

APPENDIX K

Landscape and Visual Impact Assessment

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

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1 Executive Summary

This Landscape and Visual Impact Assessment (LVIA) has been prepared by LatStudios Pty Ltd (trading as Lat27) on behalf of Future Freight Joint Venture (FFJV) as part of the revised draft Environmental Impact Statement (EIS) for the Border to Gowrie (B2G) Project in accordance with the final Terms of Reference (ToR) for the Project and addresses the additional requests for information issued by the Office of the Coordinator-General following the public notification stage.

The Inland Rail Program is a major national interstate freight route project between Melbourne and Brisbane, which Australian Rail Track Corporation Ltd (ARTC) proposes to construct and operate. The Border to Gowrie section of Inland Rail (the Project) extends approximately 217.48 kilometres (km) in length between the NSW/QLD border and Gowrie, in Queensland.

1.1 Key elements of the Project relevant to LVIA

The elements of the Project that are relevant to the LVIA include the:

- Construction impacts: including vegetation clearance, presence of construction equipment, stockpiles, laydown areas, site facilities, construction compounds and temporary construction lighting
- Non-resident workforce accommodation facilities: Two non-resident workforce accommodation facilities are proposed near Yelarbon and Inglewood. The requirement for a third non-resident workforce accommodation facility has been identified as required in the Millmerran area. The location for this site has not been included in the revised draft EIS and therefore has not been addressed in this LVIA.
- Concrete batching plants and precast yards: Two sites have been nominated at Brookstead and Millmerran
- New track: Approximately 149.48 km of new track within a greenfield rail corridor and 68 km of new track within a brownfield corridor
- Crossing loop and turnouts: Five proposed crossing loops, 2,200 metres (m) long to accommodate trains up to 1,800 m long
- Bridges: 37 new bridges (14 rail-over-road, 18 rail-over-watercourse, and 5 road-over-rail)
- Culverts: Reinforced concrete pipes and reinforced concrete box culverts. Scour protection measures will generally be installed around culverts to avoid erosion
- Drainage: Embankment and catch drains adjacent to the proposed alignment to divert surface runoff
- Cuts and embankments: approximately 11,458,700 m³ of cut (rail and road), with maximum cut depths up to 21 m and approximately 12,678,300 m³ of fill (rail and road), with maximum fill depths of up to 21 m
- Level crossings: New and existing level crossings – both passive and active including lighting
- Ancillary works: Ancillary infrastructure including signalling and communications infrastructure, signage, fencing and utilities
- Presence of the freight train: Presence of double stacked trains, with a height of 6.5 m and length of 1,800 m
- Fencing: Fencing will be provided for the majority of the rail corridor and its primary purpose is to limit access to the railway and will typically comprise standard rural fencing. Where superior fencing is required (for example where tracks are in close proximity to roads and/or communities, or where trespass is anticipated to occur) a 1.8 m chain link boundary fence may be provided. Fencing will not be provided across flood-prone areas.
- Proposed fauna passage features: funnel fencing and crossing structures such as canopy bridges and fauna culverts
- Noise barriers: Potential inclusion of noise barriers in the vicinity of Yelarbon, Brookstead and Pittsworth (design subject to future noise modelling).

1.2 Landscape and visual impacts

The Project commences at the Macintyre River on the NSW/QLD border approximately 30 km south of Yelarbon traversing in a generally north-easterly direction to Gowrie Junction, northwest of Toowoomba in Queensland. It passes near or through the settlements of Yelarbon, Inglewood, Millmerran, Brookstead and Pittsworth. Between these settlements, the Project traverses rural landscapes, comprising agricultural and pastoral landscapes and extensive areas of State Forest. The Project includes significant bridge crossings of up to 1,918 m long associated with the floodplains of the Macintyre and Condamine River and their tributary creeks. Key road-over-rail bridges are located on Cunningham Highway, Gore Highway, and Linthorpe Road.

This LVIA has identified and assessed the impact of the Project on landscape, visual and lighting amenity through a combination of desk and field work, including Geographical Information Systems (GIS) analysis, Visibility Analysis Mapping (VAM) and preparation of illustrative cross-sections and visualisations. The LVIA has also been updated in accordance with the final ToR for the Project to address additional requests for information issued by the Office of the Coordinator-General following the public notification stage and concerns raised by the community.

There are no nationally-protected landscapes or scenic amenity areas currently identified within the Project footprint. However, the *Toowoomba Regional Scenic Amenity Study* (Lat27, 2021a) recently produced on behalf of Toowoomba Regional Council does identify several landscape features within the LVIA Study Area as having high scenic amenity value.

Twelve Landscape Character Types (LCTs) have been identified within the Impact assessment area, of which ten are potentially affected by the Project with impacts of up to a High level of effect anticipated.

For much of the impact assessment area there are relatively few residential receptors within the landscape, comprising isolated farmsteads set on large private farms and travellers on the network of roads and highways traversing the area. However, there are some settlements within the potential viewshed of the Project defined by the VAM including Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook, Kingsthorpe and Gowrie Mountain. Visual impacts are typically contained by the presence of vegetation, including along creek lines, and localised undulations in landform. Due to the relatively flat and low-lying topography there are few elevated or panoramic views over the Project although consideration has been given to views from elevated areas including Mount Basalt, Commodore Peak, Gowrie Mountain and Mount Kingsthorpe. Elsewhere, there are fairly open views across the rural landscape from the network of local roads and highways, including the Cunningham Highway, Millmerran-Inglewood Road, Gore Highway and Warrego Highway.

As part of the visual assessment, 29 representative viewpoints have been selected and assessed for both the construction works and operations stages of the Project. Visualisations (artist's impressions) have been prepared to inform the assessment as well as illustrate and communicate the effect on nine of the key viewpoints identified. During construction, the greatest visual impact identified was up to a Moderate level of effect, relating to nine viewpoints.

For visual impacts during operation, visual impacts of up to a High level of effect were identified on seven representative viewpoints prior to the application of mitigation. These include the following:

- The impact of the Cunningham Highway road bridge and introduction of additional rail infrastructure on Viewpoint 3: Yelarbon Rest Area
- The impact of the new road bridge and embankments north of Brookstead and additional rail infrastructure at Viewpoint 20: Near Brookstead State School
- the impacts of bridges and large embankments on the northern edge of Pittsworth at Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn
- The impact of the large cuts and embankments close to rural residential lots at Viewpoint 25: Gore Highway near Southbrook
- The impact of large embankments and new rail and bridge infrastructure at Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth

- The impact of embankments and a proposed controlled level crossing in proximity to existing rural residential lots at Viewpoint 26: View from Athol School Road
- The impact on views obtained from the summit of Mount Kingsthorpe at Viewpoint 29: Mount Kingsthorpe summit scenic lookout.

Other representative viewpoints assessed are impacted to a lesser extent, during both construction and operation, typically relating to views experienced by relatively small numbers of homesteads or with lower modification to visual amenity values.

An additional six representative viewpoints have the potential for the significance of impact during operation to increase, should noise barriers be included at the detailed design stage, including:

- Viewpoint 3: Yelarbon Rest Area
- Viewpoint 4: Yelarbon silo artwork viewing platform
- Viewpoint 20: Near Brookstead State School
- Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn
- Viewpoint 23: Stanley Street near local park
- Pittsworth and Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth).

This is with exception of Viewpoint 4: Yelarbon silo artwork viewing platform (where the potential effect would increase from Moderate to High), as these viewpoints are already considered to experience a magnitude of change of high, this would not change the potential effect/significance (as 'high' is the highest magnitude of change possible). For all qualitative lighting impacts (including during both construction works and operations stage) typical identified impacts are of a Low level of effect. Additional information on potential obtrusive lighting effects associated with the Project is provided in Appendix 3.

Cumulative impacts, particularly the effects in combination with the adjoining Inland Rail Projects (North Star to Border and Gowrie to Helidon) have been considered. Cumulative impacts during both the construction works and operations stages are considered to be up to Medium level of significance, due to the potential for localised areas (particularly in the north of the area) to be affected by multiple projects, dependent upon project phasing. There are no identified concerns relating to the cumulative impacts associated with night lighting.

1.3 Mitigation opportunities

The design has incorporated some mitigation measures that are considered as initial mitigations, which have been considered in the impact assessment. The LVIA has also identified a range of additional mitigations that have been proposed for implementation in future stages of Project delivery, including undertaking an updated visual impact assessment during the detailed design stage to address design refinements, undertaking a wildlife lighting assessment during the detailed design stage in accordance with the Department of Climate Change, Energy, the Environment and Water's *National Light Pollution Guidelines for Wildlife* (2023), consultation with key stakeholders, protection of existing vegetation, rehabilitation of disturbed vegetation, opportunities to undertake additional planting to buffer views and opportunities for urban design of key structures. These have potential to enhance the legacy of the Project and would reduce the residual impact of the Project on some landscapes and views, particularly including landscapes and views around several rural settlements including Yelarbon, Brookstead and Pittsworth.

2 Scope of report

This LVIA has been prepared by LatStudios Pty Ltd (trading as Lat27) on behalf of Future Freight Joint Venture (FFJV) as part of an Environmental Impact Statement (EIS) for the Border to Gowrie section of Inland Rail (the Project) in accordance with the final Terms of Reference (ToR) for the Project and addresses additional requests for information issued by the Office of the Coordinator-General following the public notification stage.

The Inland Rail Program ('the Program') is a major national interstate freight route project between Melbourne and Brisbane. Australian Rail Track Corporation Ltd (ARTC) proposes to construct and operate the New South Wales/Queensland Border to Gowrie Project (the Project) of the Program which extends approximately 217.48 km in length. The Project commences at the NSW/QLD border, the median line of the Macintyre River, approximately 18 km to the southeast of Goondiwindi near Kurumbul and the Project end-point is between Leeson Road and Draper Road, on the southern outskirts of Kingsthorpe, where it connects to the Gowrie to Helidon section of the Inland Rail. The location of the Project is shown in Figure 1: Regional context and Figure 2: Landscape and visual impact assessment area. The Project will utilise a mix of brownfield (existing) and greenfield (new) rail corridors connecting the adjacent Inland Rail projects of North Star to NSW/QLD Border (NS2B) to the south and Gowrie to Helidon (G2H) to the northeast.

The elements of the Project that are relevant to the LVIA include:

- Construction impacts: including vegetation clearance, presence of construction equipment, stockpiles, laydown areas, construction compounds and temporary construction lighting
- Non-resident workforce accommodation facilities: Two non-resident workforce accommodation facilities are proposed near Yelarbon and Inglewood. The requirement for a third non-resident workforce accommodation facility has been identified as required in the Millmerran area. The location for this site has not been included in the revised draft EIS and therefore has not been addressed in this LVIA.
- Concrete batching plants: Two sites have been nominated at Brookstead and Millmerran New track: Approximately 149.48 km of new track within a greenfield rail corridor and 68 km of new track within a brownfield corridor
- Crossing loop and turnouts: Five proposed crossing loops, 2,200 m long to accommodate trains up to 1,800 m long
- Bridges: 37 new bridges (14 rail-over-road, 18 rail-over-watercourse, and 5 road-over-rail)
- Culverts: Reinforced concrete pipe culverts and reinforced concrete box culverts. Scour protection measures will generally be installed around culverts to avoid erosion
- Drainage: Embankment and catch drains adjacent to the proposed alignment to divert surface runoff
- Cuts and embankments: approximately 11,458,700 m³ of cut (rail and road), with maximum cut depths up to 21 m and approximately 12,678,300 m³ of fill (rail and road), with maximum fill depths of up to 21 m
- Level crossings: New and existing level crossings – both passive and active including lighting
- Ancillary works: Ancillary infrastructure including signalling and communications infrastructure, signage, fencing and utilities
- Presence of the freight train: Presence of double stacked trains, with a height of 6.5 m and length of 1,800 m
- Fencing: Fencing will be provided for the majority of the rail corridor and its primary purpose is to limit access to the railway, and will typically comprise standard rural fencing. Where superior fencing is required (for example where tracks are in close proximity to roads and/or communities, or where trespass is anticipated to occur) a 1.8 m chain link boundary fence may be provided. Fencing will not be provided across flood-prone areas.
- Proposed fauna passage features: funnel fencing and crossing structures such as canopy bridges and fauna culverts
- Noise barriers: Potential inclusion of noise barriers in the vicinity of Yelarbon, Brookstead and Pittsworth (design subject to future noise modelling).

The Project was declared a 'coordinated project; for which an EIS is required by the Queensland Coordinator-General under section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) (Qld Government, 2017). The Project is also a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and requires approval from the Australian Government Minister for the Environment and Water administering the EPBC Act.

2.1 Objectives of the LVIA

The purpose of the LVIA is to:

- Identify the urban design and landscaping aspects of the Project
- Assess the impact of the Project on the urban, rural and natural fabric
- Explore the use of Crime Prevention Through Environmental Design (CPTED) principles during the design development process, including natural surveillance, lighting, walkways, signage and landscape
- Identify urban design strategies and opportunities to enhance healthy, cohesive and inclusive communities
- Assess the visual impact of the Project on:
 - Views and vistas
 - Streetscapes, key sites and buildings
 - Heritage items including Aboriginal places and environmental heritage (as identified in EIS Chapter 19: Cultural Heritage)
 - The local community.
- Provide artist impressions and perspective drawings of the Project to illustrate how the Project has responded to the visual impact through urban design and landscaping.

Key objectives of the LVIA are:

- To undertake a baseline assessment describing existing environmental values of the impact assessment area (defined in Section 4.1) with respect to landscape character and visual amenity including scenic viewpoints
- To describe the existing landscape including with reference to any landscape or visual values identified in planning schemes (landscape receptors) and identify those people who experience and value views of the landscape (visual receptors)
- To identify key Project impacts on landscape and/or visual values during the day (and consider the potential for any night-time impacts)
- To evaluate the significance of the impacts of the Project activities on landscape, views and visual receptors during the construction works and operations stages during day and night
- To describe any Project modifications or management techniques that can mitigate identified landscape and visual impacts
- To illustrate the visual impacts using visualisation techniques to assist members of the public in understanding potential impacts.

3 Legislation, policies, standards and guidelines

The purpose of this section is to identify and discuss the relevance of legislative or policy level objectives and standards that exist to protect or manage the landscape and visual values in the context of the Project.

LVIA can assist the development of a design that is integrated into its landscape context across the Inland Rail Program. For this reason, it is necessary to consider policies and guidelines (particularly at the higher national, State and regional level) that may extend beyond the immediate context in which the Project is sited as well as those that apply at the local level. As an example, consideration of urban design principles set out in both New South Wales and Queensland guidelines will ensure that a common approach is adopted which fulfils the separate requirements of these jurisdictions while ensuring design consistency across borders.

Similarly, as landscape and visual impacts may cross boundaries (e.g. views between adjoining local council areas), consideration has also been given to the policies applying to adjacent jurisdictions at the local level.

Relevant guidelines that have informed the LVIA methodology are discussed in Section 4.

The LVIA has also been informed, where appropriate, by the Infrastructure Sustainability Council of Australia (ISCA) standards and guidelines including:

- Infrastructure Sustainability Council of Australia Version 1.2 (including Technical Manual, Scorecard and supporting materials) (ISCA, 2016)
- Infrastructure Sustainability Council of Australia Infrastructure Sustainability (IS) Technical Manual Version 1.2. (2017)
- Infrastructure Sustainability Council of Australia. Version 1.2 Scorecard (April 2018 release) (ISCA, 2018).

Legislation, policies, standards and guidelines that have been considered in this LVIA are described in the sections below and, where applicable, shown on Figure 3: Regional scenic amenity and planning designations.

3.1 National

The national regulatory context for landscape and visual impact assessment practice and policy is summarised in Table 1. The following national standards are considered relevant:

- AS/NZS 4282 Control of the obtrusive effects of outdoor lighting (Standards Australia and Standards New Zealand, 2019)
- AS4970: Protection of trees on development sites (Standards Australia, 2007)
- Disability (Access to Premises – Buildings) Standards 2010.

Table 1: Regulatory context – national

Legislation, policy or guideline	Relevance to the Project
National	
AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting (Standards Australia and Standards New Zealand, 2019) This standard sets out guidelines for the control of the obtrusive effects of outdoor lighting and gives recommended limits for the relevant lighting parameters to contain these effects within tolerable levels. It refers to the potential effects of lighting systems on receptors including nearby	• Lighting is proposed as part of the Project (Section 11 for details). • AS/NZS 4282:2019 is relevant to the consideration of spill lighting associated with a project. • The standard notes that the determination of when the spill light becomes obtrusive to others is difficult since both physiological and psychological effects are involved. • It provides a common basis for assessment of developments that provide outdoor lighting. • Key aspects for consideration include the level of lighting existing in the area, the times the proposed lighting is likely to operate (with different standards applied before and after an established curfew hour – typically 11 pm), and the type of lighting uses.

Legislation, policy or guideline	Relevance to the Project
residents and users of adjacent roads. It does not apply to road lighting or lighting systems that are of a cyclic or flashing nature.	- Public lighting is excluded because it is provided to facilitate all night safety and security. - As lighting of a flashing nature is excluded, technically this standard excludes lighting associated with level crossings. - Section 2.4 of the standard states that <i>“people will have a range of reactions to the installation of outdoor lighting; responses may vary from positive acceptance to outright rejection. The degree of response will depend, in part on the nature of surrounding developments, past experiences, novelty of the installation, and frequency and times of operation.”</i> - Table 2.1 of the standard sets out recommended maximum values (lux levels – a standard measurement of light intensity) for the control of obtrusive light. - Illuminance reduces in proportion to the inverse of the square of the distance from the floodlight – therefore, the further away a light source is from a receptor the lower the potential illuminance. - The objective of design is to ensure that direct view of the bright parts of floodlights are prevented from positions at eye height of neighbouring lots. - As all proposed lighting is for safety purposes during construction (Section 6) a full quantitative lighting assessment is not deemed to be required. However, the general principles of AS/NZS 4282:2019 have been used to inform the qualitative Lighting Assessment methodology (described in Section 4.10 and presented in Appendix 3).
<u>AS4970:2009: Protection of trees on development site</u> <u>(Standards Australia, 2009)</u>	This Standard provides guidance on the principles for protecting trees on land subject to development. Where development is to occur, the Standard provides guidance on how to decide which trees are appropriate for retention, and on the means of protecting those trees during construction work.
<u>Disability (Access to Premises – Buildings) Standards 2010</u> This is a legislative standard that provides a nationally applicable set of provisions that detail what must be done to provide for non-discriminatory access to public buildings for people with disability.	- The Project is mostly located in a rural area within freehold land with restricted access to the general public, limiting the applicability of the Disability (Access to Premises – Buildings) Standards. However, accessibility needs to be considered where the alignment passes through settlements and in recreational areas or adjacent to recreation trails and walkways where people may be present close to the alignment. - The objects of these Standards are: - to ensure that dignified, equitable, cost-effective and reasonably achievable access to buildings, and facilities and services within buildings, is provided for people with a disability; and - to give certainty to building certifiers, building developers and building managers that, if access to buildings is provided in accordance with these Standards, the provision of that access, to the extent covered by these Standards, will be lawful.

3.2 State and regional

The Queensland State and regional regulatory context for LVIA practice and policy is summarised in Table 2. This comprises the following documents referenced in the ToR or identified as being relevant to this Project through the LVIA process:

- *Road Landscape Manual* (Department of Transport and Main Roads (DTMR), 2013)
- *Crime Prevention through Environmental Design* (Queensland Government, 2021)
- *South East Queensland Regional Plan* (SEQRP) ShapingSEQ (Department of Infrastructure, Local Government and Planning, 2017)

- *ShapingSEQ Background paper 4: Sustain* (Department of Infrastructure, Local Government and Planning, 2017)
- *South East Queensland Regional Plan Implementation Guideline No 8 Identifying and protecting scenic amenity values*, (Department of Infrastructure, 2007)
- *Darling Downs Regional Plan* (Department of State Development, Infrastructure and Planning, 2013).

Table 2: Regulatory context – Queensland State and regional

Legislation, policy or guideline	Relevance to the Project
Queensland (State level)	
<u>Road Landscape Manual Edition 2 (DTMR, 2013)</u> This manual aims to facilitate the understanding of, and procedures associated with, the assessment, design and management of roads as they affect the Queensland landscape. It sets out principles for the design of roads to assist in their integration in their natural, cultural and urban landscape settings Appendix 2 describes the process for visual assessment required in the planning and design of Queensland roads.	• The Project requires the realignment and redesign of numerous local and State-controlled roads (Section 6 for details). • Key principles for the design of roads outlined in the manual are integration, context sensitive design, collaboration, sustainability and liveability. • Road landscape integration requires that a consistent and harmonious approach is adopted, reflecting and referencing the surrounding natural and built landscape to achieve integration. • Context sensitive design solution recognises and respond to the road landscape setting to provide “<i>a transportation facility that fits its setting...that leads to preserving and enhancing scenic, aesthetic, historic, community and environmental resources, while improving and maintaining safety, mobility, and infrastructure conditions</i>” • The manual describes a range of acceptable approaches for the design of hard and soft landscape and urban design elements, including earthworks, vehicle bridges, buffer planting etc. • The visual assessment methodology does not directly apply as it is intended for the assessment of Department of Transport and Main Roads projects. However, the principles have informed the assessment methodology for this Project (described in Section 4). • The landscape and urban design guidelines described in the Road Landscape Manual have informed the design and the mitigation of impacts of the Project on the roads within the impact assessment area as described in Section 11.
<u>Crime Prevention through Environmental Design (Queensland Government, 2021)</u> The CPTED guidelines for Queensland seek to promote the incorporation of CPTED principles into the planning, design and management of development in Queensland. They aim to guide and encourage public and private developers to design with CPTED in mind.	• The Project is mostly located in a rural area with limited public accessibility limiting the applicability of the CPTED guidelines. However, CPTED needs to be considered where the alignment passes through settlements and in recreational areas or adjacent to recreation trails and walkways where people may be present close to the alignment. • The guidelines describe several principles to inform design including surveillance (both direct and indirect), legibility, territoriality, ownership, management and vulnerability. • The guidelines address a range of scales from planning through to detailed design and include strategies for signage, public artwork, materiality (functional and robust without being harsh). • Key relevant principles include design of the built environment to reduce or limit risk from assault by providing well-lit, active and overlooked places and pedestrian and cyclist systems and routes to important places and avoiding the creation of hidden spaces close to pedestrian/cyclist travel routes in the public realm. • Elements such as landscaping, walls, fences, buildings, passages, bridges, tunnels and street furniture are to be designed to avoid hidden places close to paths or hidden corners, blind spots or bends that create places of concealment.

Legislation, policy or guideline	Relevance to the Project
	It is recommended to avoid, where possible, pedestrian/cyclist tunnels, bridges or other movement predictors (especially closed ones) which limit surveillance and response options.
Queensland (Regional level)	
<u>South East Queensland Regional Plan ShapingSEQ</u> (Department of Infrastructure, Local Government and Planning, 2017) The South East Queensland Regional Plan 2017, also known as <i>ShapingSEQ</i>, is the regional plan for the South East Queensland region. It was given effect on 11 August 2017. The South East Queensland region includes several local government areas. Relevant local government areas covered by this plan through which the Project passes include Toowoomba Regional Council (part only). The plan provides a regional framework for growth management, and sets planning direction for sustainable growth, global economic competitiveness and high-quality living including by ensuring land use and infrastructure planning are integrated, valuing and protecting the natural environment including landscapes, and supporting rural communities. The plan is supported by a range of background papers (see below). The plan is structured around the key themes of Grow, Prosper, Connect, Sustain and Live.	- The Project considers the requirements of <i>ShapingSEQ</i>, which sets out the vision and strategy for planning in the South East Queensland region. - The 'Prosper' and 'Connect' elements of the plan supports investment in upgrades and new infrastructure, including the Melbourne to Brisbane Inland Rail that "<i>will reinforce SEQ as the apex of Australia's strategic freight network</i>". - The 'Sustain' element of the plan highlights the importance of "<i>valuing and protecting our greatest assets – our regional landscapes and natural systems that sustain us.</i>" - Goal 4: Sustain is the most important in terms of guiding the regional context for landscape and visual amenity values stating "<i>Our regional landscapes contain a wide range of values, including biodiversity, rural production, natural economic resources, scenic amenity, cultural landscapes and outdoor recreation. These values contribute to SEQ being one of the most biodiverse and liveable regions in Australia.</i>" - Element 4: Regional landscapes seeks to protect the values of inter-urban breaks, protect and rehabilitate culturally significant plans, and protect the regional greenspace network and "<i>protect regional scenic amenity areas from development that would compromise their values.</i>" - Map 5c: Regional landscape values, maps key valued landscapes in South East Queensland including protected areas, regionally significant greenspace, regionally significant scenic amenity and inter-urban breaks. - The Inland Rail Project passes through/close to areas of identified regionally significant scenic amenity as described in Section 5.1, however, the Project does not traverse any of these areas (as the majority of the LVIA Study Area is outside the South East Queensland region). These areas are subject to detailed assessment in the landscape and visual assessment; see Section 7. - Scenic amenity areas are "<i>Landscape areas identified by the SEQ regional amenity methodology as having scenic amenity value</i>". The stated benefits of such areas include physical and mental health and wellbeing, tourism, sense of place and community cohesion. - Element 5: Live is also relevant in terms of landscape and scenic amenity. For example, Live Element 3: Inspiration from local character requires that "<i>The communities of SEQ demonstrate a strong respect for their heritage, distinct context and local character</i>". This includes identifying and conserving local landscape, heritage and cultural assets including indigenous landscape values; working with natural topography to create development that contributes positively to the environmental and visual experience of a place; using appropriate building materials that add to a local area's character and diversity; and, working with the characteristics, traditions and values of the local community to create a distinctive local character and contributory community value. - Map 6 Live: Some great places, identifies some locations close to the Project in South East Queensland including Toowoomba city centre.

Legislation, policy or guideline	Relevance to the Project
	- The Western Subregion includes Toowoomba. This sub-region is characterised by features including “a predominantly regional and rural lifestyle supported by spectacular open space, hinterland and natural landscape settings”. - The connect theme seeks to enhance “the movement of goods and services via key freight connections” - Key regional infrastructure outcomes for Connect in this sub-region are shown on Map 4b that indicates a future freight corridor (rail), the Warrego Highway and support for planning and industrial growth of the Toowoomba Enterprise Hub (Charlton Wellcamp). The theme emphasizes the Western Subregion’s role as the western gateway, connecting South East Queensland to the rural areas and towns of Darling Downs and South Burnett, and providing critical freight connections with northern New South Wales and the southern states. - Key regional outcomes for Sustain in this subregion include identification, protection and management of regional landscapes.
<u>South East Queensland Regional Plan Implementation Guideline No 8 Identifying and protecting scenic amenity values (Department of Infrastructure 2007)</u> This Guideline document was developed to assist South East Queensland councils to determine a framework for the protection of regional landscape values. It was developed to support the (now superseded) Scenic Amenity policies of the Queensland Regional Plan 2009–2031 but is still referenced as the <i>SEQ regional amenity methodology</i> in the current regional plan <i>ShapingSEQ</i> (see above).	- The guidelines were informed by the South East Queensland 2004 Public Preference Survey. This established that 68 per cent of people consider scenic values to be the most important or second-most important values at places where the scenery is highly preferred, such as the views from lookouts over the ocean, beaches, rocky cliffs, bushland, rivers and mountains. - The guideline establishes a voluntary methodology that centres around some key concepts: - Scenic amenity which is defined as “a measure of the relative contribution of each place in the landscape to the collective appreciation of open space as viewed from places that are important to the public” (Department of Natural Resources, 2001). - Scenic preference which is defined as “a rating of the community’s liking for scenery of open space compared to areas occupied by built structures, measured using photographs” (Department of Natural Resources, 2001). - Public viewing locations: publicly accessible outdoor locations such as roads, walkways, beaches, picnic areas, lookouts or viewing platforms. Significant and popular viewpoints are elevated public viewing locations where people can safely stop and rest to admire the view. - Seen landscape areas: natural or built areas such as hills, the ocean, farmlands, waterways, towns, cities or suburbs visible from one or many public viewing locations. Areas of high scenic amenity are highly preferred and seen landscape areas. - View corridors: three-dimensional spaces that connect public viewing locations with seen landscape areas. Important view corridors connect significant and popular viewpoints with areas of high scenic amenity. - The regional scenic amenity values are calculated using GIS analysis which combines visual exposure (least visible to most visible) and visual preference (least preferred to most preferred) to give a value between 1 and 10. - Regional scenic amenity applies to areas with a value of 9 to 10 with local scenic amenity value applying to areas with values of 6 to 8. - Regionally significant and popular viewpoints need to have a scenic value of 9 to 10 in at least one direction with a visitation importance rating of 9 or 10. Locally significant and popular viewpoints need to have a scenic value of 6 to 8 in at least one direction with a visitation importance rating of 6 to 8.

