : **23**

Page : 1 of 17
Laboratory : Environmental Division Brisbane
Contact : Carsten Emrich
Address : 2 Byth Street Stafford QLD Australia 4053
Telephone : +61 7 3552 8616
Date Samples Received : 26-Apr-2022 12:50
Date Analysis Commenced : 26-Apr-2022
Issue Date : 05-May-2022 16:50



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- TDS by method EA-015 may bias high for sample 11(BH2235_220422) due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EG035T (Total Mercury): Positive mercury results have been confirmed by re-extraction and re-analysis.
- It is recognised that EG020-T (Total Metals by ICP-MS) is less than EG020-F (Dissolved Metals by ICP-MS) for some samples. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2347_220419	BH2345_220419	BH2617_220420	BH2216_220420	BH2210_220420
Sampling date / time				19-Apr-2022 00:00	19-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EB2211383-001	EB2211383-002	EB2211383-003	EB2211383-004	EB2211383-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.08	7.77	7.46	8.09	8.10
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.52	1.23	2.36	16.2	56.0
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	1160	1970	476	2830	9960
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	785	1210	306	1620	5840
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	377	816	130	223	244
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	312	740	206	813	888
Total Alkalinity as CaCO3	----	1	mg/L	312	740	206	813	888
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	11	32	141
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	221	279	23	537	3080
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	47	129	34	40	12
Magnesium	7439-95-4	1	mg/L	63	120	11	30	52
Sodium	7440-23-5	1	mg/L	68	81	62	555	2010
Potassium	7440-09-7	1	mg/L	<1	3	3	4	12
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.004	0.002
Boron	7440-42-8	0.05	mg/L	0.06	0.05	0.09	0.19	0.35
Barium	7440-39-3	0.001	mg/L	0.083	0.027	0.244	0.054	0.149
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.002	0.001	0.020	0.152	0.247
Nickel	7440-02-0	0.001	mg/L	0.003	<0.001	0.001	0.002	<0.001

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_220419	BH2345_220419	BH2617_220420	BH2216_220420	BH2210_220420
Sampling date / time				19-Apr-2022 00:00	19-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2211383-001	EB2211383-002	EB2211383-003	EB2211383-004	EB2211383-005	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.016	<0.005	0.019	<0.005	<0.005	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	0.44	1.06	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.004	0.002	
Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.10	0.23	0.45	
Barium	7440-39-3	0.001	mg/L	0.089	0.041	0.246	0.061	0.168	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.003	<0.001	0.002	0.001	
Chromium	7440-47-3	0.001	mg/L	0.001	0.005	<0.001	0.002	0.003	
Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.001	0.004	0.002	
Manganese	7439-96-5	0.001	mg/L	0.005	0.092	0.035	0.200	0.275	
Nickel	7440-02-0	0.001	mg/L	0.004	0.009	0.002	0.003	0.003	
Lead	7439-92-1	0.001	mg/L	<0.001	0.003	<0.001	<0.001	0.002	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.019	0.008	0.011	0.010	0.006	
Iron	7439-89-6	0.05	mg/L	0.06	3.41	<0.05	1.49	2.33	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0015	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	<0.1	0.3	1.7	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.04	<0.01	0.02	0.07	0.02	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.08	2.59	0.67	0.01	0.02	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2347_220419	BH2345_220419	BH2617_220420	BH2216_220420	BH2210_220420
Sampling date / time					19-Apr-2022 00:00	19-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00	20-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211383-001	EB2211383-002	EB2211383-003	EB2211383-004	EB2211383-005
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.08	2.59	0.67	0.01	0.02
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.3	0.3	0.1	0.3	0.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		0.4	2.9	0.8	0.3	0.2
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.08	0.28	0.07	0.11	0.09
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.05	0.01	0.05	0.03	<0.01
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		12.6	22.8	4.99	32.0	108
∅ Total Cations	----	0.01	meq/L		10.5	19.9	5.38	28.7	92.6
∅ Ionic Balance	----	0.01	%		9.04	6.67	3.68	5.51	7.47



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2309_220420	BH2203_220421	BH2206_220421	BH2201_220421	BH2213_220421
Sampling date / time					20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211383-006	EB2211383-007	EB2211383-008	EB2211383-009	EB2211383-010
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.28	6.80	6.74	8.03	7.58
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		33.7	3.36	6.72	13.9	5.90
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		3640	1110	915	1180	673
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		2040	835	496	712	421
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		75	237	92	78	92
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		301	142	75	416	245
Total Alkalinity as CaCO3	----	1	mg/L		301	142	75	416	245
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	452	20	11	14
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1030	18	246	141	69
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		7	72	12	23	17
Magnesium	7439-95-4	1	mg/L		14	14	15	5	12
Sodium	7440-23-5	1	mg/L		671	119	148	282	130
Potassium	7440-09-7	1	mg/L		4	6	9	4	3
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.005	0.002	0.001	<0.001	0.002
Boron	7440-42-8	0.05	mg/L		0.07	<0.05	<0.05	0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.356	0.045	0.390	0.153	0.074
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.006	0.003	0.002	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.002	0.003	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.003	<0.001	<0.001	0.002	<0.001
Manganese	7439-96-5	0.001	mg/L		0.307	0.632	0.040	0.004	0.146
Nickel	7440-02-0	0.001	mg/L		0.003	0.003	0.038	<0.001	0.002

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2309_220420	BH2203_220421	BH2206_220421	BH2201_220421	BH2213_220421
Sampling date / time				20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2211383-006	EB2211383-007	EB2211383-008	EB2211383-009	EB2211383-010	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.008	<0.005	0.014	<0.005	0.006	
Iron	7439-89-6	0.05	mg/L	12.2	14.4	1.42	0.06	0.06	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.006	0.003	0.004	<0.001	0.003	
Boron	7440-42-8	0.05	mg/L	0.10	0.06	<0.05	0.06	0.06	
Barium	7440-39-3	0.001	mg/L	0.353	0.050	0.410	0.182	0.085	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.007	0.003	0.002	<0.001	0.005	
Chromium	7440-47-3	0.001	mg/L	0.002	0.004	0.055	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.004	<0.001	0.004	0.004	0.003	
Manganese	7439-96-5	0.001	mg/L	0.340	0.702	0.049	0.005	0.239	
Nickel	7440-02-0	0.001	mg/L	0.003	0.004	0.036	<0.001	0.003	
Lead	7439-92-1	0.001	mg/L	0.005	<0.001	0.002	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.009	<0.005	0.014	<0.005	0.008	
Iron	7439-89-6	0.05	mg/L	12.4	14.9	5.46	0.23	0.58	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.1	<0.1	0.1	0.3	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.09	0.08	<0.01	0.02	0.03	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.02	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.06	0.01	<0.01	1.37	<0.01	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Sample ID

				BH2309_220420	BH2203_220421	BH2206_220421	BH2201_220421	BH2213_220421
Sampling date / time				20-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00	21-Apr-2022 00:00
Compound	CAS Number	LOR	Unit	EB2211383-006	EB2211383-007	EB2211383-008	EB2211383-009	EB2211383-010
Result				Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued								
Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.01	0.02	1.37	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	1.7	0.1	0.2	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.0	1.7	0.1	1.6	0.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.04	0.02	0.05	0.05	0.34
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	<0.01	0.03	0.16
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	35.1	12.8	8.85	12.5	7.13
∅ Total Cations	----	0.01	meq/L	----	10.6	----	----	----
∅ Total Cations	----	0.01	meq/L	30.8	----	8.50	13.9	7.57
∅ Ionic Balance	----	0.01	%	----	9.27	----	----	----
∅ Ionic Balance	----	0.01	%	6.50	----	2.03	5.33	2.95



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2235_220422	BH2234_220422	BH2233_220422	BH2214_220423	BH2215_220423
Sampling date / time					22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	23-Apr-2022 00:00	23-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211383-011	EB2211383-012	EB2211383-013	EB2211383-014	EB2211383-015
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.21	7.80	7.47	7.72	7.25
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		1.26	3.23	3.85	35.7	34.6
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		194	559	2010	12400	15000
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		362	314	1470	7900	10600
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		52	122	537	833	1650
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		94	228	189	617	292
Total Alkalinity as CaCO3	----	1	mg/L		94	228	189	617	292
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		4	3	14	233	363
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		10	54	583	4470	5750
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		11	24	103	88	146
Magnesium	7439-95-4	1	mg/L		6	15	68	149	312
Sodium	7440-23-5	1	mg/L		21	82	205	2370	3230
Potassium	7440-09-7	1	mg/L		4	1	4	10	18
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	0.006	0.002
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	0.10	0.09
Barium	7440-39-3	0.001	mg/L		0.033	0.056	0.303	0.545	0.092
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.002	<0.001	<0.001	0.005	0.012
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.003	<0.001	0.002	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.154	0.020	0.068	3.59	0.625
Nickel	7440-02-0	0.001	mg/L		0.006	<0.001	0.037	0.002	0.006

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2235_220422	BH2234_220422	BH2233_220422	BH2214_220423	BH2215_220423
Sampling date / time				22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	23-Apr-2022 00:00	23-Apr-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2211383-011	EB2211383-012	EB2211383-013	EB2211383-014	EB2211383-015	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.008	0.006	<0.005	
Iron	7439-89-6	0.05	mg/L	0.09	0.08	<0.05	5.29	2.27	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	0.007	0.002	
Boron	7440-42-8	0.05	mg/L	0.05	<0.05	<0.05	0.10	0.10	
Barium	7440-39-3	0.001	mg/L	0.394	0.068	0.362	0.543	0.114	
Beryllium	7440-41-7	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	0.026	<0.001	0.012	0.008	0.016	
Chromium	7440-47-3	0.001	mg/L	0.069	<0.001	0.061	0.009	0.004	
Copper	7440-50-8	0.001	mg/L	0.036	<0.001	0.015	0.004	0.002	
Manganese	7439-96-5	0.001	mg/L	0.721	0.030	0.253	3.64	0.794	
Nickel	7440-02-0	0.001	mg/L	0.062	0.002	0.081	0.006	0.009	
Lead	7439-92-1	0.001	mg/L	0.013	<0.001	0.003	0.002	0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	0.09	<0.01	0.04	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.122	0.010	0.050	0.016	0.012	
Iron	7439-89-6	0.05	mg/L	40.5	0.33	23.2	9.74	4.96	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.1	<0.1	0.2	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.26	<0.01	0.01	0.93	0.16	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.72	0.13	8.06	0.18	0.12	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2235_220422	BH2234_220422	BH2233_220422	BH2214_220423	BH2215_220423
Sampling date / time					22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	23-Apr-2022 00:00	23-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211383-011	EB2211383-012	EB2211383-013	EB2211383-014	EB2211383-015
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		0.74	0.13	8.06	0.18	0.12
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		2.2	0.4	1.4	1.5	<0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		2.9	0.5	9.5	1.7	<0.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		1.76	0.11	0.74	0.51	0.20
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.22	0.07	0.11	<0.01	0.02
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		2.24	6.14	20.5	143	176
∅ Total Cations	----	0.01	meq/L		2.06	6.02	19.8	120	174
∅ Ionic Balance	----	0.01	%		----	0.96	1.88	8.84	0.48