Legislation, policy or guideline	Relevance to the Project
	• The South East Queensland Scenic Amenity Methodology mapping is a useful tool for indicating regional scenic amenity values and, therefore, assists in determining relative sensitivity of landscape and visual values across the Impact assessment area. It has been used to inform the sensitivity of the landscape character areas identified in this LVIA and to identify areas where views are likely to have high scenic amenity values and are, therefore, likely to be of greater sensitivity to change. • The South East Queensland Scenic Amenity methodology is applicable only to South East Queensland, whereas parts of Inland Rail extend beyond the South East Queensland boundary. While some local government areas (LGAs) outside of South East Queensland have applied the methodology, so some additional areas within the wider landscape context of the Inland Rail Program have this mapping available, it is not available for all landscapes affected by Inland Rail in Queensland. Therefore, care needs to be taken in its application to the LVIA methodology and it cannot be used in isolation of other approaches. For example, the scenic amenity mapping does not extend to landscapes associated with the southern extent of the Project alignment, therefore, alternative approaches are also required to ensure consistency. • The guideline includes an assessment methodology for determining acceptable proposed development in areas of high scenic amenity. This involves taking photographs and calculating the percentage of evident built development to determine acceptability. • This simplistic empirical methodology for development assessment is only applicable to high scenic value areas (which are not consistently mapped within the Project footprint) and is, therefore, not considered to be suitable to use for the LVIA assessment method for the Project. The approach used in this LVIA is consistent with standard international (including Queensland) LVIA practice and recognises the need to consider landscape and visual impacts across the impact assessment area; including impacts on areas of more local scenic amenity value to the community taking a defined qualitative approach. However, the key concepts of the guideline and the associated mapping (as discussed further in Section 5.1) have informed the baseline assessment and the analysis outputs as described in Section 4.
<u>Darling Downs Regional Plan</u> <u>(Department of State Development, Infrastructure and Planning, 2013)</u> The <i>Darling Downs Regional Plan</i> provides strategic direction and policies to deliver regional outcomes which align with the State's interests in planning and development. It is focussed on delivering regional policy aimed at achieving specific regional outcomes. The Project passes through parts of Goondiwindi Regional Council and Toowoomba Regional Council.	• The Project is located within the Darling Downs Region, of which the Darling Downs Regional Plan applies as the relevant statutory regional plan. • Key regional policies are to protect Priority Agricultural Land Uses while supporting co-existence opportunities for the resources sector and provide certainty for the future of towns in the region. • The plan states the importance of the regional landscape values stating "<i>the region has some of the State's best assets, with high value scenic and natural amenity, vibrant towns and strong communities underpinned by a diverse range of cultural values. The region encompasses a variety of regional landscapes, including urban and rural holdings, agricultural production, resource and mine sites, and protected areas.</i>" • The plan addresses the increasing importance of the region for tourism noting increasing growth with visitors coming to experience scenic, natural, cultural and heritage attractions.

Legislation, policy or guideline	Relevance to the Project
	- The plan also emphasises the importance of the region for freight connectivity, noting the eastern Darling Downs is at the junction of several strategic highways and railway lines and is the major transport and service hub of the region. This area facilitates the movement of goods and resources between Queensland's south-east and west, enabling access to domestic and international markets through the strategic port facilities along the east coast. The plan also notes that the eastern area of the Darling Downs region contains the region's largest population centre, Toowoomba—the largest non-capital inland city within Australia. - The plan highlights the balanced approach that needs to be taken to managing the environmental, community and economic values of the Darling Downs, which applies to all projects including Inland Rail.

The following documents that apply to New South Wales have also been considered and, where relevant, applied to the LVIA process for this Project to ensure consistency of approach for the landscape assessment and mitigation approach across the Inland Rail Program:

- *Beyond the Pavement, 2020a, Urban design approach and procedures for road and maritime infrastructure planning, design and construction* (Transport for NSW, 2020)
- *Guideline for landscape character and visual impact assessment, Environmental impact assessment practice note EIA–N04* (Transport for NSW, 2020b)
- *Bridge Aesthetics: Design guideline to improve the appearance of bridges in NSW* (Transport for NSW, 2019)
- *Sustainable Design Guidelines Version 4.0* (Transport for NSW, 2017)
- *Crime prevention and the assessment of development applications* (NSW Department of Urban Affairs and Planning, 2001).
- *Urban Green Cover in NSW – Technical Guidelines*. (Office of Environment and Heritage, 2015).

The relevance of these references to the Project is summarised in Table 3.

Table 3: Regulatory Context – New South Wales State and Regional

Legislation, policy or guideline	Relevance to the Project
New South Wales (State level)	
<u>Beyond the Pavement, 2020a, Urban design approach and procedures for road and maritime infrastructure planning, design and construction</u> (Transport for NSW, 2020) <i>Beyond the Pavement</i> is a high-level urban design policy produced by the Transport for NSW that systematically incorporates urban design thinking into infrastructure projects, with a focus on delivering improved design outcomes and higher levels of community satisfaction. This Guideline is referenced in the <i>IS Technical Manual</i> as part of the Urb-1 Urban Design credit in the IS Rating Scheme	- This plan is relevant to the entirety of the Program, as it is important to consider the broader impacts of the Project and associated infrastructure upon existing built form, communities and the natural environments the Project transects (including infrastructure associated with temporary construction such as laydown yards, non-resident workforce accommodation facilities and construction lighting). - The key purpose of this policy is to ensure that during construction and operation: - Existing landscape and built environment qualities are understood and protected - Built projects contribute to the quality of the built environment in urban and rural contexts, and create a legacy for the future - The quality of life of local communities is protected or improved in terms of connections, access to facilities, proximity to noise, views, safety and sense of place. - The guidance considers “...roads and bridges can be impressive and attractive feats of engineering which add visual interest and identity to the environment, or, if not designed well, can be visually unappealing and fail to be embraced by the community”.

Legislation, policy or guideline	Relevance to the Project
	- Relevant to the LVIA, this report states that: - The architectural and landscape quality of transport infrastructure should be visually pleasing; - Transport infrastructure should fit sensitively into its natural setting, protecting the scale and unique qualities of the places in which it is situated; - Major built elements can add character and help transform areas for the better; - The design quality of structures and elements contributes to how a place looks and feels and how robust and durable it is; - Major structures (such as bridges) associated with the entry to country towns should be planned and designed with special care as they can form 'gateways' and signature landmarks in the landscape; - The location, scale and design of earthworks and structures should be kept in character with the existing landscapes and neither intrude into views from key sites and nearby lots, nor affect sites which may be of significant heritage or conservation value, or that have visual prominence or value - The retention of views helps define the scenic quality of a road or a journey; - Views and viewpoints to heritage bridges, abutments and buildings should be maintained, as far as possible - Signage should be designed and located to minimise the visual impact on heritage buildings and ensembles, as well as structures of heritage significance, such as bridges, Aboriginal heritage and culture, historic roads and the broader landscape of which these are part; - Vegetation contributes to the uniqueness of a place, the 'greening' of a corridor and the overall tree cover of an area; and - Plantings in towns, cities and the countryside or along roads that can be considered to have heritage value, even if their heritage value has not yet been assessed and formally listed on an environmental plan or register should be preserved and respected.
<u>Guideline for landscape character and visual impact assessment, Environmental impact assessment practice note EIA-N04 (Transport for NSW, 2020b)</u> This practice note applies to projects which Transport for NSW is seeking determination and approval to proceed. This practice note can also apply to any transport projects which require an assessment of landscape character impacts and visual impacts. It recognises the importance of landscape character and visual impact assessment to determine impacts on the character and views within a place to ensure a good urban design outcome.	- This practice note applies to New South Wales. To ensure a consistent cross-border approach it has been considered for assessment of this Project. The purpose of this practice note is to: - Inform the development of the preferred route and concept design to avoid and minimise impacts up front. - Inform Transport, other agencies and the community about what avoidance, management and mitigation strategies would be implemented. - Nine principles are described in the practice note. - Key elements of the Practice Note that inform the LVIA and mitigation approach for the Project are: - The note differentiates between the assessment of impact on an area's built, natural and cultural character or sense of place and the assessment of impacts on views. - The impact assessment process is based upon assessment of sensitivity to change and magnitude (scale, character, distance) of the Project on an area or view. - A range of attributes for the assessment of landscape character are described and the guidance requires desk and field-based study to break the impact assessment area down into character zones.

Legislation, policy or guideline	Relevance to the Project
	○ The visual assessment methodology includes defining the extent of visibility, identifying key viewpoints and their sensitivity in order to assess visual impacts. ○ Guidelines are given for refining the concept through siting and mitigation using the Transport suite of urban design guideline documents including construction works and operations stages.
<u>Bridge Aesthetics: Design guideline to improve the appearance of bridges in NSW (Transport for NSW, 2019)</u> The purpose of this document is to help design teams produce bridges of aesthetic value.	• This document is relevant to the assessment of the design of the bridge structures, it applies to New South Wales but is also worthy of consideration in the Queensland context given the cross-border nature of the Project including a bridge crossing between NSW and Queensland. This report states that: ○ Bridge design should consider the visual impact of proposed infrastructure on the local context and be contextually appropriate. ○ Bridges along the route should be designed to create a visually consistent design language, that assists in placemaking and wayfinding.
<u>Sustainable Design Guidelines Version 4.0 (Transport for NSW, 2017)</u> These guidelines are a key tool in helping to realise sustainable project outcomes and seek to deliver sustainable development practices by embedding sustainability initiatives into the planning, design, construction, operations and maintenance of transport infrastructure projects.	• The guidelines apply in NSW and incorporate the following key aims that can be considered in Project delivery in Queensland: ○ Minimising impacts on the environment, whether through transport operations, infrastructure delivery or maintenance. ○ Procuring, delivering and promoting sustainable transport options that achieve value for money and reduced life cycle costs. ○ Developing, expanding and managing the transport network that is sustainable and climate resilient. • The guidelines outline several sustainability initiatives (14 compulsory requirements and 2 sub requirements) that Project teams are required to implement at each Project delivery stage.
<u>Crime prevention and the assessment of development applications (NSW Department of Urban Affairs and Planning, 2001).</u> These guidelines are intended to assist councils identify crime risk and minimise opportunities for crime through the appropriate assessment of development projects. This guideline provides a framework for the Hea-2 Crime Prevention credit in the IS Rating Scheme	• The Project is mostly located in a rural area within privately-owned land with limited public accessibility limiting the applicability of the CPTED guidelines. However, CPTED needs to be considered where the alignment passes through settlements, near recreational areas or adjacent to recreation trails and walkways where people may be present close to the alignment. • The guidelines describe several basic CPTED principles to assess development applications including surveillance (both direct and indirect), access control, territorial reinforcement and space management. These principles apply to both construction works and operations stages of the Project.
<u>Urban Green Cover in NSW – Technical Guidelines. (Office of Environment and Heritage, 2015)</u> These guidelines offer built environment professionals practical information and typical details to encourage best practice applications of green cover, to minimise urban heat impacts across NSW.	• The Project is mostly located in a rural area with limited public accessibility limiting the applicability of the Urban Green Cover guidelines. However, the principles outlined in this document can be considered where the alignment passes through urban areas, settlements and/or in recreational areas where people may be present close to the alignment. • The document aims at increasing green cover to mitigate rising temperatures in the following ways: ○ Protecting and enhancing existing local green spaces. ○ Designing eco-friendly buildings and infrastructure. ○ Supporting existing green space networks.

3.3 Local

The Project passes through the local government areas of Goondiwindi Regional Council and Toowoomba Regional Council. Relevant provisions of the following planning schemes and associated strategy documents have informed the assessment of landscape and visual impacts associated with the Project:

- *Goondiwindi Region Planning Scheme 2018* (Goondiwindi Regional Council, 2018)- commenced 15 March 2018
- *Toowoomba Regional Planning Scheme* (Toowoomba Regional Council, 2012) – commenced 1 July 2012 and associated studies:
 - Toowoomba Regional Council – Scenic Amenity Study 2009 (Conics, 2009)
 - Toowoomba Regional Council – Heritage and Urban Character Study (Brannock & Associates, 2010)
 - West Toowoomba Land Use Investigations Study (Toowoomba Regional Council, 2017)
 - Toowoomba Regional Council – Landscape and Urban Character Study 2021 (Lat27, 2021b)
 - Toowoomba Regional Council – Scenic Amenity Study 2021 (Lat27, 2021a).

The Project adjoins several government areas in New South Wales. Relevant plans have been reviewed for relevance to the assessment of landscape and visual impacts associated with the Project, as follows:

- Moree Plains planning documents, including:
 - *Moree Plains Local Environment Plan 2011* (NSW Government, 2011)
 - *Moree Plains Shire Growth Management Strategy* (Moree Plains Shire Council, 2009).

Each of the planning schemes and associated studies recognise and protect areas valued for their landscape and/or scenic qualities, arising from nature conservation or rural characteristics. The key policies at the local level are summarised in Table 4 and Table 5.

Table 4: Regulatory Context – Queensland Local

Legislation, policy or guideline	Relevance to the Project
Queensland (local level)	
<u>Goondiwindi Region Planning Scheme 2018 (Goondiwindi Regional Council, 2018)</u> The scheme divides the area into zones with associated codes.	• The <i>Goondiwindi Region Planning Scheme 2018</i> is the primary planning document for land located within the Goondiwindi Regional Council local government area. While the planning scheme does not apply to the Project it is relevant to consider its provisions in terms of landscape and visual amenity. • The Project alignment predominantly traverses land zoned as Rural, including land within the Alluvial Plains, Kumbarilla Rises and Horticulture 1,2 and 3 precincts. • Part 3, Strategic Framework includes the following specific outcomes that reference amenity and rural landscape as follows: • 3.6.1 Community Identity – The unique identity of the towns of Goondiwindi Region is recognised and strengthened through appropriate development outcomes that protect and enhance the character of the town centres, heritage places and, more generally, the scenic amenity values of the rural landscape that provide the settings for these towns. • 3.6.2.1 Town Character Specific Outcomes – The traditional town character integral to the identity of Goondiwindi Region is preserved and promoted through development that maintains the unique built form character and identity of each town centre; and

Legislation, policy or guideline	Relevance to the Project
	- The dominance of natural landforms and open space in the Rural Area identified on Strategic Framework Map 1— Settlement Pattern and associated landscape and scenic amenity values that provide the setting for the towns are maintained. • Section 3.6.4 of the Planning Scheme states that open space, sport and recreation facilities network should be: - protected from the encroachment of incompatible development in order to protect the health wellbeing, amenity and safety of the community. • Section 3.6.5 of the Planning Scheme outlines specific outcomes relating to Cultural Heritage requires that - Development on or adjacent to a place or structure of cultural heritage significance maintains the architectural or historical significance of the place or structure through a sensitive design outcome, having regard to the scale, form, materials, setting architectural theme and style of existing development; • Section 3.6.6.1 of the Planning Scheme outlines specific outcomes relating to Scenic Amenity and Regional Landscape Character requiring protection of the productive use of rural land and the dominance of natural landforms and open space over built form in rural areas. • Section 3.8.4.1 of the Planning Scheme outlines specific outcomes for the Rail Network, requiring it is protected from development, including that which has the potential to generate reverse amenity impacts. • Section 6.2.9.2 Purpose and Overall outcomes for Rural Zone areas includes provisions for amenity and rural landscape as follows: - a general low rise and low intensity scale of development is maintained consistent with the predominant rural character of the zone and visual prominence of environmental and landscape features in the rural landscape; - the viability of rural activities, are protected from the encroachment of incompatible development such as sensitive land uses; - uses other than rural activities are located in the Rural zone only where those uses: i. do not impact adversely on the amenity of the Rural zone; ii. have a demonstrated need to co-locate with rural activities or natural or cultural resource. iii. protect the landscape values and scenic amenity of the Rural zone. - places, buildings or items of cultural heritage or heritage character are protected and enhanced by development to preserve the historic character and identity of the locality; • Section 8.2.4.2 Heritage Overlay Code Purpose includes provisions for amenity and rural landscape requiring: - the heritage significance of individual sites and places is conserved; - development on a local heritage place remains compatible with the heritage significance of the place by: i. protecting, as far as practicable, the context and setting of the local heritage place.
<u>Toowoomba Regional Planning Scheme (Toowoomba Regional Council, 2012)</u> The scheme divides the area into zones with associated codes including specific overlay codes associated with scenic amenity.	• The planning scheme does not apply to the Project. However, it is relevant to consider its provisions in terms of landscape and visual amenity. • The Project alignment predominantly traverses land zoned as Rural, however also passes through areas with High Impact Industry, Community Facilities, Limited Development, Low Density Residential, Emerging Community and Rural Residential zonings.

Legislation, policy or guideline	Relevance to the Project
	• Section 3.6 Natural Resources and Landscape, 3.6.1 Strategic outcomes requires that “Scenic landscapes are valued and protected, and natural resources are well managed.” • 3.6.2 Scenic Amenity: The scenic landscapes and landscapes of rural and heritage value help define the character and identity of Toowoomba. Changes to the essential characteristics of landscape are undertaken in a measured and informed manner. • 3.6.2.1. Specific Outcomes: Areas identified as high scenic amenity are protected by integrating built elements or significant disruptions into the landscape through design that minimises visual impacts. • Large intrusions onto this landscape, such as extraction, mining, wind turbines and large solar collectors are designed, located and operated to mitigate negative amenity impacts. • Section 8.3.3 Scenic Amenity Overlay Code includes provisions to ensure development in areas of high scenic amenity does not significantly detract from the scenic quality of the area. Overall outcomes include: – the scenic amenity values are protected; and – development in scenic amenity areas is sited and designed to minimise the adverse impacts on the scenic qualities of the area. • Development on land covered by the Scenic Amenity Overlay should not adversely affect the scenic amenity qualities of the site when seen from publicly accessible viewing locations. In the vicinity of Toowoomba, these locations include Picnic Point, Mt Kynoch and Mt Lofty (all outside of the Impact assessment area). Where no publicly accessible viewing locations such as lookouts are in the vicinity of the development site, assessment should be determined from areas indicated as having high visual exposure. • Areas having high visual exposure generally comprise thoroughfares with high traffic volumes and include the New England, Gore and Warrego Highways but also include other main roads throughout the Region. • Areas of high scenic amenity value / visual exposure are described further in Section 5.1. • Other development zones have specific requirements for the maintenance of visual amenity and requires that development mitigates adverse impacts on natural topography, features, scenic values and amenity including consideration of CPTED issues. This includes the in the Low Density Residential zone (Section 6.2.1.2); High Impact Industry Zone (Section 6.5.3.2); Community Facilities Zone (Section 6.6.1.2); Emerging Community Zone (Section 6.6.2.2). • Section 6.6.6.2 Purpose and Overall outcomes for Rural Zone includes provisions for amenity and rural landscape as follows: – (c) protect the landscape character and its associated visual and scenic amenity; – (h) natural features such as creeks, gullies, waterways, wetlands and bushland are retained, managed, enhanced and provided with appropriate buffers from development; – (k) the viability of both existing and future rural uses and activities are protected from the intrusion of incompatible uses.

Legislation, policy or guideline	Relevance to the Project
<u>Toowoomba Regional Council – Scenic Amenity Study 2009 (Conics, 2009)</u> This document provides a comprehensive inventory and assessment of scenic quality within the Toowoomba region, to identify areas of strategic significance with respect to their visual contribution to the regional image. This study has been based on the approach detailed in the South East Queensland Regional Plan 2005-2026 Implementation Guideline No. 8 – ‘Identifying and protecting scenic amenity values’ has provided a quantitative method to the process of assessment of scenic values.	• This document produced by <i>Jensen Planning + Design</i> includes recommendations and strategies for the management of scenic amenity, designed to inform the preparation of the Toowoomba Regional Plan, described above. • Section 10.2 Protecting areas with high scenic amenity includes proposed management objectives for each constraint category defined by the study. • Areas of high scenic amenity value / visual exposure are described further in Section 5.1. • Section 10.3 Managing Significant and popular viewpoints • Strategies include retaining or enhancing public access to significant and popular viewpoints by publicising its existence through maps and brochures, upgrading access to the viewing location, providing signing to draw casual visitors to the site and providing additional facilities.
<u>Toowoomba Regional Council – Landscape and Urban Character Study 2021 (Lat 27, 2021b) and Toowoomba Regional Council – Scenic Amenity Study 2021 (Lat 27, 2021a)</u>	These documents were produced by Lat27 on behalf of Toowoomba Regional Council to update the earlier work undertaken by <i>Jensen Planning + Design</i> and to inform the new planning scheme. They have been released for community consultation (Toowoomba Regional Council, 2021) but have not yet been formally adopted. The <i>Landscape and Urban Character Study</i> (Lat27, 2021b) identifies the key characteristics of landscapes and settlements across the Toowoomba Region. The <i>Scenic Amenity Study</i> (Lat27, 2021a) identifies areas of regional and local scenic amenity for the Toowoomba Region, including key regionally significant views and landscape features.
<u>Open Space Strategy (Toowoomba Regional Council, 2016)</u> The Open Space Strategy maps out a new vision for open spaces will be needed across the region. It aims to deliver a network that will enhance the unique character of each locality to create a sense of place and pride for the community.	This strategy provides a framework for protecting, enhancing and managing open spaces. • It recognises the importance of open space and includes provisions for amenity and rural landscape as follows: – Goal 2: Retain and integrate existing vegetation and landscape features to provide visual amenity – Objective: Provide attractive environments to live and play ensuring a network of Open Space that integrates with existing vegetation and preserves landscape features.
<u>West Toowoomba Land Use Investigations Study (Toowoomba Regional Council, 2017)</u> The West Toowoomba Land Use Investigation Study is part of a series of local planning investigations by Council to guide sustainable growth and development in the Toowoomba Region.	• Projected population growth, investment in major transport infrastructure (Gore and Warrego Highways, Toowoomba Second Range Crossing (now passed the Toowoomba Bypass), Toowoomba Wellcamp Airport) and Inland rail are all key drivers of this study. • The plan outlines 10 key strategic directions to guide development in the region, relevant extracts are noted below: – 3. Communities Framed by Green: Creating a Connected Greenspaces Network - Establish a major greenspace network focused on the natural vegetated features of the creek corridors, the Toowoomba escarpment and hills. These features physically and visually define the communities and contribute to the West Toowoomba sense of place. The greenspace network will have multiple functions including providing a high amenity setting for future residential development

Legislation, policy or guideline	Relevance to the Project
	- 9. West Toowoomba Identity: Connecting City and Country - Views to the Toowoomba escarpment, as well as the backdrop of open rural plains and scattered hills, create an identity recognised distinctly as West Toowoomba and the gateway between Toowoomba City and the Darling Downs. New development contributes to the distinctive sense of place by marking important gateways, such as key transport corridors and at major community facilities, through appropriate building, signage and landscaping and maintaining scenic views and vistas, such as along roads and open space. - 10. Rural Values: Agricultural Production and Landscape Character - The productive rural activity of West Toowoomba is retained as an important contributor to the local economy and employment, sense of place and lifestyle choice. The rural landscape character is noted as an important feature of this place and urban development incorporates key rural views and vistas. • The report also references significant view corridors and areas of environmental value that should be preserved and enhanced to retain the sense of place in the impact assessment area identified in the Scenic Amenity and Landscape Character Assessment. • The structure plan responds to recommendations in the Scenic Amenity and Landscape Character Assessment and is considered to be compatible with retaining high quality scenic amenity and landscape character outcomes, for example by: - Preserving important views to peaks, ridgelines and escarpment such as Gowrie Mountain - Establishing connections with existing parkland (e.g. Mount Peel and the Cranley Escarpment) - Providing open space that capitalises on view corridors - Green networks along water courses. • Relevant provisions are described further in Section 5.1. • The structure plan contributes to the West Toowoomba identity by: - establishing distinctive compact urban neighbourhoods with a defined urban edge - maintaining scenic views and vistas, such as along roads and greenspace - marking important gateways such as key transport corridors and at major community facilities through appropriate building, signage and landscaping - establishing boulevards with distinctive tree planting along key roads and approaches. • Specific scenic views and vistas have been identified within the impact assessment area (outlined below), and development within these views and vistas should be avoided. These include: - Elevated viewpoints along the escarpment – looking west across the central plains area. - Central plains in vicinity of Oestreich Road – looking east towards the treed escarpment (away from the Project). - Mount Peel to Gowrie Mountain (and along Drayton Wellcamp Road) – long distance views provide a strong sense of place as there is a full mix of different landscapes (from this direction the Project lies beyond Gowrie Mountain). • Scattered hills within the lower plains and along the Toowoomba escarpment such as Harvey Court Park provide relief in the landscape.

The following documents that apply to New South Wales have also been considered and, where relevant, applied to the LVIA process for this Project to ensure consistency of approach for the landscape assessment and mitigation approach across the Queensland and northern New South Wales sections of the Inland Rail Program. These are summarised in **Table 5**.

Table 5: Regulatory Context – New South Wales Local

Legislation, policy or guideline	Relevance to the Project
New South Wales (local level)	
<u>Moree Plains Local Environmental Plan 2011 (NSW Government, 2011)</u> The aim of the Moree Plains Local Environmental Plan 2011 is to guide planning decisions for Moree Plains Local Government Area through zoning and development controls, which provide a framework for the way land can be used. The Local Environmental Plan is the main planning tool to shape the future of communities and also ensure local development is undertaken appropriately.	- The Project does not directly fall within this council area. However, the Project joins the North Star to NSW/QLD Border alignment at the proposed Macintyre River bridge. Accordingly, the potential for cross-border impacts has been considered (and the impact assessment area, described in Section 4.1, includes part of the Moree Plains Local Government Area). - Key relevant objectives for development include: - The proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance; - The proposed development should not have any substantial adverse effect on the amenity of the surrounding area; - Earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.
<u>Moree Plains Shire Growth Management Strategy (Moree Plains Shire Council, 2009)</u> The Growth Management Strategy provides a future direction for the settlements and land within the shire. The document provides a description of the physical, social and economic environment of the Shire as well as the planning context. The development pattern of the Shire is described and issues shaping the future of the shire are discussed. The strategy then makes several recommendations for future action.	- The Project does not directly fall within this council area. However, the Project joins the North Star to NSW/QLD Border alignment at the proposed Macintyre River bridge. Accordingly, the impact assessment area includes part of the Moree Plains Local Government Area so the potential for cross-border impacts have been considered. - The unique rural landscape character of the Moree Plains Shire is noted as a visual resource as it generates tourism, development and environmental management. - The strategy notes the importance of recognising the visual amenity of open paddocks, distant views, heritage items and rural activities. - Controls which may be considered for retaining the rural character include planting controls for screening undesirable elements and incorporating buffers to significant environmental communities and the visual amenity of road corridors.