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_220423	BH2344_220423	BH2248_220423	BH2217_220424	QC100_220423
Sampling date / time					23-Apr-2022 00:00	23-Apr-2022 00:00	23-Apr-2022 00:00	24-Apr-2022 00:00	23-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211383-016	EB2211383-017	EB2211383-018	EB2211383-019	EB2211383-020
				Result	Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		7.83	8.00	8.23	7.86	7.32
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		1.21	1.17	5.08	6.52	34.6
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		2780	868	634	783	14400
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		1940	507	348	475	10700
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		1190	345	95	79	1580
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		535	412	225	251	291
Total Alkalinity as CaCO3	----	1	mg/L		535	412	225	251	291
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		61	9	<1	37	348
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		643	38	73	80	5660
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		115	46	15	15	139
Magnesium	7439-95-4	1	mg/L		220	56	14	10	300
Sodium	7440-23-5	1	mg/L		96	50	114	133	3160
Potassium	7440-09-7	1	mg/L		1	1	1	2	17
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	0.002	0.002
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	0.06	<0.05	0.07
Barium	7440-39-3	0.001	mg/L		0.011	<0.001	0.121	0.100	0.090
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.011
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.005	<0.001	0.052	0.002	0.681
Nickel	7440-02-0	0.001	mg/L		0.003	<0.001	<0.001	0.002	0.006

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_220423	BH2344_220423	BH2248_220423	BH2217_220424	QC100_220423
Sampling date / time				23-Apr-2022 00:00	23-Apr-2022 00:00	23-Apr-2022 00:00	24-Apr-2022 00:00	23-Apr-2022 00:00	
Compound	CAS Number	LOR	Unit	EB2211383-016	EB2211383-017	EB2211383-018	EB2211383-019	EB2211383-020	
				Result	Result	Result	Result	Result	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.012	<0.005	<0.005	0.006	<0.005	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.10	<0.05	2.46	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	0.003	0.002	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.08	<0.05	0.11	
Barium	7440-39-3	0.001	mg/L	0.012	0.097	0.163	0.125	0.116	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.011	<0.001	0.001	0.016	
Chromium	7440-47-3	0.001	mg/L	<0.001	0.015	0.004	<0.001	0.004	
Copper	7440-50-8	0.001	mg/L	<0.001	0.016	0.001	0.003	0.002	
Manganese	7439-96-5	0.001	mg/L	0.016	0.324	0.075	0.013	0.840	
Nickel	7440-02-0	0.001	mg/L	0.004	0.043	0.006	0.003	0.009	
Lead	7439-92-1	0.001	mg/L	<0.001	0.004	<0.001	<0.001	0.001	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	
Zinc	7440-66-6	0.005	mg/L	0.006	0.052	0.007	0.009	0.013	
Iron	7439-89-6	0.05	mg/L	0.14	13.5	1.14	0.27	5.11	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	<0.1	0.4	<0.1	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.02	<0.01	0.18	<0.01	0.18	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.26	<0.01	<0.01	<0.01	<0.01	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	21.4	4.11	0.06	0.57	0.02	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	BH2343_220423	BH2344_220423	BH2248_220423	BH2217_220424	QC100_220423
Sampling date / time					23-Apr-2022 00:00	23-Apr-2022 00:00	23-Apr-2022 00:00	24-Apr-2022 00:00	23-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EB2211383-016	EB2211383-017	EB2211383-018	EB2211383-019	EB2211383-020
				Result	Result	Result	Result	Result	Result
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		21.7	4.11	0.06	0.57	0.02
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.7	0.7	0.2	<0.1	<0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		23.4	4.8	0.3	0.6	<0.5
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.06	1.14	0.13	0.54	0.16
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		0.02	0.12	0.03	0.47	0.06
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		30.1	9.49	6.55	8.04	173
∅ Total Cations	----	0.01	meq/L		28.0	9.10	6.88	7.41	170
∅ Ionic Balance	----	0.01	%		3.53	2.08	2.46	4.10	0.94



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_220424	QC500_220424	BH2218_220421	----	----
Sampling date / time					24-Apr-2022 00:00	24-Apr-2022 00:00	21-Apr-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2211383-021	EB2211383-022	EB2211383-023	-----	-----
				Result	Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.80	5.84	7.10	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		0.12	0.12	3.71	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		<1	<1	367	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		<10	<10	283	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	<1	48	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		4	4	100	----	----
Total Alkalinity as CaCO3	----	1	mg/L		4	4	100	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	6	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	<1	52	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	6	----	----
Magnesium	7439-95-4	1	mg/L		<1	<1	8	----	----
Sodium	7440-23-5	1	mg/L		<1	<1	59	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	3	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	0.002	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	0.050	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	0.006	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.004	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	<0.001	0.444	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	0.007	----	----

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_220424	QC500_220424	BH2218_220421	----	----
Sampling date / time				24-Apr-2022 00:00	24-Apr-2022 00:00	21-Apr-2022 00:00	----	----	
Compound	CAS Number	LOR	Unit	EB2211383-021	EB2211383-022	EB2211383-023	-----	-----	
				Result	Result	Result	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	----	----	
Iron	7439-89-6	0.05	mg/L	----	----	1.63	----	----	
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.004	----	----	
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----	
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.205	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.022	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.015	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.071	----	----	
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.731	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.022	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.011	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.03	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.052	----	----	
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	11.5	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.3	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.17	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	0.03	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC300_220424	QC500_220424	BH2218_220421	----	----
Sampling date / time					24-Apr-2022 00:00	24-Apr-2022 00:00	21-Apr-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		EB2211383-021	EB2211383-022	EB2211383-023	-----	-----
				Result	Result	Result		----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	0.03	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	0.8	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	<0.1	0.8	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	0.42	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		0.08	0.08	3.59	----	----
∅ Total Cations	----	0.01	meq/L		<0.01	<0.01	3.60	----	----
∅ Ionic Balance	----	0.01	%		----	----	0.15	----	----

QUALITY CONTROL REPORT

Work Order	: EB2211383	Page	: 1 of 17
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Contact	: Carsten Emrich
Address	: 8/540 WICKHAM STREET FORTITUDE VALLEY 4006	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3553 2000	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 26-Apr-2022
Order number	: 60553814_3100.V01-B2G Variation	Date Analysis Commenced	: 26-Apr-2022
C-O-C number	: ----	Issue Date	: 05-May-2022
Sampler	: K. McGuffie & J. Suchting		
Site	: ----		
Quote number	: BN/219/20		
No. of samples received	: 23		
No. of samples analysed	: 23		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4306833)									
EB2211378-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.77	7.86	1.2	0% - 20%
EB2211378-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.88	8.90	0.2	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 4306836)									
EB2211383-005	BH2210_220420	EA005-P: pH Value	----	0.01	pH Unit	8.10	8.14	0.5	0% - 20%
EB2211383-015	BH2215_220423	EA005-P: pH Value	----	0.01	pH Unit	7.25	7.33	1.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4306834)									
EB2211378-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6890	6860	0.5	0% - 20%
EB2211378-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6590	6600	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4306837)									
EB2211383-005	BH2210_220420	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	9960	9990	0.3	0% - 20%
EB2211383-015	BH2215_220423	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	15000	14900	0.6	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4304407)									
EB2211263-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2370	2400	1.3	0% - 20%
EB2211383-003	BH2617_220420	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	306	294	3.8	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 4304408)									
EB2211383-014	BH2214_220423	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	7900	8040	1.8	0% - 20%
EB2211383-023	BH2218_220421	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	283	268	5.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4306832)									
EB2211378-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	159	167	5.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	159	167	5.0	0% - 20%
EB2211378-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4306832) - continued									
EB2211378-001	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	54	58	8.4	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	156	151	3.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	209	209	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4306838)									
EB2211383-005	BH2210_220420	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	888	889	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	888	889	0.0	0% - 20%
EB2211383-015	BH2215_220423	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	292	298	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	292	298	2.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4304589)									
EB2210599-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EB2211383-009	BH2201_220421	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	10	0.0	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4304593)									
EB2211383-019	BH2217_220424	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	37	37	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4304590)									
EB2210599-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.0	No Limit
EB2211383-009	BH2201_220421	ED045G: Chloride	16887-00-6	1	mg/L	141	141	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4304595)									
EB2211383-019	BH2217_220424	ED045G: Chloride	16887-00-6	1	mg/L	80	80	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4305910)									
EB2211383-017	BH2344_220423	ED093F: Calcium	7440-70-2	1	mg/L	46	46	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	56	55	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	50	50	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
EB2211438-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	49	48	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	13	13	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	40	40	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 4305919)									
EB2211363-022	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	235	237	0.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	205	208	1.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1920	1930	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	17	17	0.0	0% - 50%
EB2211383-008	BH2206_220421	ED093F: Calcium	7440-70-2	1	mg/L	12	12	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	15	15	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	148	155	4.3	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4305919) - continued									
EB2211383-008	BH2206_220421	ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 4313152)									
EB2211117-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	10	10	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	53	54	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	332	328	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	14	14	0.0	0% - 50%
EB2211117-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	52	52	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	389	385	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	19	19	0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4305909)									
EB2211383-017	BH2344_220423	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EB2211438-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.034	0.034	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.013	0.013	0.0	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.040	0.042	3.4	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4305909) - continued									
EB2211438-005	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.12	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4305920)									
EB2211363-022	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.059	0.060	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.09	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.31	3.29	0.5	0% - 20%
EB2211383-008	BH2206_220421	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.390	0.388	0.6	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.040	0.040	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.038	0.037	0.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.014	0.014	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.42	1.43	1.2	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4313153)									
EB2211117-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0051	0.0052	2.0	0% - 20%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.036	0.037	0.0	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 4313153) - continued									
EB2211117-001	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.096	0.096	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.083	0.082	0.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.042	0.042	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.14	0.14	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EB2211117-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.012	0.012	0.0	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.019	0.019	0.0	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.18	0.18	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020T: Total Metals by ICP-MS (QC Lot: 4313026)							
EB2211383-007	BH2203_220421	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.050	0.051	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.003	0.004	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.702	0.704	0.4	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	14.9	14.9	0.2	0% - 20%
EB2210138-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4313026) - continued									
EB2210138-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.130	0.129	1.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.271	0.270	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.39	1.40	0.0	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 4313028)									
EB2211383-018	BH2248_220423	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.163	0.163	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.006	43.9	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.075	0.075	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	0.007	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	0.08	0.08	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	1.14	1.19	4.7	0% - 20%
EB2211557-004	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.077	0.082	6.1	0% - 50%
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	6.61	6.54	1.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.011	0.011	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.385	0.405	5.0	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.019	0.020	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.022	0.024	11.7	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	6.38	6.35	0.5	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.033	0.034	3.6	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 4313028) - continued									
EB2211557-004	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.494	0.493	0.2	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	11.2	10.9	2.8	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	86.0	86.3	0.3	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 4305926)									
EB2211383-001	BH2347_220419	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2211383-006	BH2309_220420	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4305931)									
EB2211383-023	BH2218_220421	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2211405-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 4313154)									
EB2211383-021	QC300_220424	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4313024)									
EB2210138-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2211383-008	BH2206_220421	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4313025)									
EB2211383-018	BH2248_220423	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB2211557-005	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 4306835)									
EB2211378-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.1	1.1	0.0	0% - 50%
EB2211383-005	BH2210_220420	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.7	1.7	0.0	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 4306839)									
EB2211383-022	QC500_220424	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EB2211383-015	BH2215_220423	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4315563)									
EB2211326-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	46.5	47.8	2.7	0% - 20%
EB2211383-003	BH2617_220420	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 4315565)									
EB2211383-013	BH2233_220422	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.0	No Limit
EB2211383-023	BH2218_220421	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.17	0.17	0.0	0% - 50%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4304592)									
EB2210599-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2211383-009	BH2201_220421	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 4304594)									
EB2211383-019	BH2217_220424	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4315564)									
EB2211326-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4315564) - continued									
EB2211383-003	BH2617_220420	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.67	0.68	0.0	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 4315566)									
EB2211383-013	BH2233_220422	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	8.06	8.11	0.6	0% - 20%
EB2211383-023	BH2218_220421	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.03	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4313125)									
EB2210202-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	35.0	32.9	6.2	0% - 20%
EB2211239-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.0	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 4313127)									
EB2211383-004	BH2216_220420	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.3	0.0	No Limit
EB2211383-014	BH2214_220423	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.5	1.5	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4313124)									
EB2210202-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.05	<0.05	0.0	No Limit
EB2211239-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.10	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 4313126)									
EB2211383-004	BH2216_220420	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.11	0.11	0.0	0% - 50%
EB2211383-014	BH2214_220423	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.51	0.50	2.0	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4304591)									
EB2210599-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.04	0.0	No Limit
EB2211383-009	BH2201_220421	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.03	0.04	28.8	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 4304596)									
EB2211383-019	BH2217_220424	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.47	0.49	5.3	0% - 20%