4 Methodology

The LVIA methodology has been developed with reference to guidelines and techniques used in Australia and internationally, including:

- *Guidance Note for Landscape and Visual Assessment (GNLVA)* (Australian Institute of Landscape Architects (AILA), 2018)
- *Guideline for landscape character and visual impact assessment - Environmental impact assessment practice note EIA-N04* (Transport for NSW, 2020b)
- *Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3)* (Landscape Institute and the Institute of Environmental Management and Assessment 2013)
- *Guidelines for Landscape and Visual Impact Assessment, Second Edition (GLVIA2)* (Landscape Institute and the Institute of Environmental Management and Assessment, 2002)
- *South East Queensland Regional Plan Implementation Guideline No 8 Identifying and protecting scenic amenity values* (Department of Infrastructure, 2007)
- *Technical Guidance Note: Photography and Photomontage in Landscape and Visual Impact Assessment, Public Consultation Draft 2018-06-01* (Landscape Institute, 2018)
- *Landscape Institute Advice Note 01/09: Use of photography and photomontage in landscape and visual assessment* (Landscape Institute, 2011)
- *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity* (Scottish Natural Heritage and The Countryside Agency, 2006)
- *Australian/New Zealand Standard AS/NZS 4282:2019 – Control of the Obtrusive Effects of Outdoor Lighting* (Standards Australia and Standards New Zealand, 2019)
- *Guidance Note 01/21 The Reduction of Obtrusive Light* (Institution of Lighting Professionals, 2021).

As described in the GNLVA (AILA, 2018):

“Landscape and Visual Assessment (LVA) is an essential tool of reconciling development with landscape and scenic values and promoting better outcomes for our communities.”

Other guidelines that inform the basis for the qualitative appraisal of design outcomes have also been consulted as appropriate and as described previously in more detail in Section 3. These include:

- *Beyond the Pavement: Urban design approach and procedures for road and maritime infrastructure planning, design and construction.* (Transport for NSW, 2020a)
- *Guideline for landscape character and visual impact assessment, Environmental impact assessment practice note EIA-N04* (Transport for NSW, 2020b)
- *Road Landscape Manual Edition 2 (DTMR, 2013)*
- *Bridge Aesthetics: Design guideline to improve the appearance of bridges in NSW* (Transport for NSW, 2019)
- *Sustainable Design Guidelines Version 4.0* (Transport for NSW, 2017)
- *Crime prevention and the assessment of development applications* (NSW Department of Urban Affairs and Planning, 2001)
- *Urban Green Cover in NSW – Technical Guidelines.* (Office of Environment and Heritage, 2015)
- *Healthy Urban Development Checklist* (NSW Health, 2009).

4.1 Impact assessment area

For the purposes of the LVIA, an impact assessment area has been defined as the area illustrated in Figure 2: Landscape and visual impact assessment area which aims to establish the area within which the Project has potential to influence landscape and/or visual values and receptors. The impact assessment area is a 10 km offset from the centre line of the Project rail alignment; a distance derived from VAM and fieldwork. It commences at the NSW/QLD border, approximately 18 km to the southeast of Goondiwindi near Kurumbul and continues through to the west of Gowrie Mountain and crosses the Warrego Highway before tying into the Gowrie to Helidon Inland Rail project - between Leeson Road and Draper Road, on the southern outskirts of Kingsthorpe.

The definition of the LVIA impact assessment limits is based on:

- Assumptions regarding the likely extent of visibility of projects of this nature, based on experience of previous similar projects in Australia such as the LVIA for the Southern Freight Rail Corridor (AECOM, 2008). It is considered unlikely that any visual receptors located beyond the boundary of the 10 km impact assessment area will be able to obtain views of the Project.
- The horizontal and vertical alignment for the Project
- Visibility analysis mapping (VAM), as described below, which establishes the theoretical viewshed of the Project based on landform
- Refinement during the field survey stage.

4.2 Desktop assessment

A desktop analysis of existing landscape character and visual amenity for the Project and impact assessment area was undertaken to inform this LVIA. The desktop analysis comprised assessment of the underlying topography, land cover and landscape values. Information sources that have been identified and reviewed through the desktop analysis include:

- Relevant planning schemes, policies and guidelines from State Government and local councils (Section 3)
- Publicly available information on recreation spaces and public visitor areas
- Traffic count data
- Digital aerial photography (imagery obtained 2018 from Google Earth)
- Cadastral data (showing roads, land parcel boundaries and built areas)
- Queensland bioregion data Interim Biogeographic Regionalisation for Australia (IBRA) Environmental Resources Information Network (ERIN)
- Shuttle Radar Topography Mission Digital elevation model (DEM) data - landform and topography
- EPBC Act Protected Matters Search Tool - Matters of National Environmental Significance
- Department of Natural Resources, Mines and Energy - watercourses and drainage features
- Department of Environment, Science and Innovation - Matters of State Environmental Significance
- Other GIS information available online
- Publicly available LVIAs that have been prepared for Inland Rail projects within New South Wales or other similar projects in Queensland including the LVIA prepared for the Southern Freight Rail Corridor (AECOM, 2008).

4.3 Visibility Analysis Mapping study

The VAM study, sometimes also known as a 'Zone of Theoretical Visibility' study, comprises a digitally mapped representation of the area within which a proposed development may have an influence or effect upon views and visual amenity. It is used as a desktop tool to inform the visual assessment, including selecting representative viewpoints for more detailed assessment through field survey.

ESRI ArcGIS 10.5.1 software has been used to model the VAM. The viewshed analysis tool in ArcGIS was used to identify the cells in the DEM that are potentially visible from the observation features, which are selected mapped points along the rail alignment at approximately 500 m intervals and their known elevations. The DEM was derived from a combined DEM lidar survey (resampled to a raster size of 20 m) within 5 km and Shuttle Radar Topography Mission DEM data beyond this distance (at 30 m resampled back to 20 m).

Cells in the DEM that are in the theoretical visible line of sight of each part of the rail line are given the value of 1 (potentially visible). Cells that are not in the line of sight of each observation feature, due to being obscured by intervening landform, are given the value of 0 (not visible). The digitally-mapped representation indicates how many of the observation points are theoretically visible based on topography over the extent of the impact assessment area: No colour is applied to areas that are not visible from any observation points with blue, turquoise, yellow, orange and red colour added with increasing number of observation points potentially visible (up to a maximum of 50).

The calculation of the VAM does not take into account any built development, which can locally reduce the availability of receptors views. However, based on field observations, it is considered that because built development within the impact assessment area is generally minimal, it would be unlikely to meaningfully affect the extent of the identified visible zone. VAMs also do not account for vegetation which can considerably affect visibility locally and over large forested areas (such as State forests) but provide a coarse level of analysis to guide the fieldwork as described below.

An additional VAM was produced during the assessment period indicating the height of the double stacked train (i.e. to a height of 6.5 m above the rail alignment).

Further analysis was undertaken to compare the VAM of permanent infrastructure with the VAM of the double stacked train. This assisted in determining the extent to which the operational rolling stock may affect visibility of the Project. Preparation of a VAM comparing the difference between operational infrastructure and the rolling stock assisted further.

Collectively the VAM outputs were used with other desktop information (such as cadastral information indicating the likely presence of visual receptors) to assist in identifying view sheds and potential major views and outlooks for further analysis in the field, to meet the requirements of the ToR to assess the visual impact of the construction works and operations stages of the Project on major views, view sheds, outlooks, and features contributing to the amenity of the area.

4.4 Field survey

Three field visits to assess the impact assessment area were carried out on 4 October to 16 November 2018 and 6 March 2019. Additional field work was undertaken on 7 and 8 October 2021 to address changes to the Project's revised reference design alignment and community concerns. These were undertaken by a landscape planner with extensive experience in LVIA accompanied by a landscape architect skilled in landscape photography.

The purpose of the field assessment was to ground truth the findings of the desktop assessment and to assess landscape character and visual amenity, including identifying sensitive viewpoints requiring further assessment. Photographs were taken to:

- Portray landscape character
- Inform the viewpoint assessment from representative viewpoints
- Provide base images to produce visualisations.

The field visits were focused on assessing aspects of the landscape with the potential to be of the greatest sensitivity to the Project, and on understanding Project infrastructure that is most likely to affect landscape character and visual amenity values.

4.5 Stakeholder and community consultation inputs

Community perception of Inland Rail is an important consideration in assessing the landscape and visual impact of the Project. Therefore, a stakeholder and community engagement process has been undertaken for the Project. Relevant feedback from preliminary consultation activities undertaken by ARTC (including as part of the Social Impact Assessment) has informed the LVIA, where appropriate.

Issues raised during consultation that have informed the landscape and visual assessment process include:

- Key views or vistas enjoyed by members of the community
- Concerns about impacts upon specific landscape features
- Concerns about impacts on landscapes and places of significance to Traditional Owners
- General comments about impacts on landscape values, such as rural amenity.

This includes, for example, selection of particular viewpoints for the visual assessment and informing the sensitivity of identified landscape and visual values.

Visualisations have subsequently been developed to inform the LVIA and communicate the impacts of the Project to stakeholders. Feedback from stakeholders and the community on these visualisations has, where appropriate, informed the assessment. The visualisation process is described further in Section 4.9.

Additional consultation has been undertaken with local communities with regards to the two proposed locations of non-resident accommodation facilities to facilitate the construction of the Project near Yelarbon and Inglewood. The location for a Millmerran based non-resident workforce accommodation has not been included in the revised draft EIS. The site selection and due diligence associated with locating a Millmerran based non-resident workforce accommodation facility will be undertaken during detailed design.

Key community and local council concerns raised during these sessions relevant to this LVIA included:

- The desire for sites to be aesthetically pleasing and well planned out, particularly if sites are planned to remain in situ
- Consideration of long-term legacy benefits and opportunities (e.g. for infrastructure to stay in situ for future use and to attract more people into the community).

Inland Rail acknowledges that the Project will impact the landscape and visual amenity of communities along the alignment. ARTC has developed a number of visualisations and communication tools to support engagement regarding visual impact. These tools have been made publicly available via community engagement events and on the Inland Rail website. It has also been communicated that the Project is in the revised reference design stage and that changes may result during the detailed design stage. As the Project design is refined, visualisations and communication tools will be utilised to provide the community with up-to-date information on the visual impact.

Key actions and consultation aids have included:

- Development of the Project fly-through - created 2019
- Detailed fly-through of the Condamine River Floodplain Crossing. Several images were extracted from the fly-through for consultation purposes
- Series of sliders highlighting the before and after images. Some of the key locations included Pittsworth, Brookstead, Pampas and Yelarbon
- Social pin-point – interactive mapping system which has included examples of road/rail treatments – created 2019.

In addition, the revised draft EIS for the Project has provided additional visualisations at key locations along the alignment, including visualisations of the concept noise barriers and related mitigation measures at these locations.

ARTC has sought feedback from the community on how to best manage and mitigate these impacts where possible, which will be incorporated into the detailed design stage, wherever possible. For more detailed consultation records and outcomes refer to EIS Chapter 6: Stakeholder Engagement and EIS Appendix E: Consultation Report.

4.6 Identification of potential Project impacts

This component of the LVIA includes describing temporary and permanent infrastructure that is likely to be associated with the Project, such as the presence of embankments, bridges, cuttings, fencing, noise barriers and level crossings.

The potential for impacts of different types across a range of Project stages, scales and timeframes are considered, including:

- Temporary (short-term) and permanent (long-term)
- Reversible and irreversible
- Beneficial, neutral and adverse
- Daytime and night-time (lighting)

- construction works and operations stages
- Cumulative.

The potential Project impacts are further discussed in Section 6.

4.7 LVIA methodology overview

The LVIA methodology is a significance assessment as described in EIS Chapter 4: Assessment Methodology. The significance assessment method has been applied to environmental values that will be impacted by the Project where impacts cannot be quantified. Unlike some other technical disciplines there are no established, measurable thresholds of significance for defining either landscape or visual impacts, although there are some standards associated with lighting. The purpose of the LVIA process is to determine the level of significance of impacts on the landscape and visual resource, during day and night, during both construction works and operations stages of the Project.

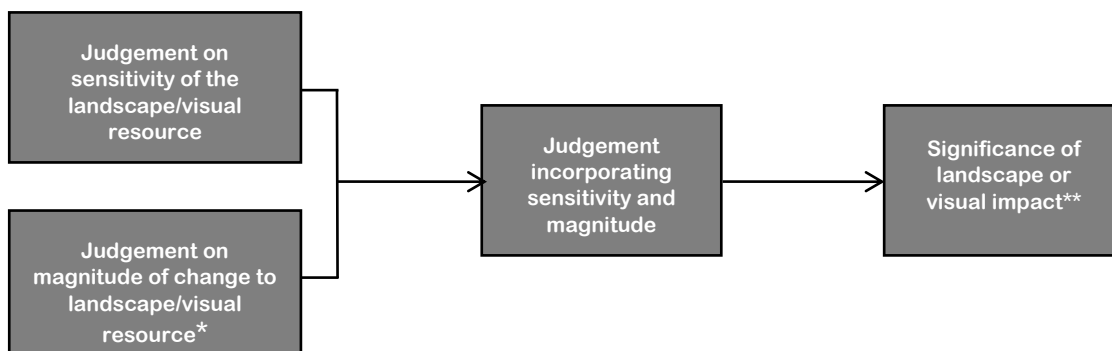
The significance of a potential impact is assessed in terms of the sensitivity (or vulnerability) of the environmental value, and the magnitude of the potential impact. The LVIA significance methodology is, therefore, determined by considering the sensitivity of the landscape or visual receptor and the magnitude of change to the receptor anticipated as a result of the Project.

The LVIA methodology has defined its own thresholds for sensitivity and magnitude that are different to the criteria in EIS Chapter 4: Assessment Methodology and follow criteria and principles more widely-used for the assessment of landscape and visual impacts. This is because many landscape values, including views, are rarely listed on statutory State, national or international registers. Assessment at the LGA level of landscape and visual values is also not always available and is frequently inconsistent. Therefore, establishing common criteria specific to landscape and visual values is more likely to result in a fair assessment of values and sensitivity. Similarly, magnitude criteria need to be defined that recognise the range of factors relevant to LVIA, for example the number of people experiencing a change in view and the intensity of the change.

The significance assessment matrix has also been streamlined to remove 'major' for sensitivity and magnitude established in EIS Chapter 4: Assessment Methodology since these thresholds are difficult to translate to landscape and visual values. For example, 'major sensitivity' elements are not anticipated to be present since there are no 'entirely intact' landscapes within the LVIA study as all have been influenced by human activities. Similarly, 'major magnitude' is unlikely because any Project impacts on landscape or visual values would be reversible, with sufficient time and budget.

Although related, landscape, visual and lighting impacts are considered separately for clarity. This process is illustrated on Plate 1 and described in further detail in Sections 4.8, 4.9 and 4.10.

Plate 1: Landscape and visual impact assessment process



* There is no standard methodology for the quantification of the magnitude of effects; however, it is generally based on the scale or degree of change to the landscape or visual resource, the nature of the effect and its duration.

** Overall landscape or visual impact is determined by combining the sensitivity of the landscape or visual resource with the magnitude of change. Professional judgement is used to determine the overall significance of impact based on these two elements.

While the values placed on views and landscapes may be culturally influenced, the GNLVA (AILA, 2018) states the following general principles have been consistently found in scenic preference studies and community consultation:

- Water and natural elements are preferred over urban scenes
- Mountains and hills are preferred over flat land
- Views are preferred which include both mid-ground elements (with some detail discernible) and a background
- Views with skyline features and views which include focal points are preferred
- Views dominated by, or with a high proportion of attractive features (such as mountains) are considered to be more attractive, and hence more important to retain, than those with only a minor or distant proportion of such elements
- Panoramic views with multiple distinctive elements are more attractive and worthy of protection than narrow view corridors or a line of sight to a single element
- Diversity is generally preferred over uniformity, and heritage over modernity, but these need to be balanced with preferences for consistency and coherence of built form, which are also valued
- Viewpoints (including residences and public places) may have primary views in one direction (e.g. to an attractive or distinctive feature) and secondary views in other directions. The distinction may be related to desirability of views (e.g. river views), viewing distance, or to the orientation of viewpoints (e.g. lookouts)
- Discordant elements which contrast markedly with their otherwise-attractive settings are often regarded as having a detrimental impact on amenity. This depends on the viewing distance and proportion of view affected, and overall design
- Views from accessible public spaces (streets, lookouts, parks etc.) are valued more than views available only from private residences.

4.8 Landscape impact assessment methodology

The landscape assessment is based upon an analysis of landscape character, including those landscape features that contribute to the amenity of the area; particularly any landscape values identified in legislation or planning documents during the desktop review or through community and stakeholder consultation.

Landscape Character Assessment (LCA) is a tool for identifying what makes one place different from another. It identifies what makes a place distinctive, without necessarily assigning a value to it. This approach has been used to establish the existing character of the landscape to provide a framework for measuring the impact of the Project on landscape character. Landscape character types have been defined and, where necessary, these have been further subdivided into geographically distinct LCAs. It is noted that:

- Landscape Character Types (LCT) are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern
- Landscape Character Areas (LCAs) are single unique areas and are the discrete geographical areas of a particular Landscape Character Type.

The general character of the landscape and the identified LCTs are described in Sections 5.1 and 5.2.

4.8.1 Landscape sensitivity

The sensitivity of a landscape is judged on the extent to which it can accept change of a particular type and scale without adverse effects on existing landscape character and values. Therefore, assessment of sensitivity is based on the scale and location of the Project and how this relates to the landscape characteristics of the impact assessment area. For example, undulating forested landscapes may be sensitive to removal of vegetation and creation of cuttings. Sensitivity to change also considers landscape values protected by legislation or policies (such as national parks or locally-valued landscapes protected in a local planning scheme).

Levels of sensitivity vary according to the type of development and the nature of the landscape. Key aspects that have been considered when identifying the level of sensitivity associated with each landscape character type include:

- The landscape's inherent values (e.g. perceptual qualities, cultural importance, and any specific values that may apply such as landscape planning designations, as described in Section 3).
- The landscape's ability to absorb changes associated with the Project (e.g. the extent to which the Project may fit or be absorbed into the landform, land use, pattern, scale or texture of the existing landscape).

A guide to these is described in Table 6.

Table 6: Defining landscape sensitivity

Sensitivity of landscape	Attributes of landscape sensitivity categories
High	A landscape protected by national designation (such as a national park) and/ or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.
Moderate	A moderately valued landscape, perhaps a regionally important landscape and / or protected by regional/State designation, or where its character, land use, pattern and scale may have some capacity to accommodate a degree of the type of change envisaged.
Low	A landscape valued to a limited extent, perhaps a locally important landscape or where its character, land use, pattern and scale is likely to have the capacity to accommodate the type of change envisaged.
Negligible	A landscape which is not valued for its scenic quality or where its character, existing land use, pattern and scale are tolerant of the type of change envisaged, and the landscape has capacity to accommodate change.

4.8.2 Magnitude of change to landscape amenity

The magnitude of change to landscape character depends on the nature, scale and duration of the change that is expected to occur. The magnitude of change also depends on the loss, change or addition of any feature to the existing landscape and is based upon that part of the landscape character type which is likely to be impacted to the greatest extent by the Project before the application of any mitigation.

Magnitude of change is described as Negligible (barely perceptible change), Low (noticeable change), Moderate (considerable change) or High (dominant change), as illustrated in Table 7. The descriptions of magnitude and sensitivity are illustrative as there is no defined boundary between the categories described.

Table 7: Defining magnitude of change to landscape character

Magnitude of change to landscape character	Typical examples
High	<u>Dominant change</u> : A clearly evident and frequent/continuous change in landscape characteristics affecting an extensive area, which is likely to fundamentally change the character of the landscape.
Moderate	<u>Considerable change</u> : A considerable change in landscape characteristics, frequent or continuous and over a wide area or a clearly evident change, but over a restricted area.
Low	<u>Noticeable change</u> : A noticeable change in landscape characteristics over a wide area or a considerable change over a restricted area but will not fundamentally change the character of the landscape.
Negligible	<u>Barely perceptible change</u> : An imperceptible, barely or rarely perceptible change in landscape characteristics.
No impact	<u>No change</u> : No change in landscape characteristics.

4.8.3 Significance of landscape impact

An evaluation of overall potential effects on landscape character is based on the sensitivity of the existing landscape to change and the magnitude of change that is likely to occur. No prescribed methods for assessment of significance of landscape impacts exist; therefore, professional judgement and experience are applied to identify the level of significance. Each landscape receptor is assessed on its own merits, as factors unique to each circumstance need to be considered. However, there are general principles which can be used as a guide to this process that provide transparency about how judgements have been made as described in in Section 4.7. The overall significance of change to landscape amenity is determined by using Table 8.

Table 8: Determining level of effect on landscape values

Level of effect		Magnitude of change to landscape amenity			
		High (Dominant change)	Moderate (Considerable change)	Low (Noticeable change)	Negligible (Barely perceptible change)
Sensitivity of landscape	High	Major	High	Moderate	Low
	Moderate	High	Moderate	Low	Low
	Low	Moderate	Low	Negligible	Negligible
	Negligible	Low	Low	Negligible	Negligible

Where magnitude of change is 'No impact' the significance is 'No impact'.

Classification of significance of impact is considered as described in Table 9:

Table 9: Significance classifications

Significance	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 important 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.
No impact	Does not result in any change to the environmental value.

4.9 Visual impact assessment methodology

4.9.1 Identification and description of visual receptor audiences and viewpoints

The visual assessment is based upon an analysis of views and viewsheds; particularly any major views or outlooks identified in legislation or planning documents during the desktop assessments or through stakeholder and community consultation.

Visual receptor audiences are assessed and described in terms of the views which can be obtained from selected representative viewpoints within the impact assessment area. The specific viewpoints used for the assessment have been selected based upon outputs from the VAM study and field survey (as described in Section 4.3 and 4.4). Consistent with typical landscape and visual assessment practice, viewpoints on private lots have not been visited or assessed. Where appropriate, publicly-accessible locations nearby have been selected to represent private views.

Potential representative visual audiences and receptors have been identified based on a range of parameters including:

- Proximity of the receptor: the most affected visual receptors are typically anticipated to be located within a 5 km radius of the Project unless located at an elevated vantage point
- Type of visual receptor/visual receptor audience, for example:
 - A permanent resident of a dwelling or homestead
 - Drivers or passengers of vehicles passing through the impact assessment area
 - Members of the public accessing marked recreational areas (for example in national parks, State forests, cycle ways, footpaths and public parks and sportsgrounds)
 - An industrial or commercial worker (excluding those employed as part of the Project).

These visual receptor audiences and representative viewpoints are discussed further in Section 5.3 and Section 8.

4.9.2 Visual sensitivity

The sensitivity of each viewpoint, and the visual receptor audiences which it represents, is considered to be dependent upon the:

- Importance of the view, its existing scenic qualities and the presence of other existing man-made elements in the view
- Type of the visual receptor audience and their likely interest in the view (e.g. residents, visitors to important/valued landscapes or visitors to non-designated areas, motorists)
- Volume of visual receptors and the duration of time that receptors spend experiencing the view.

The GLVIA (2002) states *'changes affecting large numbers of people are generally more significant than those affecting a relatively small group of users.'* Similarly, GLVIA (2013) states the visual receptors most susceptible to change include *'... residents at home...people, whether residents or visitors who are engaged in outdoor recreation, including use of public rights of way whose attention or interest is likely to be focused on the landscape and on particular views; ...communities where views contribute to the landscape setting enjoyed by residents in the area'*. This guidance is reflected in the method used to assess the sensitivity of the viewpoints to the Project. For example, views from a regionally important location where viewers' interest is specifically focussed on the landscape (such as views from a scenic viewpoint in a national park) have been judged as having a high sensitivity to change as have large numbers of residential viewers. In contrast, passing transient views from cars are typically judged to have lower sensitivity.

Levels of sensitivity, described in Table 10, vary according to the type of development and the visual receptor audience.

Table 10: Defining visual sensitivity

Sensitivity of viewpoint	Attributes of visual sensitivity categories
High	Large numbers of viewers or those with proprietary interest and prolonged viewing opportunities such as residents and users of attractive and/or well-used recreational facilities. Views from a regionally important location whose interest is specifically focussed on the landscape, for example a national park.
Moderate	Medium numbers of residents (e.g. rural communities and townships) and moderate numbers of visitors with an interest in their environment (e.g. visitors to State forests, including bush walkers, horse riders, trail bikers). Larger numbers of travellers with an interest in their surroundings, for example, local designated scenic routes.
Low	Small numbers of visitors with a passing interest in their surroundings or transient views (e.g. those travelling along principal roads). Viewers whose interest is not specifically focussed on the landscape, for example, workers, commuters, truck drivers.
Negligible	Very occasional numbers of viewers with a passing interest in their surroundings, for example, those travelling along minor roads and views from the air.

4.9.3 Magnitude of change to visual amenity from representative viewpoints

The magnitude of change to views and visual amenity depends on the nature, scale and duration of the change that is expected to occur. The magnitude of change also depends on the loss, change or addition of any feature in the field of view of the receptor; or any change to the backdrop to, or outlook from, a viewpoint. The level of effects on a view depend on the extent of visibility, degree of obstruction of existing features, degree of contrast with the existing view, angle of view, duration of view and distance from the Project.

Magnitude of change is described as Negligible (barely perceptible change), Low (noticeable change), Moderate (considerable change) or High (dominant change), as illustrated in Table 11. Full descriptions on the magnitude of change from each representative viewpoint are discussed further in Section 8.2.

Table 11: Defining magnitude of change to visual amenity

Magnitude of change to view	Typical examples
High	<u>Dominant change</u> : Major changes in view at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of view. Generally, short distances (typically < 250 m) to the nearest Project infrastructure element
Moderate	<u>Considerable change</u> : Clearly perceptible changes in views at intermediate distances, resulting in either a distinct new element in a significant part of the view, or a more wide-ranging, less concentrated change across a wider area. Generally, short to medium views (typically 250 m – 1 km) to the nearest Project infrastructure
Low	<u>Noticeable change</u> : Minor changes in views at long distances or visible for a short duration, and/or are expected to blend in with the existing view to a moderate extent. Generally, medium to long distance views (typically 1 km – 2.5 km to the nearest Project infrastructure)
Negligible	<u>Barely perceptible change</u> : Change which is barely visible at a very long distance or visible for a very short duration, and/or is expected to blend with the existing view. Distant views (generally, > 2.5 km to the nearest Project infrastructure).
No impact	<u>No change</u> : No change in landscape characteristics

4.9.4 Significance of visual impact

Impacts on the visual resource have been described by representative views in the impact assessment area. Impacts can be short term (i.e. those occurring during installation/construction of a development) or long term (i.e. those lasting for the lifetime of the Project). In addition, they can be widespread (i.e. taking up a large proportional change in the view) or localised.

The evaluation of overall potential impacts on visual amenity is based on the sensitivity of existing views to change and the magnitude of change that is likely to occur. No prescribed methods for assessment of significance of impacts on visual amenity exist; therefore, professional judgement and experience are applied in order to identify the level of significance. Each viewpoint is assessed on its own merits, as factors unique to each circumstance need to be considered. However, the general principles outlined in Section 4.7 and this section provide transparency about how judgements have been made. The overall significance of change to landscape amenity is determined by using Table 12.

Table 12: Determining level of effect on visual values

Level of effect		Magnitude of change to visual amenity			
		High (Dominant change)	Moderate (Considerable change)	Low (Noticeable change)	Negligible (Barely perceptible change)
Sensitivity of views	High	Major	High	Moderate	Low
	Moderate	High	Moderate	Low	Low
	Low	Moderate	Low	Negligible	Negligible
	Negligible	Low	Low	Negligible	Negligible

Where magnitude of change is 'No impact' the significance is 'No impact'.

Classification of significance of visual impact is considered as described in Table 9.

4.9.5 Preparation of visualisations

Visualisations are artist's illustrations that aim to represent an observer's view of a proposed development. For the purposes of this assessment, visualisations have been prepared to represent the potential visual impact of the presence of the Project from a selection of the representative viewpoints identified.

Visualisations have been used to:

- Assist with community and stakeholder consultation through providing an artist's impression of features of the Project that affect key views identified in the assessment
- Illustrate the visual impact assessment to assist in the interpretation of the findings
- Validate the assessment of magnitude of change
- Inform the development of mitigation measures by identifying opportunities for Project modifications including landscape and urban design proposals (such as screen planting or alternative materials) to help integrate the Project into its visual and landscape setting.

Visualisations have not been prepared for all viewpoints. Visualisations have been selected on the basis of those illustrating key infrastructure elements likely to be of interest to the community and/or the most sensitive viewpoints, such as from regionally-significant scenic lookouts and have also been informed by feedback from stakeholders and the community, as described further in Sections 4.5 and 4.9.

The methodology for the visualisation production has been based on State and international guidance including the GNLVA (AILA, 2018), GLVIA (Landscape Institute, 2013) and *Landscape Institute Advice Note 01/09: Use of photography and photomontage in landscape and visual assessment* (2011). Consideration has also been given to the Landscape Institute *Technical Guidance Note: Photography and Photomontage in Landscape and Visual Impact Assessment, Public Consultation Draft* 2018-06-01 (2018).

The visualisations have been generated using the following sequential method:

- Step 1: Select and prepare candidate field imagery for photomontage base (field panorama preferred viewpoint):
 - Select preferred field photo location as part of representative LVIA condition
 - Choose a sequence set of field photos from this location representing 75 degrees (°) horizontal field of view (H-FOV) (generally 2 to 3 overlapping images)
 - Create combined panorama from raw imagery and crop to 75°
 - Note GPS location of chosen panorama camera position.
- Step 2: Assemble 3D design model on terrain model for each viewpoint
 - Import georeferenced 2 km x 2 km meshed terrain model Triangular Irregular Network (TIN) to SketchUp as base for Project design visualisation
 - Drape georeferenced high resolution ortho aerial photography Enhanced Compression Wavelet (ECW via AutoCAD) onto TIN Mesh
 - Create surface meshes from 3D Civil design geometry strings and insert into terrain model (12D Exports to DWG – Then insert into SKP with geo-reference)
 - Add structural design geometry of bridges and other design structures. (Export from Revit as IFC and inserted)
 - Cross check master assembly of geometries against contemporaneous general arrangement plans, sections and other details documents
 - Cross check to ensure civil geometry closely matches terrain model (especially batters / earthworks).
- Step 3: Camera match field panorama in 3D design model
 - Create camera frame in 3D model with 75° H-FOV
 - Locate approximate camera position in model based on GPS coordinates and field notes, set bearing and set camera height to photographer's eye height. Generally positional accuracy at this stage is +/- 5 m
 - Create positional massing of existing site features (buildings, power poles, isolated trees, fencing and others) that are identifiable on both aerial and site photography
 - Fine-tune camera position by superimposing field panorama and 3D model viewpoint. Positional iterations at this stage aim to locate 3D camera within 1 m of actual field position.
- Step 4: Site detail and entourage
 - Create or import site furniture or design detail, materials, planting, texture necessary or having significant visual impact or effect on visual character of the scene
 - Create and insert suitable distribution of entourage and vehicles. Generally, this means illustrating a track use condition showing proximity of typical representative double-stacked freight traffic.
- Step 5: 3D Rendering and photomontage creation.
 - Render 3D Model at suitably high resolution for desired production outputs. For LVIA reporting this is 7500 x 2500 pixels
 - Composite rendered image with field panorama image using Adobe Photoshop
 - Postprocessing and repair to existing site features. Remove and demolished site features (such as poles, trees and buildings) and make good any ground features to be altered permanently during construction.
 - Mask parts of rendered image that can be better represented by parts of field image (generally terrain)

- Introduce new elements to the view including any draft mitigation measures such as vegetation.

Every reasonable effort has been made to ensure the images included in this assessment are representative and have not been manipulated to downplay the extent of impact. It is noted that visualisations produced are representative of the Project design as developed for the revised draft EIS, and subject to change during the detailed design stage.

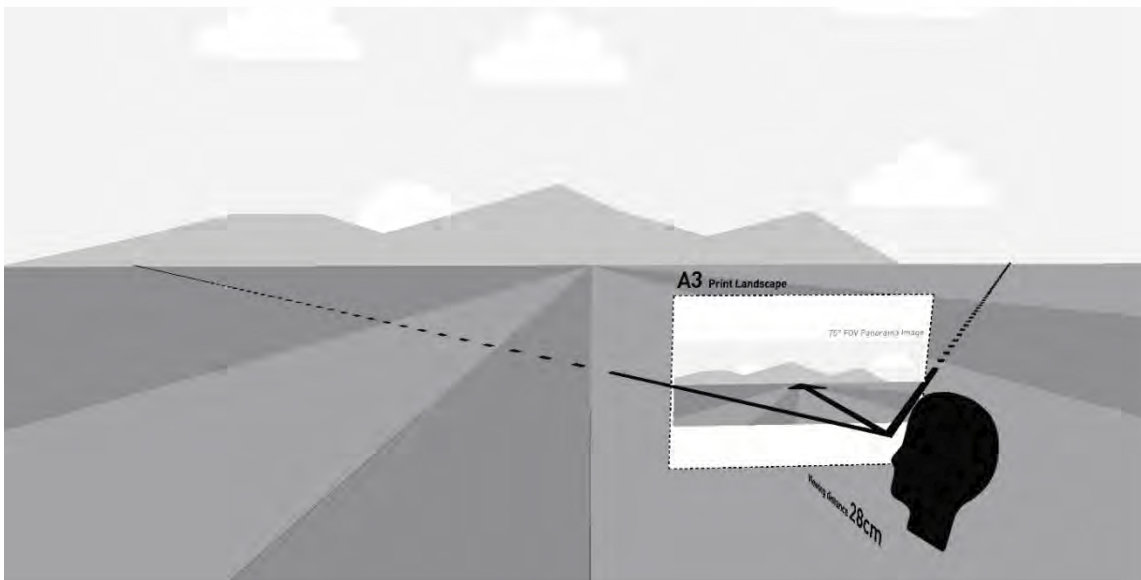
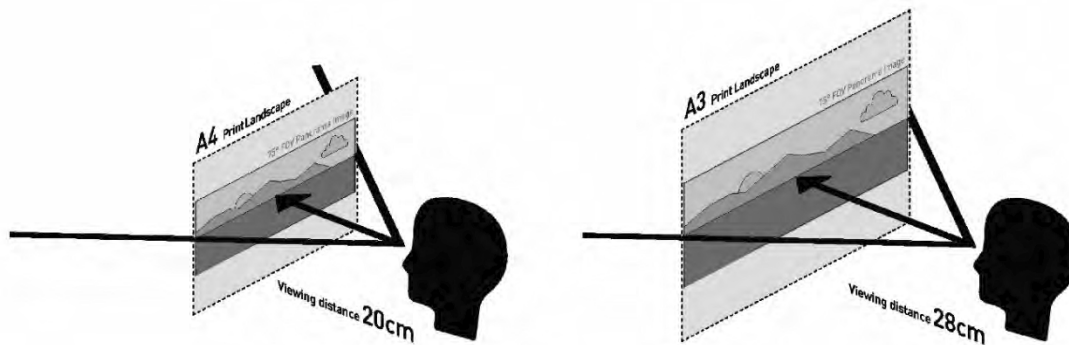
To ensure the photomontages consistently present a view which is representative of the human eye, the field assessment photographs were taken at around average human viewing height (typically considered to be 1.5 m). The photos were taken using a Canon EOS 6D Mark II body with a Sigma 50 mm f/1.4 DG JSM lens. The Canon EOS 6D is a full sensor lens. Using a 50 mm lens it has an equivalent field of view as a Standard Single Lens Reflex (SLR) using 35 mm film and 50 mm focal length, which is the standard recommendation for obtaining photographs that are representative of the human field of vision (40°).

Photo stitching software and Adobe Photoshop were used to piece together the adjoining images to produce a field of vision of approximately 75° that is considered representative of the human field of view. Although the parameters of human vision when stationary is often quoted as falling between the 45 to 60° (SNH, 2006), humans generally move their eyes, heads and bodies as necessary to experience a view. Therefore, a wider field of view has been used for the photomontages with 75° insets of key portions of the viewfield, which is in line with good practice.

Photomontages and visualisations should be viewed at the correct 'viewing distance'. Very simply, if the hard copy of the photomontage is held too close to the eye, the elements in the scene will appear too big; if it is held too far away, the elements will appear too small; and there is only one distance at which the photograph will match the real scene (the correct viewing distance).

The visualisations have been illustrated on A4 landscape pages, although could be printed at A3. The recommended viewing distance for each photomontage is determined by the image size and field of view. These are 20 cm for A4 prints and 28 cm for A3 prints, as represented in Plate 2.

Plate 2: Recommended viewing distance for photomontages and visualisations



4.10 Qualitative lighting impact assessment methodology

The qualitative lighting assessment is based upon an analysis of representative views identified through the visual assessment. Lighting impacts are considered during both construction works and operations stages of the Project.

The majority of the construction works for the Project will be undertaken during the day. To shorten the duration of the construction period as far as practicable and minimise potential impacts to the community the following primary construction hours are proposed:

- Monday to Sunday – 6.00 am to 6.00 pm
- No work on public holidays.

Blasting activities would only be undertaken during the hours of:

- Monday to Friday 9.00 am to 3.00 pm
- Saturday 9.00 am to 1.00 pm
- No blasting outside of the above hours.
- No blasting on Sundays and public holidays.

ARTC will consult with Queensland Rail (QR) to determine the optimum timing and duration for temporary possession of QR network during construction of the Project. These details will be finalised prior to the commencement of construction.

Some construction works are proposed after dark; lighting for construction activities will comprise night-time lighting of compounds, non-resident workforce accommodation facilities and laydown areas with security lighting as well as some sites where night-time construction works will be required. Permanent lighting associated with the Project will be minimal comprising only the train headlight and safety lighting associated with features such as level crossings and safety lighting for roads. Therefore, light spill during the construction works and operations stages has been assessed through a high-level qualitative assessment.

As there is no prescribed assessment method for assessing the impacts of lighting on visual amenity, guidance and terminology has been taken from Australian/ New Zealand Standard 4282:2019 – *Control of Obtrusive Effects of Outdoor Lighting* (Standards Australia, 2019). The *Guidance Note 01/21 The Reduction of Obtrusive Light* (Institute of Lighting Professionals, 2021) has also been reviewed. This information has then been combined with the standard method of assessment for impacts on visual amenity. Visual receptor audiences are assumed to be the same as those identified in the visual impact assessment process. The assessment is qualitative, and these locations have not been visited at night to measure existing light levels.

4.10.1 Mt Kent Observatory

Concern has been raised through stakeholder engagement regarding the potential for lighting from the construction works and operations stage of the Project to impact on the operations of the University of Southern Queensland's Mt Kent Observatory. The observatory is Queensland's only professional astronomical research facility and is located approximately 21 km southeast from the Project (closest Project point is Southbrook), beyond the extent of the impact assessment area (University of Southern Queensland, 2024). The Mt Kent Observatory has not been considered in this assessment due to:

- The substantial distance between the Project and the observatory
- The limited lighting associated with the construction (flashing beacons and temporary spotlights in support of short-duration night works, if required) and operation (head lamp on rollingstock and safety lighting at road-rail interfaces) of the Project
- The presence of several more substantial light sources that are located closer, or equally distant to the observatory. These other light sources include:
 - The presence of existing townships in close proximity to the observatory with the potential for night-time lighting, including the settlements of Greenmount, Nobby and Cambooya (approximately 4.5 km, 7.5 km and 9 km from the observatory respectively) and other townships located further from the observatory, including Pittsworth and Southbrook
 - Proximity to Toowoomba urban area (approximately 22 km to southwestern outskirts)
 - Presence of the existing South Western System railway (which facilitates freight movements), approximately 4.5 km from the observatory
 - The Gore Highway is located between the Project and the Mt Kent Observatory

However, ARTC has discussed the Project with the Mt Kent Observatory and made a commitment to consult further during future stages of the Project.

4.10.2 Judgement of visual sensitivity to lighting

The sensitivity of each representative viewpoint to changes in after-dark lighting conditions due to the Project has been based upon elements illustrated in Table 13 including:

- The proximity of the viewpoint to the greatest lighting source that is associated with the Project
- The public and private accessibility of the representative viewpoint location and the likely number of viewers who will visit the viewpoint.

Full descriptions on the judgements of visual sensitivity to lighting from each representative viewpoint are discussed in Section 9.

Table 13: Defining viewpoint sensitivity to lighting

Sensitivity of viewpoint to lighting	Attributes of visual sensitivity categories
High	Easily accessible at night with large numbers of viewers or those with proprietary interest and prolonged viewing opportunities located at very close distances (typically less than 200 m) to the light source.
Moderate	Relatively accessible at night with medium numbers of viewers and close to the site or easily accessible with propriety interest but located some distance (typically up to 500 m) from the light source.
Low	Typically, location not accessed at night, with small numbers of visitors with a passing interest in their surroundings (e.g. those travelling along principal roads or greater numbers of viewers but located at considerable distance from the light source (typically less than 1 km)).
Negligible	Rarely accessed at night. Rural locations with very occasional numbers of viewers with a passing interest in their surroundings (e.g. those travelling along minor roads and views from the air or located at greater than 1 km from the light source).

4.10.3 Magnitude of change to lighting from representative viewpoints

The magnitude of change to views and visual amenity due to lighting depends on the nature, scale and duration of the change to lighting that is expected to occur. The magnitude of change also considers any change to the backdrop of, or outlook from, the representative viewpoint. The assessment assumes a worst-case scenario without mitigation. The level of effect on a view depends on the extent of visibility, degree of obstruction of existing features, degree of contrast with the existing view and angle of view.

To enable the judgement of the magnitude of changes in lighting, Table 14 considers the existing condition against the potential condition. It is noted that no intrinsically dark conditions are considered to occur within the LVIA Study Area, as these areas are associated with UNESCO Starlight Reserves and IDA Dark Sky Parks and major optical observatories (which are not present within the study area). The conditions assessed in this LVIA include areas identified as being dark or having low, medium or high levels of district brightness, which is utilised as a measure of change in visual conditions:

- Dark – Relatively remote and uninhabited rural areas with minimal artificial lighting other than that which is localised lighting of a dwelling. Typically, no road or street lighting (unless specially required by road controlling authorities) and no industrial lighting.
- Low district brightness – Commonly sparsely inhabited rural areas or semi-rural residential areas where dwellings are still largely isolated from one another, creating a relatively dark atmosphere with intermittent sources of lighting (such as street lighting). Industrial lighting may occur in predominantly dark landscapes; however lengthy distances between these sites and residential dwellings result in minimal lighting spill onto private lot.
- Medium district brightness – Commonly small towns and suburban areas with standard elements of lighting, such as street lighting and lighting from residential dwellings, commercial businesses and some limited industrial lighting.
- High district brightness – Town and city centres or largescale industrial and commercial landscapes with high levels of lighting. Also includes residential areas in close proximity to brightly lit commercial and industrial areas.

The outcome of this judgement will result in either a high, moderate, low or negligible change to lighting conditions from the representative viewpoint. Full descriptions on the magnitude of change from each representative viewpoint are discussed in Section 9.

Table 14: Defining magnitude of change to lighting amenity

Magnitude of change to lighting	Typical examples
High	<u>Dominant change</u> : Occurs when a dark landscape becomes an area with high district brightness due to proposed Project lighting.
Moderate	<u>Considerable change</u> : Occurs when a dark landscape becomes an area of medium district brightness, or an area considered to have low district brightness becomes an area with high district brightness due to proposed Project lighting.
Low	<u>Noticeable change</u> : Occurs when a dark landscape becomes an area with low district brightness, an area with low district brightness becomes an area of medium district brightness, or an area of medium district brightness becomes an area of high district brightness due to proposed Project lighting.
Negligible	<u>Barely perceptible change</u> : Occurs when a landscape experiences negligible changes from the existing lighting conditions to the proposed lighting conditions due to proposed Project lighting.
No impact	<u>No change</u> : No change in landscape characteristics due to no proposed Project lighting.

4.10.4 Significance of lighting impact

This evaluation considers sensitivity of each representative night-time viewpoint and the magnitude of change that is likely to occur. The general principles outlined in this section provide transparency about how judgements have been made. The significance of change to lighting amenity and individual viewpoints is determined using Table 15.

Table 15: Determining level of effect on lighting values

Level of effect		Magnitude of change to lighting amenity			
		High (Dominant change)	Moderate (Considerable change)	Low (Noticeable change)	Negligible (Barely perceptible change)
Sensitivity of viewpoint to lighting	High	Major	High	Moderate	Low
	Moderate	High	Moderate	Low	Low
	Low	Moderate	Low	Negligible	Negligible
	Negligible	Low	Low	Negligible	Negligible

Where magnitude of change is 'No impact' the significance is 'No impact'.

Classification of significance of impact is considered as described in Table 9.

4.11 Quantitative lighting impact assessment methodology

A quantitative lighting assessment has also been undertaken by a lighting impact professional in line with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting (Standards Australia and Standards New Zealand, 2019). The methodology and findings of this assessment are included in Appendix 3: Obtrusive lighting assessment.

4.12 Mitigation and residual impact assessment methodology

Mitigation describes measures that can be implemented to avoid or reduce potential impacts to as low as reasonably practicable, based on the hierarchy of avoid, minimise, manage and offset. The aim of mitigation identified in the LVIA is to protect identified landscape and visual values. Measures may be implemented through Project design, construction methods, operating and/or maintenance procedures.

Some measures to avoid, mitigate and manage potential impacts form part of ARTC's standard environmental management procedures and, therefore, constitute the base case prior to the implementation of the identified mitigation measures. The initial mitigation measures are described in Section 11.1.

Additional mitigation and management measures proposed as a result of the findings of this LVIA may be incorporated into the Project to further reduce identified impacts. These comprise a range of generic measures that are applicable to a component across the Project as well as identification of measures that are specific to an infrastructure component or particular location. The additional mitigation measures are described in Section 11.2.

Residual impacts relate to any changes in the overall level of effect for potential impacts post the implementation of mitigation. This potentially includes measures that avoid an impact occurring or reduce the magnitude of change. The residual impact assessment is determined using the same process as for the landscape, visual and lighting assessment methodology described above. The residual impact assessment is presented in Section 11.3.

5 Description of existing landscape and visual amenity values

5.1 Regional landscape context

The impact assessment area includes extensive areas of agricultural land and State forest areas within the Darling Downs region. In the western part of the impact assessment area, between Goondiwindi and Inglewood, the landscape is dominated by dryland cropping, irrigated agriculture and intensive animal production on the fertile soils and floodplains associated with the Macintyre River, Dumaresq River and Macintyre Brook. North of Inglewood, the Project passes through the undulating and densely forested landscapes of Whetstone and Bringalilly State Forests. The Project then traverses the gently undulating agricultural areas near Millmerran before crossing the extensive Condamine River floodplain. The rail alignment deviates from the existing railway line north of Yarranlea to pass through the hilly landscapes surrounding Pittsworth, Southbrook and Athol before crossing Westbrook Creek near Toowoomba Wellcamp Airport and joining the Gowrie to Helidon section of Inland Rail near Gowrie Junction.

Within the impact assessment area, large areas of land have been cleared for pasture, agricultural production and for rural and urban residential settlements. Tracts of remnant vegetation are also present, limited to the steep, isolated mountains and hills (typically associated with granite and basaltic outcrops and sandstone hills) and State forest reserves. The Project and its wider landscape context are illustrated in Figure 1: Regional context and Figure 4: Landform and hydrological context in Appendix 1.

5.1.1 Settlement and infrastructure

The presence of settlement indicates locations where there are likely to be concentrations of people who may be interested in views and visual amenity. The Project traverses a broad range of landscapes, which are predominately rural landscapes comprised of isolated rural settlements, open wooded and pastoral and agricultural lots and extensive State forest reserves. The impact assessment area has both a rich Indigenous and colonial history and has been heavily modified by agriculture, farming and settlement in the region. Planning designations are shown on Figure 5: Land use.

The largest settlement in the impact assessment area is the regional city of Toowoomba, situated on an escarpment on the western side of the Great Dividing Range, approximately 700 m above sea level and 130 km west of Brisbane with a population of 173,204 (Australian Bureau of Statistics (ABS), 2021).

The largest town in the impact assessment area is Oakey, situated 29 km west of Toowoomba with a population of 4,765 (ABS, 2021), albeit this is located on the periphery of the Project area around 10 km from the Project. Westbrook is the second largest town in the impact assessment area, located 10 km southwest of Toowoomba, with a population of 4,408 (ABS, 2021). Other key towns within the impact assessment area include Millmerran, around 75 km southwest of Toowoomba, situated on the Gore Highway (population 1545) and Inglewood, 150 km southwest of Toowoomba (936). Smaller rural settlements, towns and localities within the impact assessment area comprise, Kurumbul (36), Yelarbon (313), Brookstead (182), Southbrook (626), Athol (139), Pampas (78), Gowrie Mountain (222), Kingsthorpe (2,159) and Gowrie Junction (2,242). The towns and localities of Highfields, Meringandan, Meringandan West, Meringandan South, Boggabilla and Toomelah Indigenous Settlement are all within the impact assessment area, however, it is considered that there are no direct impacts on these areas as they are a considerable distance from the alignment. There are also several areas of acreage estates and emerging residential communities within the vicinity of Kingsthorpe and Gowrie Junction.

Transport corridors provide opportunities for travellers to view the landscape and also indicate the presence of existing transport infrastructure. There are three major roads within the impact assessment area; the Gore Highway (A39), Warrego Highway (A2), and the Cunningham Highway (42). The Gore Highway has Annual Average Daily Traffic (AADT) counts between 4,503 near Westbrook to 1,771 near Millmerran.

The Warrego Highway has AADT counts between 20,927 near Toowoomba to 9,297 near Oakey.

The Cunningham Highway has AADT counts between 1,613 near Inglewood to 1,385 near Yelarbon.

Other key roads and their respective AADT counts include Toowoomba-Cecil Plains Road (varies between 12,293 to 1,944), Kingsthorpe-Haden Road (1,118), Oakey-Pittsworth Road (774), Pittsworth-Felton Road (603), Brookstead-Norwin Road (207), Millmerran-Leyburn Road (227), Millmerran-Cecil Plains Road (316), Millmerran-Inglewood (1,020) and Inglewood-Texas Road (255).

Some of these routes form part of scenic drives, as discussed further in Section 5.3. Other key routes through the impact assessment area but located at greater distance from the alignment include Bruxner Way and the Newell Highway, both south of the NSW/QLD border. The Warrego Highway has recently been constructed in the westernmost part of the impact assessment area and will become a key route through the region.

Within the impact assessment area, there are several existing railway lines. There are three railway lines relevant to the Project; the QR West Moreton Line, the QR South Western Line and the Millmerran Branch Line.

The QR West Moreton Line is an existing operational freight and passenger rail line located within the impact assessment area, connecting rail services from Brisbane to the west and southwest of the State and providing an important connection to the Darling Downs. The rail line supports the twice weekly 'Westlander' service between Brisbane to Charleville (Australian Rail Maps, 2018). The Project does not tie into the West Moreton Line.

The Millmerran Branch Line departs the Southern Line at Wyreema traversing the Darling Downs, connecting the agricultural centre of Millmerran to Pittsworth and Toowoomba, and typically follows the Gore Highway. Following the 2010-2011 Queensland floods, the Millmerran Branch Line section from Brookstead to Millmerran has been closed. The eastern section of the Millmerran Branch Line is still operational between Brookstead and Pittsworth/Toowoomba.

Throughout the impact assessment area, there are large industrial precincts, feedlots and poultry facilities within proximity to the alignment, including:

- Toowoomba Wellcamp Airport (Wellcamp)
- Commodore Mine (Millmerran)
- Millmerran Power Station (Millmerran)
- Doug Hall Poultry (Millmerran)
- Yarranbrook Feedlot (Inglewood)
- Sapphire Feedlot (Kildonan)
- Yarranlea Solar Farm.

5.1.2 Geology, landform and hydrology

Within the impact assessment area the landscape varies greatly, due to the scale of the area and its varying landform and underlying geology. Key aspects of landform and hydrology are illustrated on Figure 4: Landform and hydrological context. Landform indicates where elevated locations are located (that may create the potential for longer range views) and with geology and hydrology forms the basis for the assessment of landscape character across the region.

There are five distinctive regions within the impact assessment area, listed below:

- Low-lying alluvial floodplains of the Macintyre River (typically 200 m Australian Height Datum (AHD) to 250 m AHD)
- Forested sandstone hills of the Macintyre Brook catchment (typically 250 m AHD to 350 m AHD)
- Undulating grazing lands and peaks near Millmerran (typically 300 m AHD to 650 m AHD)
- Broad cultivated alluvial plains of the Condamine River (typically 300 m AHD to 350 m AHD)
- Basaltic uplands and isolated peaks of the Toowoomba plateau (typically 325 m AHD to 700 m AHD).

The low-lying alluvial floodplains of the Macintyre River, west of Yelarbon, are characterised by branching streams incised into alluvial plains, with multiple anabranches, channels and lagoons. These auxiliary channels drain water away from the main channel when river water levels are high. The Macintyre River and Dumaresq River are the main watercourses within the Border Rivers catchment, and these two major river systems define the NSW/QLD border. The alignment traverses the Macintyre River floodplain, before running roughly parallel to Macintyre Brook, a tributary of the Dumaresq River, between Yelarbon and Inglewood.

The landscape surrounding Macintyre Brook is relatively flat and homogenous. To the north of the alignment, the floodplain gives way to densely vegetated hills, predominately on sandstone geology with isolated instances of intrusive basalts, while to the south sandy soils and alluvial floodplains are dominant. Macintyre Brook has several small tributaries, including Catfish and Canning Creek.

Due to the variable rainfall within the catchment, irrigation and water storage is critically important for irrigation, urban water use, and intensive land uses such as feedlots and poultry farms. Coolmunda Dam is a major source of water for the Macintyre Brook Water Supply Scheme (eWater, 2012).

North of Bringalily State Forest, the landscape is undulating and there are isolated volcanic intrusions and sandstone hills. This chain of peaks, comprised of Mount Basalt Reserve, Mount Emlyn, Mount Domville, Commodore Peak and Captains Mountain, West Ridge and East Ridge is the boundary between the Condamine River and Border River catchments.

The undulating landscape to the north of these peaks transitions into the broad cultivated alluvial plains of the Condamine River. This region falls within the Condamine River drainage sub-basin, one of the largest catchments of the Murray-Darling Basin and is drained by the Condamine River and its tributaries, Back Creek and Grasstree Creek. The alignment traverses the Upper Condamine Floodplain, Condamine River, the Condamine River (North Branch) and Grass Tree Creek near Pampas.

The Toowoomba region (including parts of the Darling Downs and the hills surrounding Pittsworth) are situated on top of basalts of the Main Range volcanics and are characterised by; isolated basaltic peaks (Gowrie Mountain, Storey Mountain, Sugar Loaf Mountain, McGregor Mountain and Glenvale Mountain), dryland cropping and large open grazing lots.