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EA005P: pH by PC Titrator (QCLOT: 4306833)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA005P: pH by PC Titrator (QCLOT: 4306836)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLOT: 4306834)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	99.8	90.0	106
				<1	12890 µS/cm	99.0	90.0	106
EA010P: Conductivity by PC Titrator (QCLOT: 4306837)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	4000 µS/cm	99.1	90.0	106
				<1	24800 µS/cm	90.0	90.0	106
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLOT: 4304407)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2440 mg/L	101	81.6	118
				<10	293 mg/L	103	88.0	112
				<10	2000 mg/L	98.2	80.9	118
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLOT: 4304408)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2440 mg/L	99.1	81.6	118
				<10	293 mg/L	102	88.0	112
				<10	2000 mg/L	99.3	80.9	118
ED037P: Alkalinity by PC Titrator (QCLOT: 4306832)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	99.9	80.0	120
ED037P: Alkalinity by PC Titrator (QCLOT: 4306838)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	109	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLOT: 4304589)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.7	85.0	118
				<1	100 mg/L	97.0	85.0	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLOT: 4304593)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.0	85.0	118
				<1	100 mg/L	93.8	85.0	118
ED045G: Chloride by Discrete Analyser (QCLOT: 4304590)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	90.0	115
				<1	1000 mg/L	102	90.0	115
ED045G: Chloride by Discrete Analyser (QCLOT: 4304595)								



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
ED045G: Chloride by Discrete Analyser (QCLot: 4304595) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	103	90.0	115
				<1	1000 mg/L	104	90.0	115
ED093F: Dissolved Major Cations (QCLot: 4305910)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	85.7	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	91.6	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.2	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.0	70.0	130
ED093F: Dissolved Major Cations (QCLot: 4305919)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	84.8	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	91.6	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.4	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.4	70.0	130
ED093F: Dissolved Major Cations (QCLot: 4313152)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.9	70.0	130
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.0	70.0	130
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	70.0	130
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.9	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4305909)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.4	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	91.9	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	88.4	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.9	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	88.8	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	87.7	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.6	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.0	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.7	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.5	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.5	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	88.4	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.4	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.8	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.0	82.0	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 4305920)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.4	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.9	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.9	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.6	88.0	108



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EG020F: Dissolved Metals by ICP-MS (QCLot: 4305920) - continued								
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.1	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.4	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.6	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.2	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.3	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.1	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.0	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.5	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.8	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.8	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.7	82.0	114
EG020F: Dissolved Metals by ICP-MS (QCLot: 4313153)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	116
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.0	81.0	117
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.2	70.0	130
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.5	88.0	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.5	87.0	113
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.0	86.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.1	88.0	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.5	89.0	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.7	89.0	120
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	89.0	113
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	83.0	112
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.4	88.0	114
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.0	87.0	113
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.8	81.0	125
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	100	82.0	114
EG020T: Total Metals by ICP-MS (QCLot: 4313026)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	107	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	110	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	106	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	105	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	108	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	110	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	79.0	111

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020T: Total Metals by ICP-MS (QCLot: 4313026) - continued								
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	107	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	121	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	82.0	118
EG020T: Total Metals by ICP-MS (QCLot: 4313028)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	107	88.0	112
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	106	81.0	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	106	70.0	130
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	88.0	111
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	105	89.0	115
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	107	89.0	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	88.0	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	103	89.0	112
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	109	88.0	114
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	88.0	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	105	79.0	111
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	106	87.0	114
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	84.0	114
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	112	82.0	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	101	82.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4305926)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.0	84.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4305931)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.6	84.0	118
EG035F: Dissolved Mercury by FIMS (QCLot: 4313154)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.9	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4313024)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	110	84.0	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4313025)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.6	84.0	118
EK040P: Fluoride by PC Titrator (QCLot: 4306835)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	100	80.0	117
EK040P: Fluoride by PC Titrator (QCLot: 4306839)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	98.0	80.0	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4315563)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	94.7	83.5	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4315565)								