The Toowoomba region also falls within the Condamine River drainage sub-basin and is drained by Gowrie Creek and its tributaries, East Creek, West Creek and Black Gully. Other creeks within the Condamine River drainage sub-basin include Westbrook Creek, Dry Creek, Spring Creek and Meringandan Creek. These creeks typically have steep channel gradients and are subject to high flows and flash flooding during heavy rainfall events, exacerbated by high volumes of water transferred by the steep slopes of their upper catchments.

5.1.3 Soils, vegetation and land use

Landcover elements, including soils and the vegetation and rural land uses they support, strongly affect the character of the landscape and also influence the extent to which views can be obtained (for example views may be restricted within forested landscapes). Existing land uses within and adjacent to the impact assessment area are shown on Figure 5: Land use and are largely characterised by rural activities on a variety of allotment sizes. However, a diverse range of other land uses are also found within the impact assessment area including rural lots, urban development, industrial areas and more localised specialist land uses including poultry farms, cattle feedlots and mining operations.

The impact assessment area has been extensively cleared for agricultural, urban development and industrial land uses, particularly within the low-lying fertile floodplains associated with the Dumaresq River, Macintyre River, Macintyre Brook and Condamine River, which are renowned for their fertile soils and productive agricultural landscapes. These areas are dominated by vertosols and dermosols (alluvial soils), typically found on flat, slightly sloping and undulating land along watercourses in low-lying flood prone areas, which support irrigated agricultural production. These productive landscapes are surrounded by dryland cropping, cattle grazing (predominately beef cattle) and production forestry, on soils with lower fertility dominated by sodosols.

Despite this, the region is rich in biodiversity and supports many different ecosystems. Native remnant vegetation varies greatly across the extent of the impact assessment area, and consists of:

- Scattered riparian vegetation dominated by river red gum (*Eucalyptus camaldulensis*), coolibah (*Eucalyptus coolabah*) and river oak (*Casuarina cunninghamiana*) typically confined to constrained gullies with limited access and creek channels
- Grassy woodlands comprised of poplar box (*Eucalyptus populnea*), wilga (*Geijera parviflora*), white cypress pine (*Callitris glaucophylla*), budda (*Eremophila mitchellii*), ironwood (*Backhousia myrtifolia*) and belah (*Casuarina cristata*) with mixed grasses occurring on higher parts of floodplains
- Shrubby open forest dominated by brigalow (*Acacia harpophylla*) and/or belah (*Casuarina cristata*) associated with elevated areas of the Condamine region
- Salt tolerant vegetation such as spinifex grass (*Triodia spp.*) associated with the salt scald near Yelarbon
- Paperbark shrubland on sandy plains, dominated by paperbark (*Melaleuca tamariscina*)
- Eucalyptus woodlands on alluvial plains and fine-grained sedimentary rocks typically found in Whetstone, Bringalily and Devine State Forests
- Small remnant patches of semi-evergreen vine thicket, limited to steep gullies and slopes on both sedimentary and basalt rocks
- Open eucalypt forest on elevated areas, dominated by river red gum (*Eucalyptus camaldulensis*) or mountain yapunyah (*E. thozetiana*) and brigalow (*Acacia harpophylla*)
- Grassland dominated by *Dichanthium sericeum*, *Aristida spp.*, *Astrebla spp.* and *Panicum decompositum* on open plains of the Darling Downs.

There is one national park within the impact assessment area, Wondul Range National Park (14,695 ha); seven State forests; McEwan State Forest (306 ha), Domville State Forest (228 ha), Millmerran State Forest (583 ha), Bringalily State Forest 35,695 ha), Devine State Forest (4,665 ha), Yelarbon State Forest (30,772 ha) and Whetstone State Forest (41,282 ha); and one conservation park, the Irongate Conservation Park (29 ha). Mount Basalt Environmental Park is also located within the impact assessment area.

Two sections of Wondul Range National Park, located 30 km southwest of Millmerran and 12.9 km north of Inglewood respectively, conserves 3,555 ha of open woodland species typical of the Western Downs and has cultural and landscape values important to local indigenous people. There are no facilities and the area is typically used for informal nature-based activities such as bird watching or wildlife observation.

5.1.4 IBRA classifications

The IBRA is a biogeographic regionalisation of Australia developed by the Australian Government department formerly known as Department of Sustainability, Environment, Water, Population and Communities (Department of the Environment and Energy, 2018). IBRA represents a landscape-based approach to classifying the land surface of Australia. The IBRA data consists of two datasets: IBRA bioregions, which are a larger scale regional classification of homogenous ecosystems; and sub regions, which are more localised.

Whilst bioregions have been defined mainly for the purposes of ecosystem planning and monitoring, the nominal attributes that make up IBRA are climate, lithology/geology, landform, vegetation, flora and fauna and land use, which are themes typically used to define landscape character at a high level. On 5 July 2012, IBRA 7.0 was released, which delineates 89 biogeographic regions and 419 sub regions, each reflecting a unifying set of major environmental influences which shape the occurrence of flora and fauna and their interaction with the physical environment across Australia. The bioregion information enables a high-level desktop understanding of the different landscape settings of the impact assessment area. The descriptions for the sub-regions that accompany IBRA 7.0 are not currently published. However, upon request, the Australian Government Environmental Resources Information Network supplied descriptions of each of the sub-bioregions in the impact assessment area for the IBRA5.1 dataset (ERIN, 2012, personal communication), which follows similar boundaries).

As shown on Figure 6: Interim Biogeographic Regionalisation Australia, the majority of the impact assessment area is located within the Brigalow Belt South Bioregion, with small parts of the impact assessment area falling within the Darling Riverine Plains Bioregion near the NSW/QLD border and within the Nandewar Bioregion near Kooroongarra. Most of the impact assessment area falls within the BBS18 Inglewood Sandstones and BBS17 Eastern Darling Downs subregions, while a lesser portion is located within BBS19 Moonie-Common Floodout and DRP03 Castlereagh-Barwon subregions in the western extent of the impact assessment area. Two other subregions, the NAN01 Nandewar Northern Complex and BBS21 Northern Basalts fall within the impact assessment area but are not traversed by the Project. These bioregions are described in Table 16.

Table 16: IBRA Sub bioregion descriptions

IBRA Subregion Name, Code and Total Area (Ha)	Description
Northern Basalts BBS21 545,396 ha	Northern Basalts subregion consist of Tertiary basalts over Jurassic quartz sandstones and alluvial sediments derived from these with landforms characterised by undulating low stony hills, long slopes with sandy wash and heavy clays from the valley floors. Black loams are present on basalt ridges, while deep sands exist on sandstone and texture contrast soils on slopes. Heavy grey clay occurs on alluvial flats. Brigalow, belah, whitewood, wilga, budda and poplar box occur on basalt hills while silver-leaved ironbark, spotted gum and smooth-barked apple occur on stony hills. River red gum, belah myall and poplar box are present on basalt flats. Silver-leaved ironbark and white cypress pine occur in sandstone rocks, with smooth-barked apple, white cypress, Blakely's red gum, Moreton Bay ash, poplar box, wilga, rough-barked apple, bull oak, on lower sandstone slopes. White box, with silver-leaved ironbark, white wood, bull oak and brigalow occur on alluvial clays. River red gum grown along all streams.
Moonie-Common Floodout BBS19 802,963 ha	Moonie R. - Common Creek Floodout is level to gently undulating country on Quaternary alluvium derived from sandstone to east and overlying the Griman Creek Formation. These are also areas of partly consolidated Tertiary alluvial deposits. Soils include grey clays, brown clay loams, sandy solodics and solodised solonetz. Major vegetation types include brigalow (<i>Acacia harpophylla</i>) and/or belah (<i>Casuarina cristata</i>) open forest often with molly box (<i>Eucalyptus pilligaensis</i>) and narrow-leaved ironbark (<i>E. crebra</i>) cypress pine (<i>C. glaucophylla</i>) open forest/woodland.
Castlereagh-Barwon DRP03 4,394,293 ha	Macintyre - Weir Fan subregion consists of extensive plains on overlapping low angle alluvial fans of several rivers. Sediment derived from Jurassic sandstones are present on the Castlereagh fan and from basalts on the Namoi fan. The structure is the same as for Bogan-Macquarie with channels, floodplains, crevasse splays, levees, source bordering dunes and through flow swamps of past and present river systems. Grey and brown clays occur on the plains and depressions with brown loamy sands, pale yellow or red sands, and texture contrast soils on the low rises of former levees and channels. The vegetation of the subregion features river red gum on larger streams. Coolabah with occasional myall, river cooba, whitewood belah and clumps of river paperbark also occur. Mitchell grass with few trees occur on clay plains while poplar box with wilga, whitewood, belah, white cypress pine, silver-leaf ironbark and occasional brigalow occur on higher red soils.
Inglewood Sandstones BBS18 1,327,718 ha	Inglewood Sandstones consists of undulating to low hilly country on deeply weathered and lateritised Jurassic-Cretaceous sandstone with associated colluvial lower slopes and alluvial plains. Major vegetation types include narrow-leaved ironbark (<i>Eucalyptus crebra</i>) on hillsides, (<i>E. crebra</i>), cypress pine (<i>Callitris glaucophylla</i>) and bullock (<i>Allocasuarina luehmmanii</i>) on solodic soils in gently undulating parts and poplar box (<i>E. populnea</i>) on lower slopes and flats. There are also minor areas of brigalow (<i>Acacia harpophylla</i>) — belah (<i>Casuarina cristata</i>).
Nandewar Northern Complex NAN01 959,239 ha	Dominated by Carboniferous sediments and leucadamellite which form flat to undulating areas, low hills and ranges at high altitudes and hilly areas adjacent to granites. Lower undulating areas carry an open forest dominated by <i>E. sideroxylon</i> , with <i>E. melanophloia</i> dominant in hilly areas on leucadamellite. Open forest to woodland dominated by <i>E. melanophloia</i> and <i>Callitris hugelii</i> is widespread on the sediments with <i>E. albens</i> occurring on lower slopes and <i>Brachychiton populneum</i> on more undulating areas.

IBRA Subregion Name, Code and Total Area (Ha)	Description
Eastern Darling Downs BBS17 1,639,276 ha	Eastern Darling Downs comprises spurs and foothills of Main Range along eastern boundary of bioregion, low hills in the south and the Condamine River plain in the central and western parts. Substrates include Tertiary basalt in the extreme east, Jurassic sediments in the south– east, Triassic — Jurassic sediments in the north–east and alluvial soils of varying age along the Condamine River plain. The basalt vegetation communities are predominantly woodlands of narrow leaved ironbark (<i>Eucalyptus crebra</i>), yellow box (<i>E. melliodora</i>), forest red gum (<i>E. tereticornis</i>), white box (<i>E. albens</i>) or mountain coolibah (<i>E. orgadophila</i>). The sandstone hills support narrow-leaved ironbark (<i>Eucalyptus crebra</i>) woodland with gum-topped box (<i>E. moluccana/microcarpa</i>) and poplar box (<i>E. populnea</i>) woodland on lower slopes and valleys. There are also some areas of semi-evergreen vine thicket (<i>Araucarian microphyll</i>) rainforest, particularly in the south–east and brigalow (<i>Acacia harpophylla</i>) open forest and vine thicket in the north–east. Heavy cracking clays and black earths of the Condamine River plain supported prior to clearing bluegrass (<i>Dichanthium sericeum</i>) grassland and grassy woodlands of poplar box (<i>E. populnea</i>) with forest red gum/river red gum (<i>E. tereticornis/camaldulensis</i>), rough-barked apple (<i>Angophora floribunda</i>) adjacent to drainage lines. In the eastern part of the Condamine River plain, the black earths appear to have supported a grassy woodland of (<i>E. tereticornis</i>), (<i>Angophora floribunda</i>) rather than the <i>Dichanthium</i> grasslands and (<i>E. populnea</i>) woodlands of the central and western parts.

5.1.5 SEQRP regional and Toowoomba Regional Council local landscape values

The Queensland Government has assessed parts of the impact assessment area using the South East Queensland regional amenity methodology identified in the SEQRP *Implementation Guideline No 8 Identifying and protecting scenic amenity values* (Department of Infrastructure, 2007). *ShapingSEQ* (DILGP, 2017) includes mapping of areas of ‘regionally significant scenic amenity’ on ‘Map 5c Sustain – regional landscape values’.

As described in Table 2, the regional scenic amenity values are calculated using GIS analysis which combines visual exposure (least visible to most visible) and visual preference (least preferred to most preferred) to give a value between 1 and 10. Areas with a value of 9 to 10 are considered to be regionally significant. Areas of ‘regionally significant scenic amenity’ (within the South East Queensland region) are identified on Figure 3:Regional scenic amenity and planning designations.

Most of the impact assessment area falls outside the area studied within the *ShapingSEQ* plan, and therefore regionally significant scenic amenity mapping is not consistently available across the extent of the Impact assessment area. As shown on Figure 3: Regional scenic amenity and planning designations there are no large contiguous areas of high scenic amenity value identified within the Impact assessment area. However, the Toowoomba Regional Council *Scenic Amenity Study* (Conics, 2009) identifies the following key areas, identified on Figure 4: Landform and hydrological context where appropriate, within the impact assessment area as having high scenic amenity values:

- The mesas, hills and mountains across the central plains and the northeastern ranges (i.e. elevated areas near Toowoomba, Kingsthorpe, Gowrie Mountain and Pittsworth)
- The isolated peaks of Captains Mountain, Commodore Peak and Mount Domville.

Rural landscapes within Toowoomba Regional Council are rated as high in scenic amenity by respondents to the Toowoomba Regional Council and South East Queensland preference surveys.

The value of rural landscapes is supported by the *Goondiwindi Region Planning Scheme 2018* which outlines specific outcomes relating to Scenic Amenity and Regional Landscape Character requiring protection of the productive use of rural land and the dominance of natural landforms and open space over built form in rural areas.

5.2 Landscape character baseline

The identified LCTs and LCAs areas falling within the impact assessment area are shown on Figure 7: Landscape character assessment and summarised in Table 17.

Table 17: Landscape Character Types and Areas

Landscape Character Type (LCT)	Associated Landscape Character Areas (LCAs)
LCT A: Vegetated Watercourses - Rivers	• Condamine River (North Branch) Vegetated Watercourse (LCA A1) • Condamine River Vegetated Watercourse (LCA A2) • Macintyre River Vegetated Watercourse (LCA A3) • Dumaresq River Watercourse (LCA A4)
LCT B: Vegetated Watercourses – Creeks and Channels	• Meringandan Creek Vegetated Watercourse (LCA B1) • Gowrie Creek Vegetated Watercourse (LCA B2) • Westbrook Creek Vegetated Watercourse (LCA B3) • Upper Westbrook Creek Vegetated Watercourse (LCA B4) • Dry Creek Vegetated Watercourse (LCA B5) • Spring Creek Vegetated Watercourse (LCA B6) • Upper Westbrook Creek UT Vegetated Watercourse (LCA B7) • Linthorpe Creek Vegetated Watercourse (LCA B8) • Umbriam Creek Vegetated Watercourse (LCA B9) • Umbriam Creek UT1 Vegetated Watercourse (LCA B10) • Hodgson Creek Vegetated Watercourse (LCA B11) • Emu Creek Vegetated Watercourse (LCA B12) • Upper 14 Mile Creek Vegetated Watercourse (LCA B13) • Perrier Gully Vegetated Watercourse (LCA B14) • 14 Mile Creek Vegetated Watercourse (LCA B15) • Back Creek Vegetated Watercourse (LCA B16) • Leonard (Back Creek) Vegetated Watercourse (LCA B17) • Grass Tree Creek Vegetated Watercourse (LCA B18) • Pine Creek Vegetated Watercourse (LCA B19) • Pine Creek UT1 Vegetated Watercourse (LCA B20) • Bora Creek Vegetated Watercourse (LCA B21) • Bora Creek UT1 Vegetated Watercourse (LCA B22) • Bora Creek UT2 Vegetated Watercourse (LCA B23) • Bringalily Creek Vegetated Watercourse (LCA B24) • Boola Creek Vegetated Watercourse (LCA B25) • Nicol Creek Vegetated Watercourse (LCA B26) • Mingimarny Creek Vegetated Watercourse (LCA B27) • Canning Creek Vegetated Watercourse (LCA B28) • Cattle Creek Vegetated Watercourse (LCA B29) • Mosquito Creek Vegetated Watercourse (LCA B30) • Bodumba Creek Vegetated Watercourse (LCA B31) • Pairagara Creek Vegetated Watercourse (LCA B32) • Macintyre Brook Vegetated Watercourse (LCA B33) • Catfish Creek Vegetated Watercourse (LCA B34) • Wondalli Creek Vegetated Watercourse (LCA B35) • Kippenbung Creek Vegetated Watercourse (LCA B36) • Brigalow Creek Vegetated Watercourse (LCA B37) • Forest Creek Vegetated Watercourse (LCA B38)
LCT C: Irrigated Croplands	• Oakey North Irrigated Croplands (LCA C1) • Yalungur Irrigated Croplands (LCA C2) • Lilydale West Irrigated Croplands (LCA C3) • Lilydale East Irrigated Croplands (LCA C4) • Meringandan Irrigated Croplands (LCA C5) • Glencoe Irrigated Croplands (LCA C6) • Oakey South Irrigated Croplands (LCA C7) • Kingsthorpe Irrigated Croplands (LCA C8) • Charlton Irrigated Croplands (LCA C9)

Landscape Character Type (LCT)	Associated Landscape Character Areas (LCAs)
	- Gowrie Junction Irrigated Croplands (LCA C10) - Morris Road Irrigated Croplands (LCA C11) - Birnam Irrigated Croplands (LCA C12) - Westbrook Creek Irrigated Croplands (LCA C13) - Brimblecombe Road Irrigated Croplands (LCA C14) - Wellcamp Airport Irrigated Croplands (LCA C15) - Westbrook Irrigated Croplands (LCA C16) - Wellcamp Airport South Irrigated Croplands (LCA C17) - Athol Irrigated Croplands (LCA C18) - Half Mile Gully Irrigated Croplands (LCA C19) - Wellcamp Irrigated Croplands (LCA C20) - Bunkers Hill West Irrigated Croplands (LCA C21) - Bunkers Hill East Irrigated Croplands (LCA C22) - Linthorpe Creek Irrigated Croplands (LCA C23) - Wyreema Irrigated Croplands (LCA C24) - Jimna Springs Irrigated Croplands (LCA C25) - Hodgson Creek Irrigated Croplands (LCA C26) - Emu Creek Irrigated Croplands (LCA C27) - Umbriam Creek Irrigated Croplands (LCA C28) - Perrier Gully Irrigated Croplands (LCA C29) - Mount Taylor Irrigated Croplands (LCA C30) 14 Mile Creek Irrigated Croplands (LCA C31) - Brookstead Irrigated Croplands (LCA C32) - Pampas Irrigated Croplands (LCA C33) - Lemon Tree Irrigated Croplands (LCA C34) - Grass Tree Creek Irrigated Croplands (LCA C35) - Back Creek Irrigated Croplands (LCA C36) - Bringalily Creek North Irrigated Croplands (LCA C37) - Bringalily Creek South Irrigated Croplands (LCA C38) - Bybera Road North Irrigated Croplands (LCA C39) - Inglewood Airport Irrigated Croplands (LCA C40) - Coolmunda Irrigated Croplands (LCA C41) - Bybera Road South Irrigated Croplands (LCA C42) - Inglewood Irrigated Croplands (LCA C43) - Tobacco Road Irrigated Croplands (LCA C44) - Yarranbrook West Irrigated Croplands (LCA C45) - Yarranbrook East Irrigated Croplands (LCA C46) - Whetstone Irrigated Croplands (LCA C47) - Wondalli Creek North Irrigated Croplands (LCA C48) - Macintyre Brook North Irrigated Croplands (LCA C49) - Macintyre Brook South Irrigated Croplands (LCA C50) - Wondalli Creek South Irrigated Croplands (LCA C51) - Brigalow Creek Irrigated Croplands (LCA C52) - Kurumbul Irrigated Croplands (LCA C53) - Bengalla Reserve Irrigated Croplands (LCA C54) - Kippenbung Creek Irrigated Croplands (LCA C55) - Dumaresq River Irrigated Croplands (LCA C56) - Gibinbell Irrigated Croplands (LCA C57) - Woodleigh Irrigated Croplands (LCA C58) - Glenhurst Irrigated Croplands (LCA C59) - Texas-Yelarbon Road Irrigated Croplands (LCA C60) - Boggabilla Irrigated Croplands (LCA C61) - Melon Ridge Irrigated Croplands (LCA C62) - Humptybung West Irrigated Croplands (LCA C63) - Humptybung East Irrigated Croplands (LCA C64)
LCT D: Dry Croplands and Pastures	- Oakey Dry Croplands and Pastures (LCA D1) - Kings Siding Dry Croplands and Pastures (LCA D2) - Gowrie Little Plain Dry Croplands and Pastures (LCA D3)

Landscape Character Type (LCT)	Associated Landscape Character Areas (LCAs)
	• Glencoe Dry Croplands and Pastures (LCA D4) • Mount Kingsthorpe Dry Croplands and Pastures (LCA D5) • Gowrie Junction Dry Croplands and Pastures (LCA D6) • Gowrie Mountain Dry Croplands and Pastures (LCA D7) • Charlton Dry Croplands and Pastures (LCA D8) • Biddeston Dry Croplands and Pastures (LCA D9) • Wellcamp Dry Croplands and Pastures (LCA D10) • Westbrook Dry Croplands and Pastures (LCA D11) • Wyreema Dry Croplands and Pastures (LCA D12) • Longhurst Road Dry Croplands and Pastures (LCA D13) • Millmerran Dry Croplands and Pastures (LCA D14) • Bringalily West Dry Croplands and Pastures (LCA D15) • Kooroongarra Dry Croplands and Pastures (LCA D16) • Bringalily East Dry Croplands and Pastures (LCA D17) • Canning Creek Northern Dry Croplands and Pastures (LCA D18) • Mosquito Creek North Dry Croplands and Pastures (LCA D19) • Bodumba Creek Dry Croplands and Pastures (LCA D20) • Devine Dry Croplands and Pastures (LCA D21) • Mosquito Creek South Dry Croplands and Pastures (LCA D22) • Canning Creek West Dry Croplands and Pastures (LCA D23) • Canning Creek East Dry Croplands and Pastures (LCA D24) • Bybera Road Dry Croplands and Pastures (LCA D25) • Yelarbon Dry Croplands and Pastures (LCA D26) • Yarranbrook Dry Croplands and Pastures (LCA D27) • Whetstone East Dry Croplands and Pastures (LCA D28) • Catfish Creek Dry Croplands and Pastures (LCA D29) • Macintyre Brook Dry Croplands and Pastures (LCA D30) • Whetstone West Dry Croplands and Pastures (LCA D31) • Wondalli Creek North Dry Croplands and Pastures (LCA D32) • Wondalli Creek South Dry Croplands and Pastures (LCA D33) • Yelarbon Dry Croplands and Pastures (LCA D34) • Kurumbul Dry Croplands and Pastures (LCA D35) • Kippenbung Creek Dry Croplands and Pastures (LCA D36) • Dumaresq River North Dry Croplands and Pastures (LCA D37) • Yelarbon Salt Pan Dry Croplands and Pastures (LCA D38) • Glenhurst Dry Croplands and Pastures (LCA D39) • Goondiwindi Dry Croplands and Pastures (LCA D40) • Macintyre River Dry Croplands and Pastures (LCA D41) • Boggabilla Dry Croplands and Pastures (LCA D42) • Toomelah Dry Croplands and Pastures (LCA D43) • Dumaresq River South Dry Croplands and Pastures (LCA D44)
LCT E: Vegetated Grazing	• Meringandan West Vegetated Grazing (LCA E1) • Meringandan Vegetated Grazing (LCA E2) • Glencoe West Vegetated Grazing (LCA E3) • Glencoe East Vegetated Grazing (LCA E4) • Gowrie Junction Vegetated Grazing (LCA E5) • Highfields Road Vegetated Grazing (LCA E6) • Highfields Vegetated Grazing (LCA E7) • Birnam Vegetated Grazing (LCA E8) • Glenvale Vegetated Grazing (LCA E9) • Wellcamp Vegetated Grazing (LCA E10) • Westbrook Vegetated Grazing (LCA E11) • Wyreema Vegetated Grazing (LCA E12) • Yarranlea Vegetated Grazing (LCA E13) • Bringalily Vegetated Grazing (LCA E14) • Boggabilla Vegetated Grazing (LCA E15)

Landscape Character Type (LCT)	Associated Landscape Character Areas (LCAs)
LCT F: Rural Settlement	• Kingsthorpe (LCA F1) • Meringandan West (LCA F2) • Meringandan (LCA F3) • Meringandan South (LCA F4) • Gowrie Junction (LCA F5) • Highfields (LCA F6) • Toowoomba (LCA F7) • Westbrook (LCA F8) • Southbrook (LCA F9) • Pittsworth (LCA F10) • Brookstead (LCA F11) • Pampas (LCA F12) • Millmerran (LCA F13) • Inglewood (LCA F14) • Yelarbon (LCA F15) • Boggabilla (LCA F16) • Toomelah Indigenous Settlement (LCA F17)
LCT G: Rural Living	• Oakey (LCA G1) • Westview Rural Living (LCA G2) • Meringandan West Rural Living (LCA G3) • Glencoe Rural Living (LCA G4) • Redlands Drive Rural Living (LCA G5) • Hilltop Drive Rural Living (LCA G6) • Gowrie Junction Rural Living (LCA G7) • Highfield Ridge Rural Living (LCA G8) • Blue Mountain Heights Rural Living (LCA G9) • Gowrie Mountain Rural Living (LCA G10) • Torrington Rural Living (LCA G11) • Cranley Rural Living (LCA G12) • Westbrook Rural Living (LCA G13) • Wyreema Rural Living (LCA G14) • Southbrook North Rural Living (LCA G15) • Southbrook South Rural Living (LCA G16) • Millmerran Rural Living (LCA G17)
LCT H: Forested Uplands	• The Sugar Loaf Mountain Forested Uplands (LCA H1) • McGregor Mountain Forested Uplands (LCA H2) • Storey Mountain Forested Uplands (LCA H3) • Meringandan West Forested Uplands (LCA H4) • Mount Kingsthorpe Forested Uplands (LCA H5) • Gowrie Mountain Forested Uplands (LCA H6) • Wellcamp Forested Uplands (LCA H7) • Glenvale Mountain Forested Uplands (LCA H8) • Bunkers Hill Forested Uplands (LCA H9) • Umbriam Forested Uplands (LCA H10) • Hodgson Creek Forested Uplands (LCA H11) • Umbriam Creek Forested Uplands (LCA H12) • Scrubby Mountain Forested Uplands (LCA H13) • Captains Mountain Forested Uplands (LCA H14) • Commodore Peak Forested Uplands (LCA H15) • Commodore Peak South Forested Uplands (LCA H16) • Pine Hill Forested Uplands (LCA H17) • Kooroongarra North Forested Uplands (LCA H18) • Kooroongarra Forested Uplands (LCA H19) • Kooroongarra South Forested Uplands (LCA H20)
LCT I: Settled Hills	• Pittsworth Hills (LCA I1)

Landscape Character Type (LCT)	Associated Landscape Character Areas (LCAs)
LCT J: Forested Hills and Plains	• Turallin (LCA J1) • Millmerran Downs (LCA J2) • Wondul Creek State Forest (LCA J3) • Kooroongarra Road (LCA J4) • Mingimarny Creek West (LCA J5) • Mingimarny Creek East (LCA J6) • Bringalily Creek North (LCA J7) • Bringalily Creek South (LCA J8) • Canning Creek (LCA J9) • Bringalily State Forest West (LCA J10) • Bringalily State Forest East (LCA J11) • Devine State Forest (LCA J12) • Yelarbon State Forest North (LCA J13) • Yelarbon State Forest South (LCA J14)
LCT K: Salinity Scald	• Yelarbon Salinity Scald (LCA K1)
LCT L: Transitional Landscapes	• Wellcamp Airport (LCA L1) • Boral Quarry (LCA L2) • Toowoomba Waste Management Facility (LCA L3) • Charlton Industrial Precinct (LCA L4) • Charlton Raceway (LCA L5) • Wetalla Sewage Treatment Plant (LCA L6) • Commodore Mine (LCA L7) • Millmerran Power Station (LCA L8)

For clarity, full descriptions of these areas are included together with the impact assessment in Section 7.

5.3 Visual assessment baseline

5.3.1 Visual audiences and receptors

A number of visual receptor audiences were assessed to have the potential to be affected by the Project including:

- Local residents and workers in towns and rural settlements (including Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook, Athol, Gowrie Mountain and Kingsthorpe)
- Local residents and workers on rural and acreage lots
- Travellers on main and local roads
- Tourists on roads including users of 'scenic drives' and visitors staying in tourist accommodation within the impact assessment area
- Tourists on the 'Westlander' train
- Recreational users of the landscape, particularly using walking trails within the national parks, State forests and other nature reserves
- Traditional Owners, including those accessing culturally significant landscapes.

5.3.2 Viewpoint selection

Representative views from a range of visual audiences are assessed in detail in Section 8.2. The selection of representative viewpoints has been updated to reflect community feedback for the revised draft EIS.

Views from a range of residential lots in settlements and rural areas around the corridor are assessed including Kingsthorpe, Gowrie Mountain, Wellcamp, Athol, Murlaggan, Brookstead, Pampas, Millmerran and Yelarbon. Views from Gowrie Junction, Cotswold Hills, Glenvale, Westbrook, Wyreema, Umbriam, Biddeston, Oakey, and Inglewood were also considered although no specific views are included due to the topography and/or distance from the Project rail alignment.

Representative views from a range of local and State-controlled roads are also described and assessed including the Cunningham Highway, Gore Highway, Pittsworth-Felton Road, Toowoomba-Cecil Plains Road, Millmerran-Inglewood Road and Blackwell Road. Some of the roads within the impact assessment area are unlikely to be affected due to distance and topography so views from these roads have not been included. These include Inglewood-Texas Road (3.8 km to the south of the alignment), Millmerran-Cecil Plains Road (4 km northwest), Beaudesert-Boonah Road (7 km to the south) and the New England Highway (9 km northeast). While the Project crosses the Warrego Highway near Kingsthorpe, a view from the Warrego Highway has not been included as the impact is discussed within views from elevated nearby residential lots of Gowrie Mountain and Kingsthorpe.

As shown on Figure 8: Tourist drives and sensitive , there are many recognised tourist routes or 'scenic drives' within or close to the impact assessment area. The '*Warrego Way*', '*Adventure Way*', '*Australia's Country Way*' are nationally marketed 'Great Queensland Drives' (Outback Queensland Tourist Association, 2015) that follow both the Warrego Highway and New England Highway.

At the regional level the '*Rural Getaway*' is promoted by Tourism and Events Queensland and follows Millmerran-Inglewood Road between Inglewood and Millmerran, whilst '*Adventure Way Discovery*' and the '*Cross Country to Outback*' drives are marketed by Outback Queensland Tourism Association as 'Queensland's Big Sky Country Drives' and follow the Warrego Highway. Other regional tourist drives such as the '*Cobb & Co*' and '*Spring Bluff*' fall within the impact assessment area, however, are not directly affected by the Project.

Local drives include the '*Open Plains Country Drive*', '*Farmers Country Drive*' and '*Great Bunya Way*', which are marketed by Toowoomba Regional Council as 'Great Country Drives', following the Gore Highway between Millmerran and Toowoomba and Warrego Highway, between Toowoomba, Oakey and beyond. The '*Border Rivers*' tourist drive is advertised by Goondiwindi Regional Council and locally signposted. Several other local self-drives that appear in tourist literature but are not signposted include the '*Brigalow Belt Power Station Drive*', '*Historic Owen's Scrub Drive*', '*Rolling Hills Scenic Lookout Drive*' and '*Condamine River Flats Drive*'. Views from these drives have been considered and are incorporated into the relevant viewpoint assessments.

Recreational views have also been considered and viewpoints assessed as appropriate. This includes assessment of views within the Rainbow Reserve and from the Commodore Peak Lookout which is a marked tourist viewpoint. Specific views have also been included from Mount Kingsthorpe Reserve and Mount Basalt Reserve due to their proximity to the Project, elevated situation and panoramic viewing opportunities afforded by walking trails within these areas. Views from Wondul Range National Park have not been included as the two sections are over 12 km from the Project and separated from the Project by dense State Forest areas that screen any potential views. Similarly, views from Irongate Conservation Park, Yelarbon State Forest, Whetstone State Forest, Bringalily State Forest, Millmerran State Forest, Domville State Forest and McEwan State Forest have been considered but are not included in the assessment. While all are within the impact assessment area, due to the density of vegetation and lack of recreational facilities and vantage points within these reserves it is not anticipated that the Project would be widely visible. Views from Mount Basalt Environmental Park have been considered and included.

The identified assessment viewpoints are shown on Figure 9: Key visual receptors and location of representative and are summarised in Table 18.

Table 18: Viewpoint selection

Viewpoint name	Anticipated approximate distance to alignment	Key visual receptors
Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Alignment is approximately 300 m to the east of this viewpoint	Represents typical and accessible views of residents of local rural lots, visitors including Traditional Owners and campers at Rainbow Reserve and those travelling along Kildonan Road.
Viewpoint 2: Cunningham Highway near Yelarbon towards proposed Yelarbon non-resident workforce accommodation facility	Proposed non-resident workforce accommodation facility is located 750 m to the north of this viewpoint	Represents typical and accessible views of those travelling along the Cunningham Highway as well as rural residents and of visitors, workers and tourists around Yelarbon.
Viewpoint 3: Yelarbon Rest Area	Alignment is approximately 50 m to the north of this viewpoint	Represents typical and accessible views of residents and of visitors, workers and tourists in Yelarbon, as well as those travelling along the Cunningham Highway.
Viewpoint 4: Yelarbon silo artwork viewing area	Alignment is approximately 80 m to the north of this viewpoint	Represents typical and accessible views of residents and of visitors, workers and tourists in Yelarbon, as well as those travelling along the Cunningham Highway, particularly those stopping in the rest area to admire the GrainCorp silo artwork.
Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Alignment is approximately 1 km to the northwest of this viewpoint	Represents typical and accessible views of those travelling along the Cunningham Highway, as well as those stopping at the rest area.
Viewpoint 5: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Alignment is approximately 30 m to the west of this viewpoint.	Represents typical and accessible views of those travelling along Millmerran-Inglewood Road.
Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Proposed rail alignment and Millmerran-Inglewood Road Rail Bridge #1 is approximately 70 m to the northwest of this viewpoint	Represents typical and accessible views of those travelling north along Millmerran-Inglewood Road towards Millmerran.
Viewpoint 7: Millmerran-Inglewood Road towards proposed Inglewood non-resident workforce accommodation facility	Non-resident workforce accommodation facility is located approximately 740 m to the west of this viewpoint	Represents typical and accessible views of those travelling north along Millmerran-Inglewood Road towards Millmerran
Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Alignment is approximately 1 km to the east of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Millmerran-Inglewood Road.
Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Alignment is approximately 210 m to the west of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Millmerran-Inglewood Road.
Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Alignment is approximately 5.5 km to the west of this viewpoint	Represents typical and accessible views of those visiting Mount Basalt Reserve and walking on the Mount Basalt Circuit, a walking track with lookouts and elevated views.
Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Alignment is approximately 390 m to the west of this viewpoint	Represents typical and accessible views of nearby isolated rural residents, as well as visitors, workers and tourists travelling along Blackwell Road.
Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Alignment is approximately 530 m to the southeast of this viewpoint	Represents typical and accessible views of those visiting Commodore Peak picnic area.

Viewpoint name	Anticipated approximate distance to alignment	Key visual receptors
Viewpoint 13: Millmerran-Inglewood Road near lot	Alignment is approximately 50 m to the southeast of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Millmerran-Inglewood Road.
Viewpoint 14: Nardoo Street edge of Millmerran	Alignment is approximately 3 km to the southeast of this viewpoint	Represents typical and accessible views of residents of Millmerran.
Viewpoint 15: Turallin Road towards the proposed Turallin facility	Proposed Turallin facility is located approximately 200 m to the southwest of this viewpoint	Represents typical and accessible views of those travelling along Turallin Road.
Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Alignment is approximately 170 m to the southeast of this viewpoint	Represents typical and accessible views of those travelling along Millmerran-Leyburn Road which is part of several local tourist drives and also provides access to the Yarralong Weir camping area
Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Alignment is approximately 1.2 km to the southeast of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along the Gore Highway.
Viewpoint 18: Gore Highway near service station, Pampas	Alignment is approximately 900 m to the southeast of this viewpoint	Represents typical and accessible views of nearby residents of Pampas and of visitors, workers and tourists travelling along the Gore Highway.
Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Alignment is approximately 40 m to the southeast of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along the Gore Highway.
Viewpoint 20: Near Brookstead State School	Alignment is approximately 70 m to the southeast of this viewpoint	Represents typical and accessible views of school patrons, residents of Brookstead and of visitors, workers and tourists travelling along Ware Street and utilising nearby facilities (playground, amenities and BBQ/picnic facilities) at the historic railway station.
Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Alignment is approximately 230 m to the south of this viewpoint	Represents typical and accessible views of nearby elevated and isolated rural residential lots.
Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Alignment is approximately 190 m to the northwest of this viewpoint	Represents typical and accessible views of nearby residents of Pittsworth, guest of Pittsworth Motor Inn and of visitors, workers and tourists travelling along Pittsworth-Felton Road.
Viewpoint 23: Stanley Street near local park, Pittsworth	Alignment is approximately 380 m to the northwest of this viewpoint	Represents accessible views typically obtained by residents on the northern edge of Pittsworth, visitors to the park and of those utilising the nearby playing fields accessed via Short Street
Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Alignment is approximately 190 m to the northwest of this viewpoint	Represents accessible views typically obtained by those visiting the Pittsworth and District Assembly of God, nearby residents of the northern edge of Pittsworth and of visitors, workers and tourists travelling along Short Street. It is also representative of travellers on the A39 Gore Highway
Viewpoint 25: Gore Highway near Southbrook	Alignment is approximately 1.5 km northwest of this viewpoint	Represents typical and accessible views of nearby isolated rural residents, elevated residential lots of Southbrook and of visitors, workers and tourists travelling along the Gore Highway.
Viewpoint 26: View from Athol School Road	Alignment is approximately 200 m to the west of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Athol School Road.

Viewpoint name	Anticipated approximate distance to alignment	Key visual receptors
Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Alignment is approximately 200 m to the northeast of this viewpoint	Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Toowoomba-Cecil Plains Road.
Viewpoint 28: Linora Drive, Gowrie Mountain	Alignment is approximately 1.2 km to the northwest of this viewpoint	Represents typical and accessible views of nearby elevated residential lots of Gowrie Mountain.
Viewpoint 29a: Mount Kingsthorpe summit scenic lookout Viewpoint 29b: Southern Cross Drive, Kingsthorpe	Alignment is approximately 1.5 km, and 3 km to the south of these viewpoints	Represents typical and accessible views of those visiting Mount Kingsthorpe Bushland Park and walking on the Mount Kingsthorpe Walk, a walking track to the summit which provides expansive elevated views. Also representative of typical and accessible views of nearby elevated residential areas of Kingsthorpe.

6 Potential impacts

6.1 Project description

Key components of the Project to be assessed in the LVIA are described in Table 19.

Table 19: Overview of key components of the Project

Key Component	
Start and finish point	NSW/QLD border to between Leeson Road and Draper Road, on the southern outskirts of Kingsthorpe.
Length of alignment	217.48 km of new dedicated single-track, open access freight railway (149.48 km of new rail corridor and utilisation of approximately 68 km of existing rail corridor). Crosses extensive sections of the Condamine River floodplain.
Track dimensions	Rail corridor with a minimum width of 40 m with some variance to accommodate earthworks, drainage structures, rail infrastructure, access tracks, fencing and cater for local topographic variation. Single track dual gauge railway line with five crossing loops, each 2,200 m in length. Crossing loops are situated near Yelarbon, Inglewood, Kooroongarra, Yandilla and Broxburn.
Train lengths	Double stacked freight trains up to 1,800 m

6.2 Key sources of potential impact

Impacts are considered during construction and operation. Table 20 below describes potential impacts during the construction works stage. Mitigation measures are discussed in Section 11.

6.2.1 Construction works stage

Table 20: Potential Project impacts during construction works stage

Construction activities and infrastructure	Indicative imagery
Demolition of existing infrastructure The demolition and removal of existing redundant rail infrastructure would convey construction traffic to and within the construction areas resulting in short-term impacts on landscape and visual values.	 Source: Lat27
Vegetation clearing and associated earthworks Much of the landscape is already cleared for agricultural purposes. Where required, large-scale machinery will be used to assist in vegetation clearance or trimming activities. This will generate traffic on surrounding roads. Temporary stockpiles of cleared vegetation may also be present. Topsoil, subsoil, rock and other unsuitable materials will be removed where necessary to create stable and level areas for infrastructure to be constructed. This will result in the temporary presence of exposed areas of land.	 Source: ARTC

Construction activities and infrastructure	Indicative imagery
Road and railway construction The construction of new railway tracks, haul roads and access roads within the Project footprint would convey construction traffic to and within the construction areas resulting in short-term impacts on landscape and visual values.	 Source: Lat27
Bridge construction Bridges, culverts and viaducts will be constructed over creeks, rivers, flood plains and existing road corridors. The construction of new infrastructure would introduce construction traffic to and within the construction areas resulting in short-term impacts on landscape and visual values.	 Source: ARTC
Creation of stockpiles (existing material from site) Stockpiles of materials cleared from site will be present in the laydown areas in the Project footprint, where they will be stored prior to use, re-use or disposal. This includes ballast from the existing rail corridor; rail tracks and soil from cut and fill sites. Stockpile protocols are further detailed in the EIS Appendix AB: Earthworks Strategy and Draft Soil Management Plan	 Source: Lat27
Creation of stockpiles (material delivered to site) Stockpiles of materials delivered to site will be present in the laydown areas and within the rail corridor, where the material will be stored prior to use. This includes clean ballast, soil stockpiles and rail materials including tracks and sleepers. Stockpile protocols are further detailed in the EIS Appendix AB: Earthworks Strategy and Draft Soil Management Plan	 Source: ARTC
Presence and movement of construction equipment Large-scale construction equipment and machinery such as cranes, excavators, trucks, water trucks, scrapers, graders, heavy bulldozers, generators and dump trucks will be required for construction activities.	 Source: ARTC

Construction activities and infrastructure	Indicative imagery
Non-resident workforce accommodation facilities and workers Presence of construction workers wearing high visibility personal protective equipment. The construction workforce is expected to peak at around 900 full-time equivalents around week 80 of construction. Two non-resident workforce accommodation facilities are proposed near Yelarbon and Inglewood. At a minimum, each non-resident workforce accommodation facility will have capacity to accommodate a minimum of 300 beds. Each facility will be self-contained and will include accommodation units with kitchen, dining, ablution, laundry facilities. These areas will be lit with lighting. A third non-resident workforce accommodation facility will be required in the Millmerran area. The location for this site has not been included in the revised draft EIS. The site selection and due diligence associated with locating a Millmerran based non-resident workforce accommodation facility will be undertaken during detailed design and subject to further review and approval. Following construction, the non-resident workforce accommodation facilities will be progressively decommissioned so that reinstatement and revegetation activities can commence as soon as possible.	 0 50 metres Scale: 1:3000 Imagery includes material © CNES reproduced under license from Airbus DS, all rights reserved © 21AT © Earth-1, all rights reserved, 2019. Includes material © State of Queensland 2019. <i>Example of a non-resident workforce accommodation facility layout. Dalby, Queensland</i>
Construction traffic movement There will be increased traffic movement on existing main roads and side roads. This will include a variety of light and heavy vehicle types.	 Source: Lat27
Temporary construction lighting Site preparation activities undertaken to provide access to the rail corridor are commonly conducted during daylight hours. However, some activities may be undertaken outside of standard daytime hours as described in Section 4.10. Night lighting would be required at the proposed non-resident workforce accommodation facilities, the Turallin facility, site offices and fuel storage areas. Potentially, night lighting may also be required at bridge laydown areas. The primary light source will be from large-scale temporary security lighting.	 Source: FFJV
Embankments Many embankments will be created to establish the proposed rail corridor. This will be evident in areas where there is a change in levels with the existing ground, for example major cuts. In addition, abutments in support of culverts and bridges will be required adjacent to creeks and existing road corridors.	 Source: Lat27

Construction activities and infrastructure	Indicative imagery
Shipping containers and storage sheds Shipping containers will be delivered to construction sites via crane trucks and then stored in laydown areas. The containers commonly contain construction equipment.	 Source: FFJV
Site offices, Turallin facility and associated car parking areas The Project will require several temporary buildings including site offices and workshops, as well as car parking areas. Nominated site office locations are as follows: • LDN025.9: Yelarbon-Kurumbul Road - Secondary site office • LDN054.2: Cremascos Road – Secondary site office • LDN074.0: Millmerran-Inglewood Road - Secondary site office • LDN116.5: Millmerran-Inglewood Road - Main site office • LDN161.0: Pittsworth-Tummaville Road - Main site office • LDN175.5 Linthorpe Road Bridge-Linthorpe Road – Secondary site office • LDN188.2: Athol School Road – Main site office • LDN192.3: Off Berghofer Road – Secondary site office • LDN206.3: Leeson Road – Main site office. In addition, a 20 ha site facility is proposed near Turallin, to be utilised for a laydown area, a training facility, or native plant nursery and traditional land management training facility. These sites will introduce additional traffic, staff and machinery to the impact assessment area. The new, temporary built forms may be seen as uncharacteristic elements in a predominantly rural landscape.	 Source: FFJV
Construction of drainage infrastructure including concrete piping Temporary and permanent drainage infrastructure will be present, including areas in proximity to existing road corridors.	 Source: FFJV

Construction activities and infrastructure	Indicative imagery
Signage A large number of signs will be displayed around construction sites, especially where existing road corridors are in proximity to the proposed rail corridor. Signage will include speed signs, stop signs, and safety signs and construction signage such as truck access signage.	 Source: FFJV

6.2.2 Operations stage

Table 21 describes potential impacts during the operations stage of the Project. Mitigation measures are discussed in Section 11.

Table 21: Potential Project impacts during operation

Operation activities and infrastructure	Indicative imagery
Lighting infrastructure Permanent lighting infrastructure will be limited to standard road lighting required for the Cunningham Highway Road Bridge near Yelarbon. There will also be standard flashing lights located at all of the active level crossings (Section 9.1 for locations).	 Source: ARTC
Freight trains Trains may be at times visible in the landscape from existing roads and residential lots. Current operational modelling projects an average of 14 train movements per day during the initial years of operation. This is likely to increase to an average of 20 trains per day after 15 years, and up to 25 per day during peak operational periods.. These will be double stacked and up to 1.8 km long and 6.5 m high. The wait time for a 1.8 km train to pass at a speed of between 80 km and 115 km/h (maximum speed) will be up to 199 seconds, at active level crossings. The train will have headlights.	 Source: ARTC  Source: ARTC

Operation activities and infrastructure	Indicative imagery
Road and rail bridges Bridges are an obvious visible feature for viewers and are typically landmarks for motorists. The bridges are typically proposed as single track, Super-T girder type structures. The Project has five road-over-rail bridges as follows: • Cunningham Highway Bridge: 104 m • Heckendorf Road Bridge: 59 m • Owens Scrub Road Bridge: 72 m • Gore Highway Bridge: 108 m • Linthorpe Road Bridge: 66 m The Project has fourteen rail-over-road bridges as follows: • Bybera Road Rail Bridge: 75 m • Millmerran-Inglewood Road Rail Bridge #2: 75 m • Commodore Peak Road Bridge: 75 m • Millmerran-Inglewood Road Rail Bridge #3: 167 m • Yarranlea Road Rail Bridge: 69 m • Roche Road Rail Bridge: 121 m • Oakey-Pittsworth Road Rail Bridge: 69 m • Lochaber Road Rail Bridge: 75 m • Biddenston-Southbrook Road Rail Bridge: 144 m • Athol School Road Rail Bridge: 75 m • Toowoomba-Cecil Plains Road Rail Bridge: 92 m • Brimblecombe Road Rail Bridge: 75 m • Warrego Highway Rail Bridge: 132 m • Chamberlain Road Rail Bridge: 299 m	Road-over-rail bridge  Source: Lat27 (Visualisation) Rail-over-road bridge  Source: Lat27 (Visualisation)
River and creek bridges Rail over water bridges are typically lower, with their height determined by flood levels, except where they also pass over adjacent roads. They are also obvious built landmark for viewers where visible from roads and residential areas. The Project has 15 rail-over-watercourse bridges, as follows: • Macintyre Brook Rail Bridge 1: 207 m • Macintyre Brook Rail Bridge 2: 207 m • Pariagara Creek Rail Bridge: 345 m • Cattle Creek Rail Bridge: 138 m • Native Dog Creek Rail Bridge: 184 m • Bringalily Creek 1 Rail Bridge: 299 m • Bringalily Creek 3 Rail Bridge: 621 m • Nicol Creek Rail Bridge: 92 m • Back Creek Rail Bridge: 230 m • Grasstree Creek Rail Bridge: 1,330 m • Condamine River South Branch Rail Bridge: 658 m • Condamine River Main Branch Rail Bridge: 2,577 m • Condamine River North Branch Rail Bridge: 1,568 m • Westbrook Creek Rail Bridge: 230 m • Dry Creek Rail Bridge: 184 m	Rail-over-watercourse Bridge  Source: Lat27 (Visualisation)
Level crossings Crossings occur where the rail alignment intersects a road. Infrastructure includes rail tracks, crossing protection measures (as required) and signage. The revised reference design includes 6 new and existing passive level crossings of public roads and 22 new and existing active level crossings	 Source: ARTC

Operation activities and infrastructure	Indicative imagery
(including the active pedestrian level crossing at Yelarbon (with lights and barriers) of public roads. Railway tracks Railway tracks will be present along the alignment and may be sighted from adjacent roads and residents' lots in locations where the rail corridor is not screened by vegetation or topographic features. Five crossing loops (2,200 m long) are proposed along the alignment.	 Source: ARTC  Source: ARTC (Sydney to Brisbane Interstate Rail Line)
Culverts Culverts, including multiple barrel culverts, are required where road and rail corridors traverse watercourses, drainage lines and land subject to periodic inundation.	 Source: ARTC
Track formation The railway track will be laid on layers of ballast and sub-ballast above prepared subgrade formation. In places the rail will be elevated on embankments.	 Source: Lat27
Cuttings Cuts will be created through areas of elevated landform, for example in the undulating areas surrounding Pittsworth, to accommodate the proposed rail infrastructure.	 Source: ARTC
Fencing Fencing will be provided for the majority of the rail corridor and its primary purpose is to limit access to the railway. Fencing will act to protect adjoining lands from trespass and to prevent stock on such adjoining land from gaining access to the railway. As the Project comprises substantial greenfield works in rural agricultural and grazing areas, standard rural fencing will typically be provided according to ARTC guidelines, with specific considerations discussed with local landowners during the detailed design stage. Where superior fencing is required (for example where tracks are in close proximity to roads	 Source: FFJV

Operation activities and infrastructure	Indicative imagery
and/or communities, or where trespass is anticipated to occur) a 1.8 m chain link boundary fence may be provided. Fencing will not be provided across flood-prone areas due to the risk of debris being caught in the fencing during flood events. Instead, guide posts will be used to demarcate the extent of the rail corridor across the floodplain. Opportunities to provide fauna exclusion fencing have been identified as part of the revised reference design. This fencing would guide animals towards a fauna crossing structure or passage, whilst reducing their potential to be struck by vehicles or trains. The appropriateness of fauna fencing opportunities will be investigated further during the detailed design stage of the Project.	 Source: FFJV
Noise barriers The potential need for noise barriers has been identified, and conceptual designs for these barriers developed for the operational noise modelling assessments (EIS Appendix W: Noise and Vibration Assessment – Railway Operations). During the detailed design phase, the implementation of noise barriers, along with other feasible mitigation options, will be considered to reduce noise levels and related impacts on sensitive land uses. Visualisations of the concept noise barriers at Yelarbon, Brookstead and Pittsworth have been included in this assessment. Additionally, four more conceptual noise barriers have been evaluated as possible operational noise mitigation options at Kildonan, Pampas, Athol and Gowrie (EIS Appendix W: Noise and Vibration Assessment – Railway Operations). These locations will undergo further detailed design development and community consultation, including visual assessments to evaluate the feasibility and practicality of these as mitigation measures.	Noise Barriers  Source: Lat27 (Visualisation) <i>Note: Location and dimensions of any potential noise barriers will be subject to confirmation through the detailed design process and further community consultation.</i>

6.3 Illustrative cross sections of typical conditions

The following illustrations (Figure 13: Typical cut to Figure 21: Typical pier with Slab Span) have been prepared to indicate typical cross sections of the rail and associated components found across the Project rail corridor.

It is noted that these images are indicative “artist’s impressions” only, and representative of typical conditions found within the Project rail corridor. These sections are representative of a train with double stacked containers (future scenario). The sections are not specific to any one location and do not show the potential for mitigation, which is discussed in Section 11.