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4315565) - continued								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	95.1	83.5	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4304592)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	99.1	90.0	110
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4304594)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	98.2	90.0	110
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4315564)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	90.8	85.7	111
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4315566)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	92.0	85.7	111
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4313125)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	86.2	70.1	108
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4313127)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1 mg/L	81.7	70.1	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4313124)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	100	90.2	108
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4313126)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.442 mg/L	96.8	90.2	108
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4304591)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	93.2	81.7	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4304596)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	88.6	81.7	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4304589)							
EB2210599-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	98.8	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4304593)							
EB2211383-020	QC100_220423	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4304590)							
EB2210599-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	111	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 4304595)							
EB2211383-020	QC100_220423	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4305909)							
EB2211383-018	BH2248_220423	EG020A-F: Arsenic	7440-38-2	1 mg/L	93.8	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.7	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	92.4	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	93.3	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	91.1	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	92.2	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	93.5	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	99.7	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	97.5	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	90.9	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	90.0	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	92.9	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4305920)							
EB2211363-023	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	99.6	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	98.1	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	104	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	86.9	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	94.8	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	98.2	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	93.0	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	92.6	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	98.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	89.4	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.5	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	88.5	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 4313153)							
EB2211117-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	103	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	101	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	103	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.0	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	102	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	102	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	99.4	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	96.5	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	104	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 4313153) - continued							
EB2211117-002	Anonymous	EG020A-F: Nickel	7440-02-0	1 mg/L	98.6	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	102	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	93.8	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4313026)							
EB2210517-031	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	106	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	115	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	103	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	103	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	108	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	104	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	108	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	102	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	106	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	103	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	97.2	70.0	130
EG020T: Total Metals by ICP-MS (QCLot: 4313028)							
EB2211383-019	BH2217_220424	EG020A-T: Arsenic	7440-38-2	1 mg/L	108	70.0	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	116	70.0	130
		EG020A-T: Barium	7440-39-3	1 mg/L	108	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	108	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70.0	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	108	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	104	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	107	70.0	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	107	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	105	70.0	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	104	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	109	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4305926)							
EB2211383-002	BH2345_220419	EG035F: Mercury	7439-97-6	0.01 mg/L	80.3	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4305931)							
EB2211438-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	79.8	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 4313154)							
EB2211383-022	QC500_220424	EG035F: Mercury	7439-97-6	0.01 mg/L	98.1	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4313024)							
EB2210517-031	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	101	70.0	130



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4313025)							
EB2211383-019	BH2217_220424	EG035T: Mercury	7439-97-6	0.01 mg/L	96.8	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4306835)							
EB2211378-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	92.2	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 4306839)							
EB2211383-014	BH2214_220423	EK040P: Fluoride	16984-48-8	5 mg/L	86.6	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4315563)							
EB2211326-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	# Not Determined	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 4315565)							
EB2211383-014	BH2214_220423	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	84.3	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4304592)							
EB2210599-002	Anonymous	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	96.4	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 4304594)							
EB2211383-020	QC100_220423	EK057G: Nitrite as N	14797-65-0	0.4 mg/L	96.9	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4315564)							
EB2211326-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	# Not Determined	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 4315566)							
EB2211383-014	BH2214_220423	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	92.8	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4313125)							
EB2211102-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	84.0	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 4313127)							
EB2211383-005	BH2210_220420	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	88.9	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4313124)							
EB2211102-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	103	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 4313126)							
EB2211383-005	BH2210_220420	EK067G: Total Phosphorus as P	----	1 mg/L	106	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4304591)							
EB2210599-002	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.4 mg/L	99.2	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 4304596)							
EB2211383-020	QC100_220423	EK071G: Reactive Phosphorus as P	14265-44-2	2 mg/L	90.1	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2211383	Page	: 1 of 18
Client	: AECOM AUSTRALIA PTY LTD	Laboratory	: Environmental Division Brisbane
Contact	: KRYSTLE NICHOLS	Telephone	: +61 7 3552 8616
Project	: INLAND RAIL	Date Samples Received	: 26-Apr-2022
Site	: ----	Issue Date	: 05-May-2022
Sampler	: K. McGuffie & J. Suchting	No. of samples received	: 23
Order number	: 60553814_3100.V01-B2G Variation	No. of samples analysed	: 23

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB2211383--020	QC100_220423	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EB2211383--020	QC100_220423	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK055G: Ammonia as N by Discrete Analyser	EB2211326--002	Anonymous	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	EB2211326--002	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Matrix: WATER

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH2347_220419,	BH2345_220419	----	----	----	27-Apr-2022	19-Apr-2022	8
Clear Plastic Bottle - Natural							
BH2617_220420,	BH2216_220420,	----	----	----	27-Apr-2022	20-Apr-2022	7
BH2210_220420,	BH2309_220420						
Clear Plastic Bottle - Natural							
BH2203_220421,	BH2206_220421,	----	----	----	27-Apr-2022	21-Apr-2022	6
BH2201_220421,	BH2213_220421,						
BH2218_220421							
Clear Plastic Bottle - Natural							
BH2235_220422,	BH2234_220422,	----	----	----	27-Apr-2022	22-Apr-2022	5
BH2233_220422							
Clear Plastic Bottle - Natural							
BH2214_220423,	BH2215_220423,	----	----	----	27-Apr-2022	23-Apr-2022	4
BH2343_220423,	BH2344_220423,						
BH2248_220423,	QC100_220423						
Clear Plastic Bottle - Natural							
BH2217_220424,	QC300_220424,	----	----	----	27-Apr-2022	24-Apr-2022	3
QC500_220424							
EK057G: Nitrite as N by Discrete Analyser							