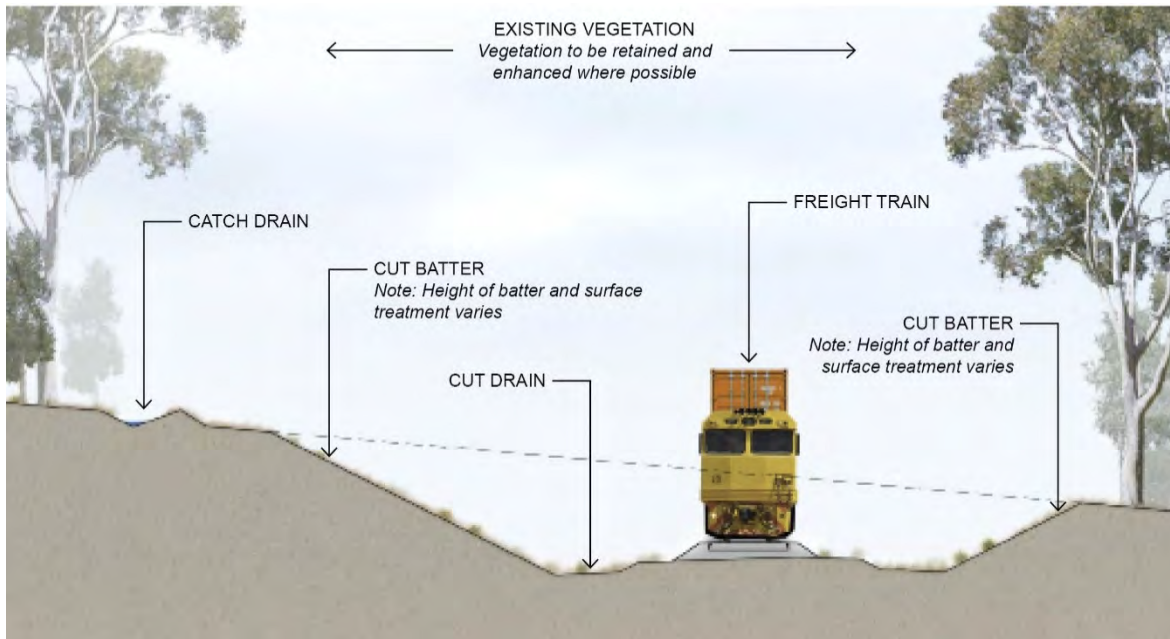


Figure 13: Typical cut

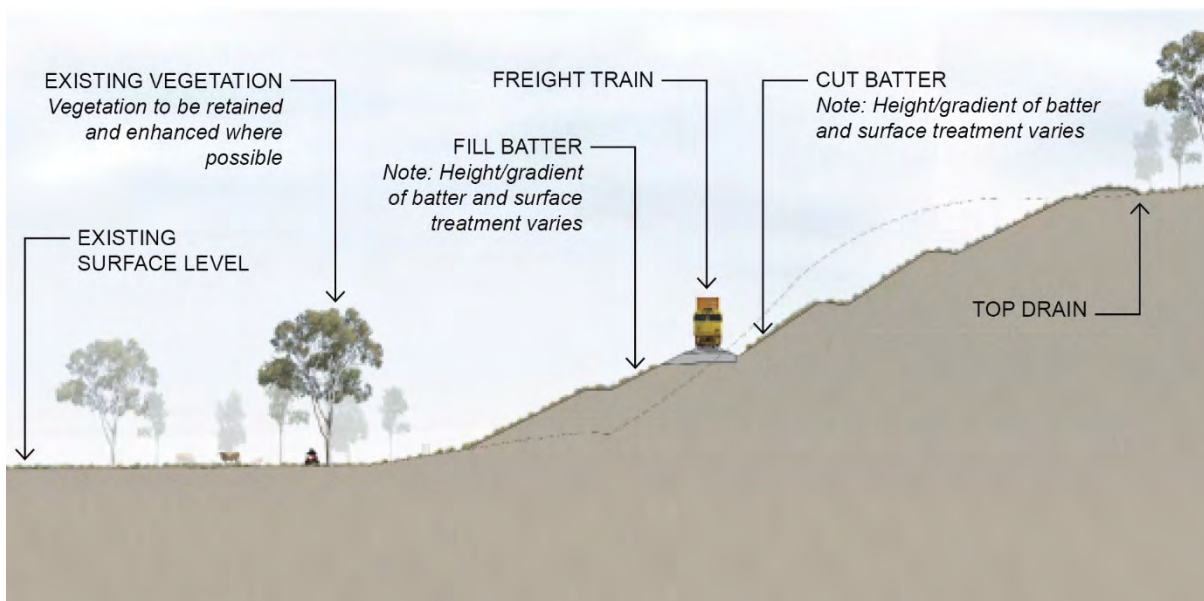


Figure 14: Typical cut/fill batter

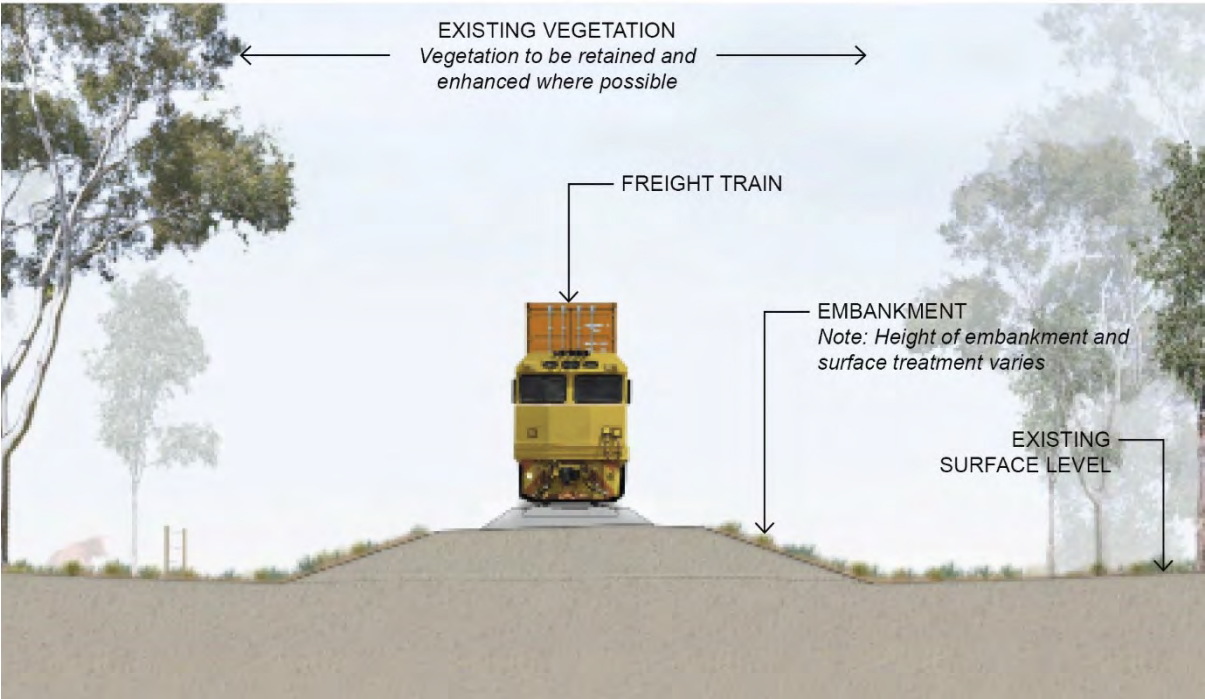


Figure 15: Typical low embankment

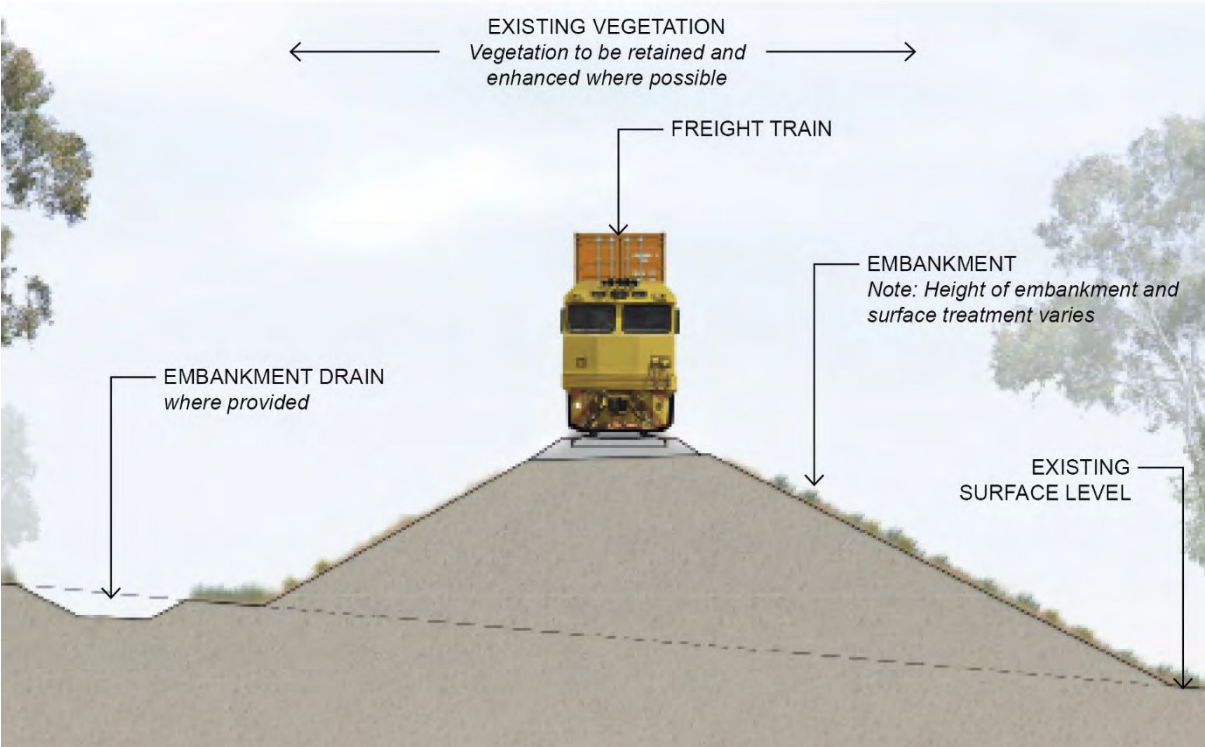


Figure 16: Typical high embankment with drain

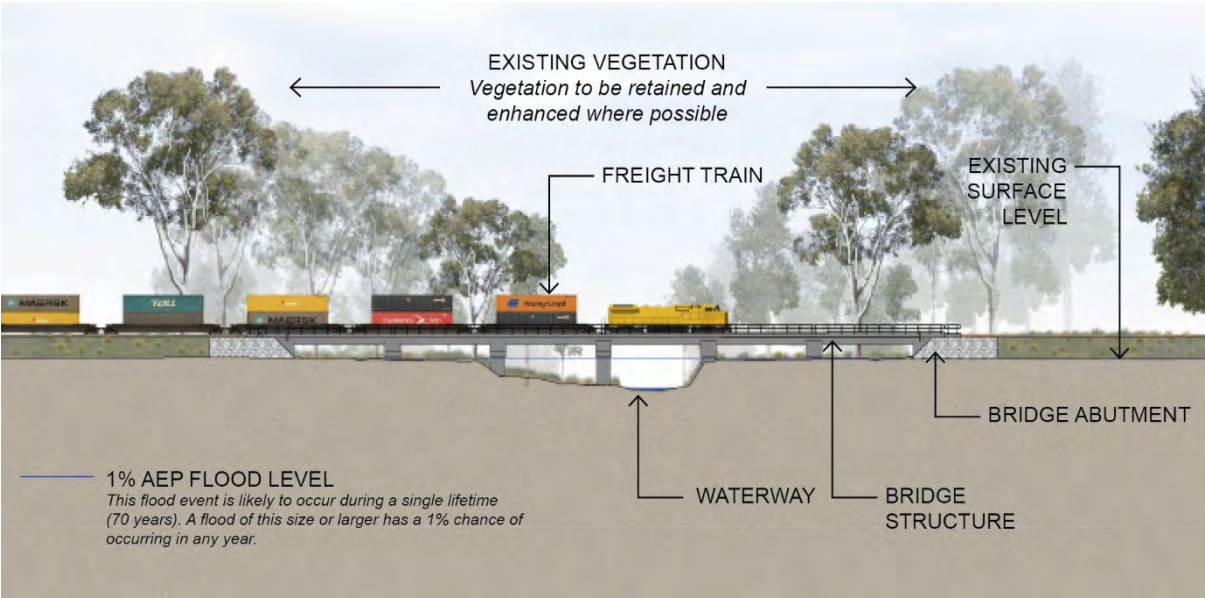


Figure 17: Typical creek crossing

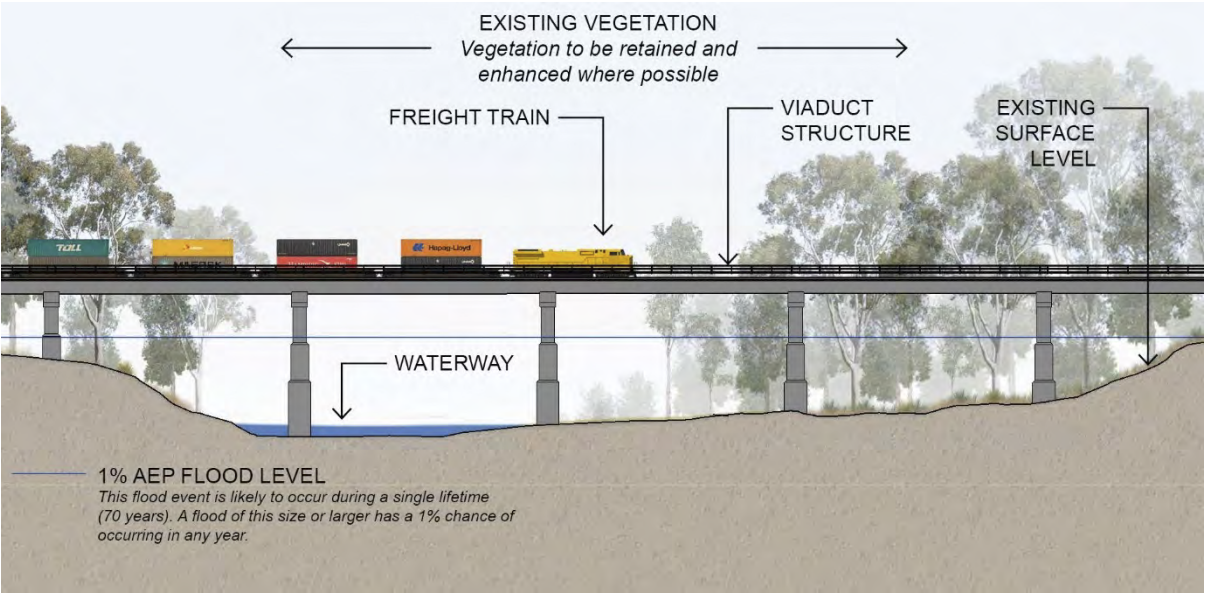


Figure 18: Typical river crossing

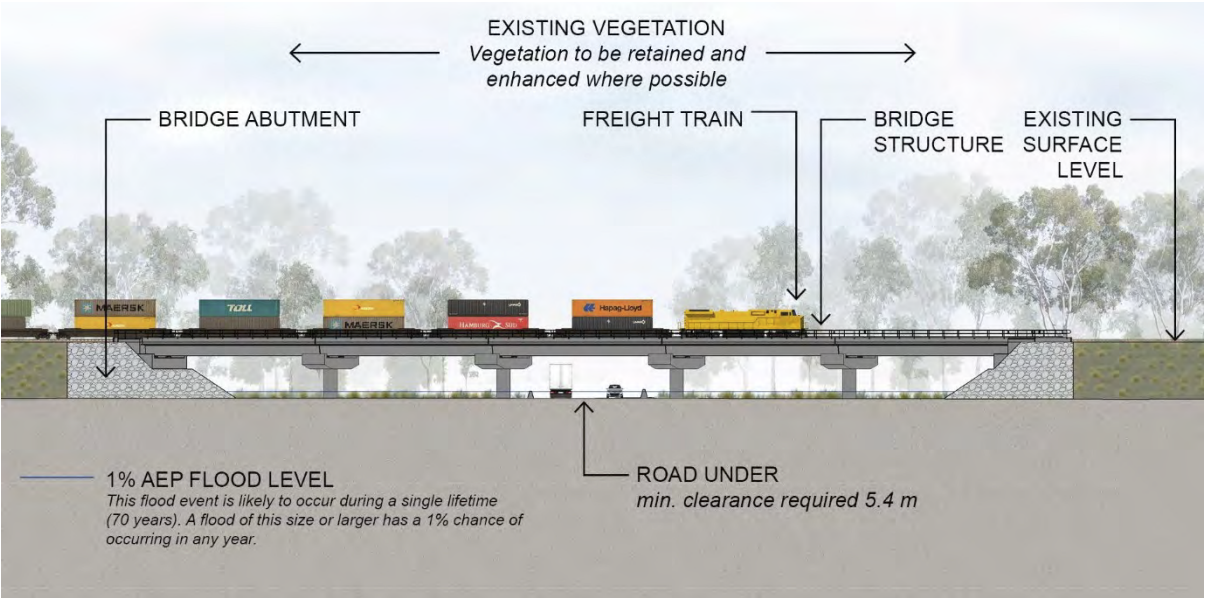


Figure 19: Typical rail-over-road bridge

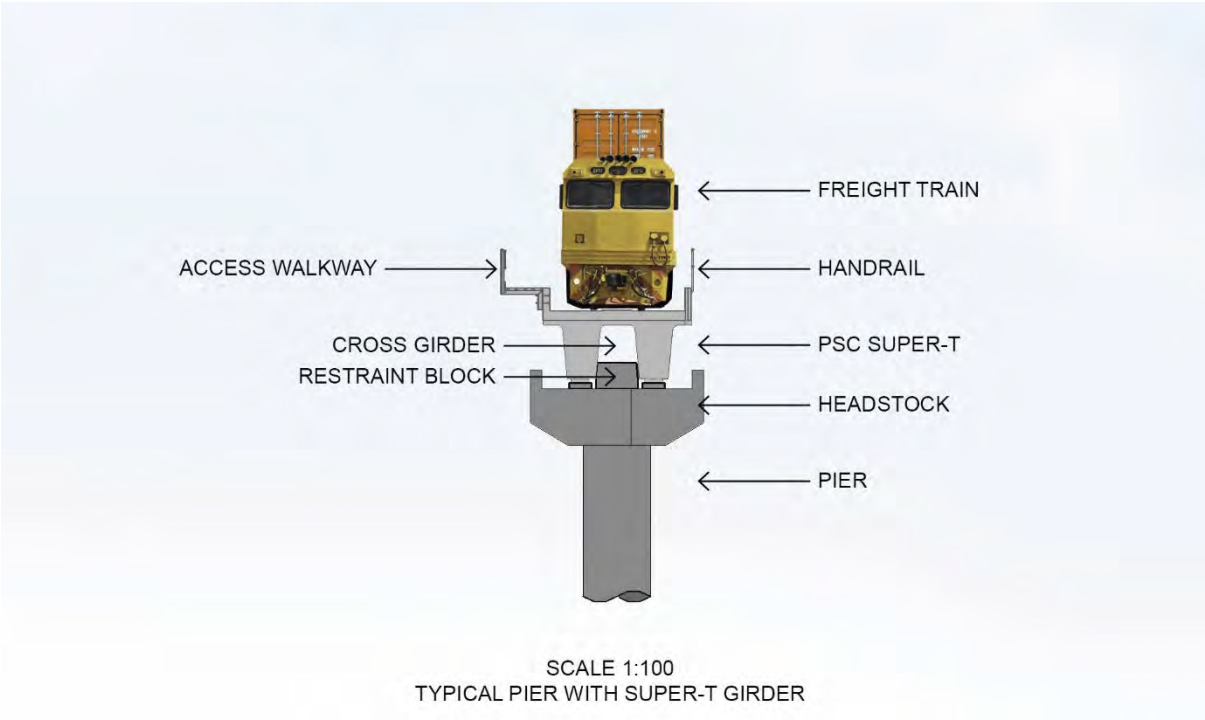


Figure 20: Typical pier with Super-T Girder

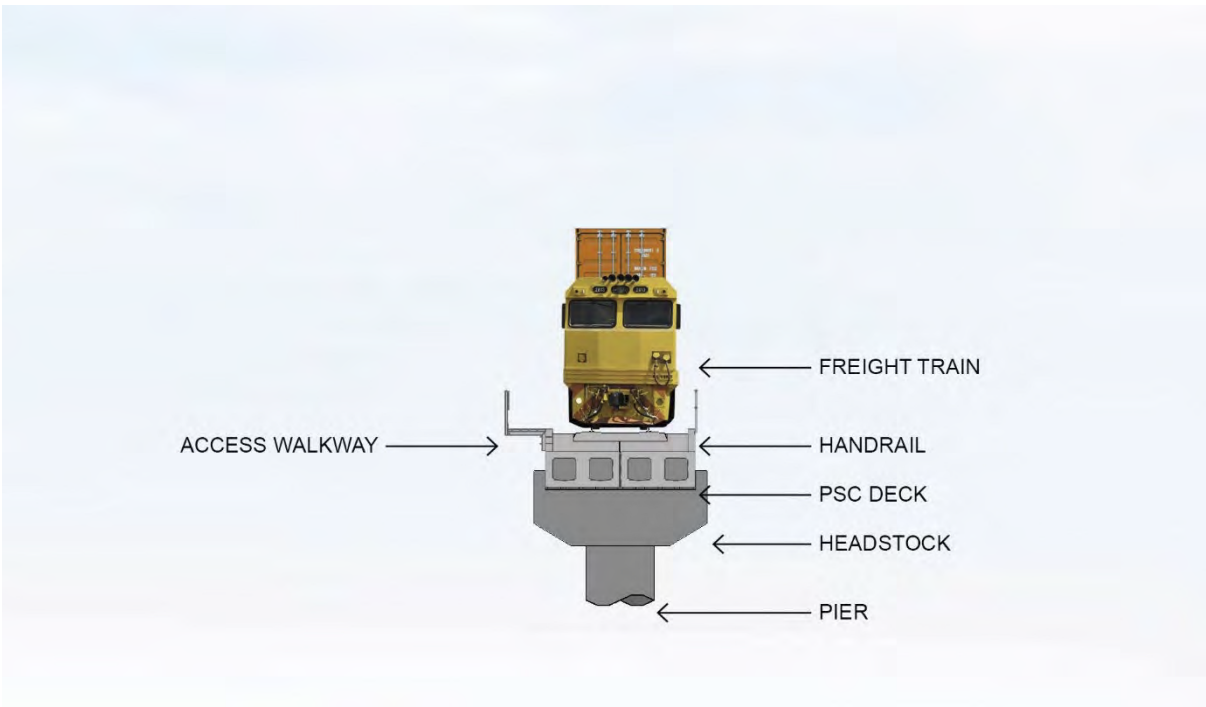


Figure 21: Typical pier with Slab Span

7 Landscape impact assessment

7.1 Landscape character impact assessment

Twelve LCTs have been identified within the impact assessment area. These are identified in Figure 7: Landscape character assessment (refer Appendices). Ten of these LCTs are directly intersected by the Project, as follows:

- LCT A: Vegetated Watercourses - Rivers
- LCT B: Vegetated Watercourses - Creeks and Channels
- LCT C: Irrigated Croplands
- LCT D: Dry Croplands and Pastures
- LCT F: Rural Settlement
- LCT G: Rural Living
- LCT H: Forested Uplands
- LCT I: Settled Hills
- LCT J: Forested Hills and Plains
- LCT K: Salinity Scald.

Two other LCTs are present in the wider impact assessment area but as they are not intersected by the Project any impacts would be indirect and are not assessed in detail:

- LCT E: Vegetated Grazing
- LCT L: Transitional Landscapes.

The LCTs and associated LCAs are described in Table 22 to Table 31. These tables also assess the likely sensitivities for each identified LCT in relation to the Project and provide a preliminary indication of the likely magnitude of change and consequent likely significance of that effect on landscape amenity.

Construction impacts on landscape character are temporary and relate to things like removal of vegetation which persist into the operations stage. Therefore, the assessment presented below is a combined assessment of impacts during both construction and operation, reflecting elements removed or disturbed during construction as well as the introduction of structures that affect the perception and character of the landscape over the longer term.

7.1.1 Landscape Character Type A

Table 22: Landscape impact assessment of LCT A: Vegetated Watercourses – Rivers

Type A: Vegetated Watercourses - Rivers		
Landscape Baseline Assessment		
Location and boundaries	This landscape type is located in both the western and central parts of the impact assessment area, associated with the Dumaresq River, Macintyre River and Condamine River. There are four LCAs of this type in the impact assessment area: • <i>Condamine River (North Branch) Vegetated Watercourse</i> (LCA A1) • <i>Condamine River Vegetated Watercourse</i> (LCA A2) • <i>Macintyre River Vegetated Watercourse</i> (LCA A3) • <i>Dumaresq River Vegetated Watercourse</i> (LCA A4).	
Typical character images:		
		
<i>Macintyre River at old Little Bondi Road Bridge</i>	<i>Dumaresq River at Lees Reserve</i>	<i>Keetah Road Bridge over the Dumaresq River</i>
		
<i>Condamine River near Pampas</i>	<i>Condamine River at Yarramalong Weir Reserve</i>	<i>Condamine River at Yarramalong Weir Reserve</i>
Key characteristics	• The majority of the Macintyre and Condamine River systems exist on a gently undulating landscape. • Both river channels have slight slopes, so water movement is usually quite slow. • Macintyre and Condamine Rivers convey large amounts of water in flood. • Vegetation clearance, construction of weirs and dams, and extraction of water for irrigation have greatly altered the hydrology of these river systems. • Typically, well-vegetated river banks with mature Forest red gums (<i>Eucalyptus tereticornis</i>) and Paperbark (<i>Melaleuca spp.</i>) fringing woodland creating a visually interesting natural character. • This LCT is not the subject of any landscape planning designations but likely to be valued locally for scenic amenity.	
Precedent modifications and infrastructure elements	• Natural landscape with few built infrastructure elements. • Occasional irrigation pump stations located along the river systems. • Public and private water storage for irrigation and town water supply. • Existing rail and road bridge crossings across the river allowing views of the river.	
Landscape character sensitivity assessment	• High degree of perceived naturalness, with localised waterway modifications and crossings (such as bridges) and facilities to support informal recreation (such as small car parks). • Significant areas of fringing vegetation on the river banks and floodplains contain views to and from the waterways, reducing visual sensitivity.	

Type A: Vegetated Watercourses - Rivers	
	- Parts of the Macintyre River near Toomelah (in NSW), as well as Rainbow Reserve and lagoon (in QLD) are listed as cultural heritage sites (Queensland Aboriginal Party). - Parts of this landscape type may be valued for local recreation, including fishing and informal picnicking. - The Condamine River, and other instances of water within the landscape was identified as having very high scenic amenity value in the <i>Toowoomba Regional Scenic Amenity Study</i> (Lat27, 2021a). - The overall sensitivity is considered to be, at greatest, Moderate. This recognises the relatively intact and high quality of the landscape and its value for the local Aboriginal community. However, it is noted that there are no formal landscape designations.
Impact Assessment	
Magnitude of change assessment	- The Project crosses both the Macintyre and Condamine rivers. - The alignment crosses the Macintyre River (LCA A3) near Boggabilla. - The alignment crosses the Condamine River (LCA A1 and LCA A2) through a large alluvial floodplain near Pampas. - New bridge and railway infrastructure will result in highly localised removal of vegetation and the intrusion of built infrastructure within what is currently a relatively un-developed landscape. - The Project will cross the Macintyre River, approximately 2.5 km south of Rainbow Reserve. - The Macintyre River is relatively inaccessible in this location, as the crossing is situated on private land. - This location and the Macintyre River crossing will not be visible from Rainbow Reserve and Kildonan Road due to vegetation. - The Project will cross the Condamine River approximately 4 km southwest of Pampas. - Distant views to this location and the river crossing will be visible from the Gore Highway and Millmerran-Leyburn Road. - The proposed alignment will cross the Condamine River (North Branch), approximately 1.7 km northeast of Pampas. - Close views towards the proposed river crossing will be possible from the Gore Highway, approximately 20 m to the west of the alignment. - The proposed crossing will replace an existing rail bridge in this location. - Due to the transient nature of views from the highway and State-controlled roads, the primary impact of any changes in character would be on private land owners adjacent to the alignment and river crossings. - The overall magnitude of change is predicted to be Moderate. There will be no fundamental change to the character of this LCT, however localised areas will be affected by removal of vegetation and introduction of bridges.
Potential effect	The effect of the Project on LCT A: Vegetated Watercourses - Rivers is Moderate during construction and operation.