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural BH2347_220419, BH2345_220419	----	----	----	26-Apr-2022	21-Apr-2022	5
Clear Plastic Bottle - Natural BH2617_220420, BH2210_220420, BH2309_220420	----	----	----	26-Apr-2022	22-Apr-2022	4
Clear Plastic Bottle - Natural BH2203_220421, BH2201_220421, BH2218_220421	----	----	----	26-Apr-2022	23-Apr-2022	3
Clear Plastic Bottle - Natural BH2235_220422, BH2233_220422	----	----	----	26-Apr-2022	24-Apr-2022	2
Clear Plastic Bottle - Natural BH2214_220423, BH2343_220423, BH2248_220423	----	----	----	26-Apr-2022	25-Apr-2022	1
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural BH2347_220419, BH2345_220419	----	----	----	26-Apr-2022	21-Apr-2022	5
Clear Plastic Bottle - Natural BH2617_220420, BH2210_220420, BH2309_220420	----	----	----	26-Apr-2022	22-Apr-2022	4
Clear Plastic Bottle - Natural BH2203_220421, BH2201_220421, BH2218_220421	----	----	----	26-Apr-2022	23-Apr-2022	3
Clear Plastic Bottle - Natural BH2235_220422, BH2233_220422	----	----	----	26-Apr-2022	24-Apr-2022	2
Clear Plastic Bottle - Natural BH2214_220423, BH2343_220423, BH2248_220423	----	----	----	26-Apr-2022	25-Apr-2022	1



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	19-Apr-2022	✖
Clear Plastic Bottle - Natural (EA005-P) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	20-Apr-2022	✖
Clear Plastic Bottle - Natural (EA005-P) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	21-Apr-2022	✖
Clear Plastic Bottle - Natural (EA005-P) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	22-Apr-2022	✖
Clear Plastic Bottle - Natural (EA005-P) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	23-Apr-2022	✖
Clear Plastic Bottle - Natural (EA005-P) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	27-Apr-2022	24-Apr-2022	✖



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Natural (EA010-P) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	27-Apr-2022	22-May-2022	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	26-Apr-2022	26-Apr-2022	✓
Clear Plastic Bottle - Natural (EA015H) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	26-Apr-2022	27-Apr-2022	✓
Clear Plastic Bottle - Natural (EA015H) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	26-Apr-2022	28-Apr-2022	✓
Clear Plastic Bottle - Natural (EA015H) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	26-Apr-2022	29-Apr-2022	✓
Clear Plastic Bottle - Natural (EA015H) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	26-Apr-2022	30-Apr-2022	✓
Clear Plastic Bottle - Natural (EA015H) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	26-Apr-2022	01-May-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3								
Clear Plastic Bottle - Natural (ED093F) QC300_220424,	QC500_220424	24-Apr-2022	----	----	----	30-Apr-2022	01-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_220424		24-Apr-2022	----	----	----	27-Apr-2022	22-May-2022	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	03-May-2022	✓
Clear Plastic Bottle - Natural (ED037-P) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	04-May-2022	✓
Clear Plastic Bottle - Natural (ED037-P) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	05-May-2022	✓
Clear Plastic Bottle - Natural (ED037-P) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	06-May-2022	✓
Clear Plastic Bottle - Natural (ED037-P) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	07-May-2022	✓
Clear Plastic Bottle - Natural (ED037-P) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	27-Apr-2022	08-May-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	26-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Natural (ED041G) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	26-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Natural (ED041G) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	26-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Natural (ED041G) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	26-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Natural (ED041G) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	26-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Natural (ED041G) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	26-Apr-2022	22-May-2022	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	26-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Natural (ED045G) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	26-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Natural (ED045G) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	26-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Natural (ED045G) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	26-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Natural (ED045G) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	26-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Natural (ED045G) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	26-Apr-2022	22-May-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QC300_220424,	QC500_220424	24-Apr-2022	----	----	----	30-Apr-2022	01-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F) BH2217_220424		24-Apr-2022	----	----	----	27-Apr-2022	22-May-2022	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-F) QC300_220424,	QC500_220424	24-Apr-2022	----	----	----	30-Apr-2022	21-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	16-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	17-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	18-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	19-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	20-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH2217_220424		24-Apr-2022	----	----	----	27-Apr-2022	21-Oct-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2347_220419,	BH2345_220419	19-Apr-2022	30-Apr-2022	16-Oct-2022	✓	30-Apr-2022	16-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	30-Apr-2022	17-Oct-2022	✓	30-Apr-2022	17-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	30-Apr-2022	18-Oct-2022	✓	30-Apr-2022	18-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	30-Apr-2022	19-Oct-2022	✓	30-Apr-2022	19-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	30-Apr-2022	20-Oct-2022	✓	30-Apr-2022	20-Oct-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	30-Apr-2022	21-Oct-2022	✓	30-Apr-2022	21-Oct-2022	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Natural (EG035F) QC300_220424,	QC500_220424	24-Apr-2022	----	----	----	03-May-2022	22-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH2217_220424		24-Apr-2022	----	----	----	27-Apr-2022	22-May-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	03-May-2022	17-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	03-May-2022	18-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	03-May-2022	19-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	03-May-2022	20-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	03-May-2022	21-May-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	03-May-2022	22-May-2022	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	27-Apr-2022	17-May-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	27-Apr-2022	18-May-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	27-Apr-2022	19-May-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	27-Apr-2022	20-May-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	27-Apr-2022	21-May-2022	✓
Clear Plastic Bottle - Natural (EK040P) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	27-Apr-2022	22-May-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	03-May-2022	17-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	03-May-2022	18-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	03-May-2022	19-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	03-May-2022	20-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	03-May-2022	21-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	03-May-2022	22-May-2022	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	26-Apr-2022	21-Apr-2022	✗
Clear Plastic Bottle - Natural (EK057G) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	26-Apr-2022	22-Apr-2022	✗
Clear Plastic Bottle - Natural (EK057G) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	26-Apr-2022	23-Apr-2022	✗
Clear Plastic Bottle - Natural (EK057G) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	26-Apr-2022	24-Apr-2022	✗
Clear Plastic Bottle - Natural (EK057G) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	26-Apr-2022	25-Apr-2022	✗
Clear Plastic Bottle - Natural (EK057G) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	26-Apr-2022	26-Apr-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2347_220419, BH2345_220419	19-Apr-2022	----	----	----	03-May-2022	17-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2617_220420, BH2210_220420, BH2309_220420	20-Apr-2022	----	----	----	03-May-2022	18-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2203_220421, BH2201_220421, BH2218_220421	21-Apr-2022	----	----	----	03-May-2022	19-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2235_220422, BH2233_220422	22-Apr-2022	----	----	----	03-May-2022	20-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2214_220423, BH2343_220423, BH2248_220423,	23-Apr-2022	----	----	----	03-May-2022	21-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK059G) BH2217_220424, QC300_220424,	24-Apr-2022	----	----	----	03-May-2022	22-May-2022	✓	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2347_220419, BH2345_220419	19-Apr-2022	30-Apr-2022	17-May-2022	✓	03-May-2022	17-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2617_220420, BH2210_220420, BH2309_220420	20-Apr-2022	30-Apr-2022	18-May-2022	✓	03-May-2022	18-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2203_220421, BH2201_220421, BH2218_220421	21-Apr-2022	30-Apr-2022	19-May-2022	✓	03-May-2022	19-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2235_220422, BH2233_220422	22-Apr-2022	30-Apr-2022	20-May-2022	✓	03-May-2022	20-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2214_220423, BH2343_220423, BH2248_220423,	23-Apr-2022	30-Apr-2022	21-May-2022	✓	03-May-2022	21-May-2022	✓	
Clear Plastic Bottle - Sulfuric Acid (EK061G) BH2217_220424, QC300_220424,	24-Apr-2022	30-Apr-2022	22-May-2022	✓	03-May-2022	22-May-2022	✓	



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2347_220419,	BH2345_220419	19-Apr-2022	30-Apr-2022	17-May-2022	✓	03-May-2022	17-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	30-Apr-2022	18-May-2022	✓	03-May-2022	18-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	30-Apr-2022	19-May-2022	✓	03-May-2022	19-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	30-Apr-2022	20-May-2022	✓	03-May-2022	20-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	30-Apr-2022	21-May-2022	✓	03-May-2022	21-May-2022	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	30-Apr-2022	22-May-2022	✓	03-May-2022	22-May-2022	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) BH2347_220419,	BH2345_220419	19-Apr-2022	----	----	----	26-Apr-2022	21-Apr-2022	✗
Clear Plastic Bottle - Natural (EK071G) BH2617_220420, BH2210_220420,	BH2216_220420, BH2309_220420	20-Apr-2022	----	----	----	26-Apr-2022	22-Apr-2022	✗
Clear Plastic Bottle - Natural (EK071G) BH2203_220421, BH2201_220421, BH2218_220421	BH2206_220421, BH2213_220421,	21-Apr-2022	----	----	----	26-Apr-2022	23-Apr-2022	✗
Clear Plastic Bottle - Natural (EK071G) BH2235_220422, BH2233_220422	BH2234_220422,	22-Apr-2022	----	----	----	26-Apr-2022	24-Apr-2022	✗
Clear Plastic Bottle - Natural (EK071G) BH2214_220423, BH2343_220423, BH2248_220423,	BH2215_220423, BH2344_220423, QC100_220423	23-Apr-2022	----	----	----	26-Apr-2022	25-Apr-2022	✗
Clear Plastic Bottle - Natural (EK071G) BH2217_220424, QC500_220424	QC300_220424,	24-Apr-2022	----	----	----	26-Apr-2022	26-Apr-2022	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	26	11.54	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	5	38	13.16	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	6	58	10.34	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	6	51	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	31	12.90	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	3	26	11.54	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	25	12.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	29	10.34	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	30	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	33	12.12	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	26	15.38	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	38	7.89	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	58	5.17	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	51	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	29	13.79	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	30	20.00	15.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	38	7.89	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	58	5.17	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	51	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	29	6.90	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	30	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	38	7.89	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	58	5.17	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Fluoride by Auto Titrator	EK040P	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	31	6.45	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	26	7.69	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	25	8.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	29	6.90	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	33	6.06	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by Auto Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Sodium Adsorption Ratio	EA006	WATER	In house: Referenced to APHA 3120 Ca, Mg, Na. This method is compliant with NEPM Schedule B(3)
Conductivity by Auto Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Fluoride by Auto Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO ₂ - B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO ₃ -. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Project : INLAND RAIL



Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)