7.1.2 Landscape Character Type B

Table 23: Landscape impact assessment of LCT B: Vegetated Watercourses – Creeks and Channels

Type B: Vegetated Watercourses - Creeks and Channels	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is located throughout the impact assessment area, associated with the many small tributaries of the Condamine River (near Pampas) and Macintyre River (along the New South Wales/Queensland border). There are 38 LCAs of this type in the impact assessment area: • <i>Meringandan Creek Vegetated Watercourse (LCA B1)</i> • <i>Gowrie Creek Vegetated Watercourse (LCA B2)</i> • <i>Westbrook Creek Vegetated Watercourse (LCA B3)</i> • <i>Upper Westbrook Creek Vegetated Watercourse (LCA B4)</i> • <i>Dry Creek Vegetated Watercourse (LCA B5)</i> • <i>Spring Creek Vegetated Watercourse (LCA B6)</i> • <i>Upper Westbrook Creek UT Vegetated Watercourse (LCA B7)</i> • <i>Linthorpe Creek Vegetated Watercourse (LCA B8)</i> • <i>Umbriam Creek Vegetated Watercourse (LCA B9)</i> • <i>Umbriam Creek UT1 Vegetated Watercourse (LCA B10)</i> • <i>Hodgson Creek Vegetated Watercourse (LCA B11)</i> • <i>Emu Creek Vegetated Watercourse (LCA B12)</i> • <i>Upper 14 Mile Creek Vegetated Watercourse (LCA B13)</i> • <i>Perrier Gully Vegetated Watercourse (LCA B14)</i> • <i>14 Mile Creek Vegetated Watercourse (LCA B15)</i> • <i>Back Creek Vegetated Watercourse (LCA B16)</i> • <i>Leonard (Back Creek) Vegetated Watercourse (LCA B17)</i> • <i>Grass Tree Creek Vegetated Watercourse (LCA B18)</i> • <i>Pine Creek Vegetated Watercourse (LCA B19)</i> • <i>Pine Creek UT1 Vegetated Watercourse (LCA B20)</i> • <i>Bora Creek Vegetated Watercourse (LCA B21)</i> • <i>Bora Creek UT1 Vegetated Watercourse (LCA B22)</i> • <i>Bora Creek UT2 Vegetated Watercourse (LCA B23)</i> • <i>Bringalily Creek Vegetated Watercourse (LCA B24)</i> • <i>Boola Creek Vegetated Watercourse (LCA B25)</i> • <i>Nicol Creek Vegetated Watercourse (LCA B26)</i> • <i>Mingimarny Creek Vegetated Watercourse (LCA B27)</i> • <i>Canning Creek Vegetated Watercourse (LCA B28)</i> • <i>Cattle Creek Vegetated Watercourse (LCA B29)</i> • <i>Mosquito Creek Vegetated Watercourse (LCA B30)</i> • <i>Bodumba Creek Vegetated Watercourse (LCA B31)</i> • <i>Pariagara Creek Vegetated Watercourse (LCA B32)</i> • <i>Macintyre Brook Vegetated Watercourse (LCA B33)</i> • <i>Catfish Creek Vegetated Watercourse (LCA B34)</i> • <i>Wondalli Creek Vegetated Watercourse (LCA B35)</i> • <i>Kippenbung Creek Vegetated Watercourse (LCA B36)</i> • <i>Brigalow Creek Vegetated Watercourse (LCA B37)</i> • <i>Forest Creek Vegetated Watercourse (LCA B38)</i>

Type B: Vegetated Watercourses - Creeks and Channels			
Typical character images:			
			
<i>Macintyre Brook near Bybera Road</i>	<i>Grasstree Creek near Hall Road</i>	<i>Pariagara Creek within Bringalily State Forest</i>	
			
<i>Watercourse near Yelarbon</i>	<i>Gowrie Creek near Leasons Road</i>	<i>Typical road bridge over watercourse</i>	
Key characteristics	- Includes creeks and low-lying channels that form part of Macintyre & Weir Rivers, Macintyre Brook, Dumaresq River and Condamine River catchments, conveying large amounts of floodwaters away from the main river channels when in flood. - Remnant areas of flood-dependent forest/woodlands and wetlands. - Natural landscape with few built infrastructure elements		
Precedent modifications and infrastructure elements	- Relatively natural landscape with minimal infrastructure, comprising road and existing rail bridges over the main creek channels within the impact assessment area. - Generally fringing vegetation has been retained and creates a buffer between adjacent land uses. - Telecommunication infrastructure including telegraph poles typically follows the road alignment.		
Landscape character sensitivity assessment	- Moderate degree of perceived naturalness, with some instances of evidence of human uses and modifications to the waterways. - Significant areas of fringing vegetation in some locations contain views to and from creek lines, reducing the sensitivity. Vegetation is sparser in low-lying agricultural areas. - Parts of creeks and other instances of water within the landscape that occur throughout the Toowoomba Region were identified as having very high scenic amenity value in the <i>Toowoomba Regional Scenic Amenity Study</i> (Lat27, 2021a). - The overall sensitivity is considered to be Low. This recognises that there are no formal landscape designations associated with this LCT and the landscape does not appear to be used by the local community for recreation. Additionally, parts of the LCT is already affected by the presence of road and rail infrastructure (albeit some of which is disused) so it has capacity to accommodate further change.		

Type B: Vegetated Watercourses - Creeks and Channels	
Impact Assessment	
Magnitude of change assessment	- The Project follows the existing rail alignment between the Kildonan and Whetstone and Yandilla and Yarranlea. - Between Whetstone and Yandilla and Yarranlea to Kingsthorpe the alignment is on greenfield land. - Where it deviates from the existing South Western Line rail corridor, it traverses a variety of landscapes and land uses, including the densely vegetated and undulating landscapes of Whetstone and Bringalily State forests, rural landscapes, intensive agricultural areas and the urban areas fringing existing townships. - There are anticipated to be direct impacts on LCA B2, LCA B5, LCA B7, LCA B8, LCA B17, LCA B18, LCA B8, LCA B17, LCA B25, LCA B26, LCA B28, LCA B29 and LCA B32. These comprise the introduction of new rail infrastructure into the rural and urban setting including around fourteen creek crossings, where the alignment crosses Macintyre Brook, Pariagara Creek, Cattle Creek, Native Dog Creek, Bringalily Creek, Nicol Creek, Back Creek, Grasstree Creek, Westbrook Creek and Dry Creek. - New bridge and railway infrastructure, as well as associated drainage infrastructure (e.g. culverts) will result in localised removal of vegetation. - Typically, these works would introduce new infrastructure into what is a relatively intact rural and natural setting. - Changes to the landscape character associated with creek and floodplain infrastructure will be evident from Yarranbrook Feedlot and Cremascos Road, Millmerran-Inglewood Road, Hall Road, Millmerran-Leyburn Road, the Gore Highway, Toowoomba-Cecil Plains Road and Brimblecombe Road. - The overall magnitude of change is predicted to be Moderate.
Potential effect	The effect of the Project on LCT B: Vegetated Watercourses – Creeks and Channels is Low during construction and operation.

7.1.3 Landscape Character Type C

Table 24: Landscape impact assessment of LCT C: Irrigated Croplands

Type C: Irrigated Croplands	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is located within the alluvial valleys and fertile floodplains of the Macintyre and Weir Rivers, Macintyre Brook and Condamine River catchments. There are 64 LCAs of this type in the impact assessment area: - Oakey North Irrigated Croplands (LCA C1) - Yalungur Irrigated Croplands (LCA C2) - Lilydale West Irrigated Croplands (LCA C3) - Lilydale East Irrigated Croplands (LCA C4) - Meringandan Irrigated Croplands (LCA C5) - Glencoe Irrigated Croplands (LCA C6) - Oakey South Irrigated Croplands (LCA C7) - Kingsthorpe Irrigated Croplands (LCA C8) - Charlton Irrigated Croplands (LCA C9) - Gowrie Junction Irrigated Croplands (LCA C10) - Morris Road Irrigated Croplands (LCA C11) - Birnam Irrigated Croplands (LCA C12) - Westbrook Creek Irrigated Croplands (LCA C13) - Brimblecombe Road Irrigated Croplands (LCA C14) - Wellcamp Airport Irrigated Croplands (LCA C15) - Westbrook Irrigated Croplands (LCA C16) - Wellcamp Airport South Irrigated Croplands (LCA C17) - Athol Irrigated Croplands (LCA C18)

Type C: Irrigated Croplands	
	• <i>Half Mile Gully Irrigated Croplands (LCA C19)</i> • <i>Wellcamp Irrigated Croplands (LCA C20)</i> • <i>Bunkers Hill West Irrigated Croplands (LCA C21)</i> • <i>Bunkers Hill East Irrigated Croplands (LCA C22)</i> • <i>Linthorpe Creek Irrigated Croplands (LCA C23)</i> • <i>Wyreema Irrigated Croplands (LCA C24)</i> • <i>Jimna Springs Irrigated Croplands (LCA C25)</i> • <i>Hodgson Creek Irrigated Croplands (LCA C26)</i> • <i>Emu Creek Irrigated Croplands (LCA C27)</i> • <i>Umbriam Creek Irrigated Croplands (LCA C28)</i> • <i>Perrier Gully Irrigated Croplands (LCA C29)</i> • <i>Mount Taylor Irrigated Croplands (LCA C30)</i> • <i>14 Mile Creek Irrigated Croplands (LCA C31)</i> • <i>Brookstead Irrigated Croplands (LCA C32)</i> • <i>Pampas Irrigated Croplands (LCA C33)</i> • <i>Lemon Tree Irrigated Croplands (LCA C34)</i> • <i>Grass Tree Creek Irrigated Croplands (LCA C35)</i> • <i>Back Creek Irrigated Croplands (LCA C36)</i> • <i>Bringalily Creek North Irrigated Croplands (LCA C37)</i> • <i>Bringalily Creek South Irrigated Croplands (LCA C38)</i> • <i>Bybera Road North Irrigated Croplands (LCA C39)</i> • <i>Inglewood Airport Irrigated Croplands (LCA C40)</i> • <i>Coolmunda Irrigated Croplands (LCA C41)</i> • <i>Bybera Road South Irrigated Croplands (LCA C42)</i> • <i>Inglewood Irrigated Croplands (LCA C43)</i> • <i>Tobacco Road Irrigated Croplands (LCA C44)</i> • <i>Yarranbrook West Irrigated Croplands (LCA C45)</i> • <i>Yarranbrook East Irrigated Croplands (LCA C46)</i> • <i>Whetstone Irrigated Croplands (LCA C47)</i> • <i>Wondalli Creek North Irrigated Croplands (LCA C48)</i> • <i>Macintyre Brook North Irrigated Croplands (LCA C49)</i> • <i>Macintyre Brook South Irrigated Croplands (LCA C50)</i> • <i>Wondalli Creek South Irrigated Croplands (LCA C51)</i> • <i>Brigalow Creek Irrigated Croplands (LCA C52)</i> • <i>Kurumbul Irrigated Croplands (LCA C53)</i> • <i>Bengalla Reserve Irrigated Croplands (LCA C54)</i> • <i>Kippenbung Creek Irrigated Croplands (LCA C55)</i> • <i>Dumaresq River Irrigated Croplands (LCA C56)</i> • <i>Gibinbell Irrigated Croplands (LCA C57)</i> • <i>Woodleigh Irrigated Croplands (LCA C58)</i> • <i>Glenhurst Irrigated Croplands (LCA C59)</i> • <i>Texas-Yelarbon Road Irrigated Croplands (LCA C60)</i> • <i>Boggabilla Irrigated Croplands (LCA C61)</i> • <i>Melon Ridge Irrigated Croplands (LCA C62)</i> • <i>Humptybung West Irrigated Croplands (LCA C63)</i> • <i>Humptybung East Irrigated Croplands (LCA C64)</i>

Type C: Irrigated Croplands			
Typical character images:			
			
<i>Irrigation infrastructure near Gowrie</i>	<i>Irrigated croplands near Gowrie</i>	<i>Irrigation infrastructure near Inglewood</i>	
			
<i>Highly fertile vertosol soils and dam infrastructure near Pampas</i>	<i>Cereal crops with vegetation associated with the Condamine River in the background, near Pampas</i>	<i>Existing rural infrastructure near Yandilla</i>	
Key characteristics	- Extensively developed agricultural areas. - Irrigation channels occur in flatter areas. - Typically located in areas with highly fertile vertosol soils. - The vertosols, are typically cracking clay soils with high nutrients capable of supporting agriculture. - Extensive large and relatively flat open fields of irrigated cropland. - Landscape substantially cleared of vegetation, except at the periphery, along waterways (LCT A and LCT B) on the skyline and local roads. - In addition to irrigated production, current land use activities include grazing and dryland farming with localised recreation.		
Precedent modifications and infrastructure elements	- Modifications have been made to the floodplain to improve land used for grazing, dryland cropping and irrigated cropping to enhance agricultural productivity. - Channels are present across the landscape which have been constructed to manage and store irrigation and domestic water. These channels are particularly evident near Kurumbul, the Condamine River floodplain and low-lying areas surrounding Gowrie Creek. - Leslie Dam (near Warwick, outside of the impact assessment area) is the main water storage for the Upper Condamine Water Supply Scheme, providing water to irrigators along the North Branch of the Condamine River. Other bulk water assets within the impact assessment area include Yarramalong Weir and Lemon Tree Weir. - Coolmunda Dam is situated on Macintyre Brook, approximately 13.4 km east of Inglewood and is the main storage facility for the Macintyre Brook Water Supply Scheme, providing recreational opportunities and supplying water for irrigation, potable water supply and industrial use. Other bulk water assets include Whetstone Weir, Ben Dor Weir and Greenup Weir. - Farm infrastructure is also present throughout the landscape.		
Landscape Character Sensitivity Assessment	- The Irrigated Croplands landscape type is predominantly visually open, with a sparsely settled rural character and no large-scale infrastructure elements. It has long distant views and strong skylines. - Vegetation within low-lying areas is extensively cleared and very sparse, with denser vegetation along waterways.		

Type C: Irrigated Croplands	
	Due to the extensively modified character of the landscape and local value of the landscape in terms of landscape amenity the overall inherent sensitivity is considered to be Low.
Impact Assessment	
Magnitude of change assessment	- The primary impact will be on private land where new rail infrastructure is being introduced. Typically, the alignment follows the existing rail corridor when passing through this landscape character type, apart from land surrounding Westbrook Creek, where there is no existing rail infrastructure. - Other impacts are associated with locations where non-resident workforce accommodation facilities, the Turallin facility or laydown areas are proposed, noting that these impacts are temporal and associated with the construction of the Project. - There would be direct impacts on LCA C8: Kingsthorpe, LCA C14: Brimblecombe Road, LCA C18: Athol, LCA C32 Brookstead, LCA C33: Pampas, LCA C35: Grass Tree Creek, LCA C37: Bringalily Creek North, LCA C38: Bringalily Creek South, LCA C48: Wondalli Creek North, LCA C51: Wondalli Creek South Irrigated Croplands and LCA C53: Kurumbul. - The impact on private land and irrigated cropping areas will be most evident between Pittsworth and Gowrie Junction (LCA C8, LCA C14 and LCA C18), where the alignment deviates from the existing railway corridor and within LCA C51 where a potential location for a non-resident workforce accommodation facility has been identified on the outskirts of Yelarbon. - New earthwork infrastructure within this landscape will generally be consistent with the current landscape character, however the Project will also introduce large embankments (up to 24.5 m), viaduct and bridge structures and temporary infrastructure associated with the construction of the Project such as site offices, accommodation buildings and other ancillary infrastructure associated with laydown areas and the proposed non-resident workforce accommodation facility into the landscape. - The overall magnitude of change is predicted to be Low.
Potential effect	The effect of the Project on LCT C: Irrigated Croplands is Negligible during construction and operation.

7.1.4 Landscape Character Type D

Table 25: Landscape impact assessment of LCT D: Dry Croplands and Pastures

Type D: Dry Croplands and Pastures	
Landscape Baseline Assessment	
Location and boundaries	This landscape extends across a considerable part of the impact assessment area and is largely defined by extensively cleared, often undulating, open rural lots utilised for agriculture and livestock production. In the western extent of the impact assessment area, the landscape is typically flatter and prone to flooding. There are 44 LCAs of this type in the impact assessment area: <i>Oakey Dry Croplands and Pastures (LCA D1)</i> <i>Kings Siding Dry Croplands and Pastures (LCA D2)</i> <i>Gowrie Little Plain Dry Croplands and Pastures (LCA D3)</i> <i>Glencoe Dry Croplands and Pastures (LCA D4)</i> <i>Mount Kingsthorpe Dry Croplands and Pastures (LCA D5)</i> <i>Gowrie Junction Dry Croplands and Pastures (LCA D6)</i> <i>Gowrie Mountain Dry Croplands and Pastures (LCA D7)</i> <i>Charlton Dry Croplands and Pastures (LCA D8)</i> <i>Biddeston Dry Croplands and Pastures (LCA D9)</i> <i>Wellcamp Dry Croplands and Pastures (LCA D10)</i> <i>Westbrook Dry Croplands and Pastures (LCA D11)</i>

Type D: Dry Croplands and Pastures			
	• Wyreema Dry Croplands and Pastures (LCA D12) • Longhurst Road Dry Croplands and Pastures (LCA D13) • Millmerran Dry Croplands and Pastures (LCA D14) • Bringalily West Dry Croplands and Pastures (LCA D15) • Kooroongarra Dry Croplands and Pastures (LCA D16) • Bringalily East Dry Croplands and Pastures (LCA D17) • Canning Creek Northern Dry Croplands and Pastures (LCA D18) • Mosquito Creek North Dry Croplands and Pastures (LCA D19) • Bodumba Creek Dry Croplands and Pastures (LCA D20) • Devine Dry Croplands and Pastures (LCA D21) • Mosquito Creek South Dry Croplands and Pastures (LCA D22) • Canning Creek West Dry Croplands and Pastures (LCA D23) • Canning Creek East Dry Croplands and Pastures (LCA D24) • Bybera Road Dry Croplands and Pastures (LCA D25) • Yelarbon Dry Croplands and Pastures (LCA D26) • Yarranbrook Dry Croplands and Pastures (LCA D27) • Whetstone East Dry Croplands and Pastures (LCA D28) • Catfish Creek Dry Croplands and Pastures (LCA D29) • Macintyre Brook Dry Croplands and Pastures (LCA D30) • Whetstone West Dry Croplands and Pastures (LCA D31) • Wondalli Creek North Dry Croplands and Pastures (LCA D32) • Wondalli Creek South Dry Croplands and Pastures (LCA D33) • Yelarbon Dry Croplands and Pastures (LCA D34) • Kurumbul Dry Croplands and Pastures (LCA D35) • Kippenbung Creek Dry Croplands and Pastures (LCA D36) • Dumaresq River North Dry Croplands and Pastures (LCA D37) • Yelarbon Salt Pan Dry Croplands and Pastures (LCA D38) • Glenhurst Dry Croplands and Pastures (LCA D39) • Goondiwindi Dry Croplands and Pastures (LCA D40) • Macintyre River Dry Croplands and Pastures (LCA D41) • Boggabilla Dry Croplands and Pastures (LCA D42) • Toomelah Dry Croplands and Pastures (LCA D43) • Dumaresq River South Dry Croplands and Pastures (LCA D44)		
Typical character images:			
			
Grazing land near Bringalily	Grazing land near Yelarbon	Grazing land near Kurumbul	
			
Grazing land near Millmerran	Grazing land near Millmerran	Grazing land near Millmerran	

Type D: Dry Croplands and Pastures	
Key characteristics	- The landscape is typically found on the undulating, poorer foothills of the impact assessment area surrounding the low-lying alluvial floodplains (LCT C – Irrigated Croplands). - Soils typically comprise sodosols, dermosols and vertosols supporting a range of rural land uses. - Land use is predominately farmland, characterised by dryland cropping and pastoral lots for livestock production (including some occurrences of intensive animal industry piggeries, feedlots and poultry operations), with isolated instances of irrigated agriculture in parts, particularly near Bringalily and Millmerran. - The sodosols have a gravelly, sandy character, often exposed in areas and vulnerable to tunnel and gully erosion and are principally used for livestock. - Dermosols are associated with previous volcanic activity and are found in higher rainfall coastal regions. These soils are used for intensive crop production. - The vertosols, are typically cracking clay soils with high nutrients capable of supporting agriculture. - Vegetation comprises native roadside shelter belts and sporadic riparian vegetation associated with creek lines, as well as views to isolated vegetated hills and peaks associated with LCT H – Forested Uplands and LCT J – Forested Hills and Plains. - Transport corridors are typically straight in character reflecting the flat topography, with subtle curves associated with topographic variation that connect the key settlements and rural lots. State-controlled roads are sealed but other roads are typically unsealed gravel. - Open and exposed character with long distant views and strong skylines, except where views are contained by roadside or creek-side vegetation. - Sparsely settled landscape, with scattered homesteads and cottages, and small rural ‘villages’ such as Kurumbul and Athol. Farmsteads are typically located on gently elevated areas in the eastern extent of the impact assessment area (west of Bringalily State Forest). - Harmonious but fairly typical rural character, which is valued at a local level by local communities and visitors.
Precedent modifications and infrastructure elements	- Highly modified for agricultural practices, including clearing and levelling of land for cultivation of arable farmland and pastures for grazing. - Construction of roads, railways and bridges. - Telecommunication infrastructure including telegraph poles.
Landscape character sensitivity assessment	- The Dry Croplands and Pastures LCT is predominantly visually open, with a sparsely settled rural character and little large-scale infrastructure. It has long distant views and strong skylines. - Roadside shelter belts and sporadic riparian vegetation associated with creek lines and flood channels provide some screening. - Very small isolated areas within this LCT associated with the isolated mesas and hills of Mt Kingsthorpe and Gowrie Mountain are considered to have high scenic amenity values and are acknowledged in the <i>Toowoomba Regional Council Scenic Amenity Study</i> (Conics, 2009). - Additional elevated and forested parts of the LCT associated with the isolated mesas and hills are also identified as having high scenic amenity value within the <i>Toowoomba Regional Scenic Amenity Study</i> (Lat27, 2021a). - Overall, due to the simple character of the landscape and local value of the landscape, which is not protected in any planning scheme, the overall inherent sensitivity is considered to be Low.
Impact Assessment	
Magnitude of change assessment	- The primary impact will be on private land where new rail infrastructure is being introduced. - Parts of the following LCAs would be directly affected LCA D7: Gowrie Mountain, D9: Biddeston, D14: Millmerran, D15: Bringalily West, D23: Canning Creek West, D25: Bybera Road, D27: Yarranbrook, D28: Whetstone, D34: Yelarbon and D41: Macintyre River.

Type D: Dry Croplands and Pastures	
	- Impacts on private land, including agricultural and pastoral areas will be evident in the vicinity of Gowrie Mountain, Biddeston, Millmerran, Bringallily, Bybera Road, Caning Creek, Yarranbrook, Whetstone and Kurumbul (near the Macintyre River) (LCA D7, D9, D14, D15, D23, D25, D27, D28 and D41), where the Project deviates from the existing railway corridor. - Other impacts are associated with locations where non-resident workforce accommodation facilities (LCA D23 and D34), the Turallin facility (LCA D14) or laydown areas are proposed, noting that these impacts are temporal and associated with the construction of the Project. - The Project will be introducing new infrastructure into what is a relatively intact rural environment. - Impacts within this LCT will be due to localised vegetation removal, major earthworks (e.g. cuts and embankments), proposed road and creek bridges and temporary infrastructure associated with the construction of the Project such as site offices, accommodation buildings and other ancillary infrastructure associated with the Turallin facility, laydown areas and the proposed non-resident workforce accommodation facilities into the landscape. - Overall, therefore, the impact on this LCT is High.
Potential effect	The effect of the Project on LCT D: Dry Croplands and Pastures is Moderate during construction and operation.

7.1.5 Landscape Character Type E

LCT E: Vegetated Grazing falls within the impact assessment area but is not affected by the Project (the Project does not traverse any areas of this LCT) so is not assessed. There are outlying patches of this type throughout the area, particularly in the north near Toowoomba.

7.1.6 Landscape Character Type F

Table 26: Landscape impact assessment of LCT F: Rural Settlement

Type F: Rural Settlement	
Landscape Baseline Assessment	
Location and boundaries	Seventeen rural settlements are located within the impact assessment area. They include the city of Toowoomba, the towns of Kingsthorpe, Meringandan, Gowrie Junction, Highfields, Westbrook, Southbrook, Pittsworth, Brookstead, Millmerran, Inglewood, Yelarbon, the Indigenous settlement Boggabilla, and the small rural settlement of Pampas. Accordingly, there are 17 LCAs of this type in the impact assessment area: <i>Kingsthorpe (LCA F1)</i> <i>Meringandan West (LCA F2)</i> <i>Meringandan (LCA F3)</i> <i>Meringandan South (LCA F4)</i> <i>Gowrie Junction (LCA F5)</i> <i>Highfields (LCA F6)</i> <i>Toowoomba (LCA F7)</i> <i>Westbrook (LCA F8)</i> <i>Southbrook (LCA F9)</i> <i>Pittsworth (LCA F10)</i> <i>Brookstead (LCA F11)</i> <i>Pampas (LCA F12)</i> <i>Millmerran (LCA F13)</i> <i>Inglewood (LCA F14)</i> <i>Yelarbon (LCA F15)</i>

Type F: Rural Settlement		
	• <i>Boggabilla (LCA F16)</i> • <i>Toomelah Indigenous Settlement (LCA F17)</i>	
Typical character images:		
		
<i>Millmerran</i>	<i>Yelarbon</i>	<i>Yelarbon</i>
		
<i>Pittsworth</i>	<i>Yelarbon</i>	<i>Yelarbon</i>
Key characteristics	• Comprises the settled area including small rural towns, villages and communities as well as the regional city of Toowoomba. • Within rural towns buildings are typically single storey and of varying age and condition, while Toowoomba's urban centre is denser, it still has a low-scale built form and several heritage-listed buildings. • Toowoomba and the larger settlements of Kingsthorpe, Meringandan, Gowrie Junction, Highfields, Westbrook, Southbrook, Pittsworth, Brookstead, Millmerran, Inglewood, Boggabilla and Toomelah have social infrastructure including parks, public schools and sport facilities. • The alignment follows the existing South Western Line rail corridor between Kildonan and Whetstone, before deviating away from the existing corridor to the north and following the approximate alignment of Millmerran-Inglewood Road, passing to the south of Millmerran and re-joining the existing rail corridor and the Millmerran Branch Line. The alignment then follows the existing rail corridor before deviating again to pass to the north of Pittsworth and Southbrook before heading north and tying into the West Moreton railway system near Gowrie Junction. • <i>Kingsthorpe (LCA F1)</i> is a town situated approximately 20 km northwest of Toowoomba. A short distance from the town centre is Mount Kingsthorpe, the summit of which at 610 m AHD provides elevated panoramic views of the town and surrounding landscape. It is located around 1 km from the alignment. • <i>Meringandan West (LCA F2)</i> is a locality situated to the west of Meringandan township around 10 km from the alignment. • <i>Meringandan (LCA F3)</i> is a small country town located near Highfields, approximately 19 km north-northwest of Toowoomba and 10 km from the alignment. • <i>Meringandan South (LCA F4)</i> is a locality situated to the south of Meringandan township, around 8 km from the alignment. • <i>Gowrie Junction (LCA F5)</i> is a town and locality situated approximately 10 km northwest of Toowoomba around 1.5 km from the alignment. • <i>Highfields (LCA F6)</i> is a town and locality situated approximately 13 km to the north of Toowoomba and over 7 km from the alignment that serves as a satellite suburb of the city of Toowoomba.	

Type F: Rural Settlement	
	• <i>Toowoomba</i> (LCA F7) is the largest settlement in the impact assessment area and is a regional city servicing the Darling Downs region situated on an escarpment on the western side of the Great Dividing Range, approximately 700 m above sea level and 130 km west of Brisbane. The closest suburb (Cotswold Hills) is over 7 km from the alignment. • <i>Westbrook</i> (LCA F8) is a town and locality situated approximately 10.6 km southwest of Toowoomba and nearly 10 km from the alignment. • <i>Southbrook</i> (LCA F9) is a town approximately 8.5 km northwest of Pittsworth and 1 km from the alignment (with outlying rural lots at even closer distances). The Gore Highway passes through the north of the town. • <i>Pittsworth</i> (LCA F10) is a town and locality approximately 41 km southwest of Toowoomba, and a service centre for the surrounding agricultural areas. It is situated on the undulating uplands of the Darling Downs. The alignment passes along the northern edge of the town. • <i>Brookstead</i> (LCA F11) is a town and locality situated on the Gore Highway, approximately 18.7 km southwest of Pittsworth. The alignment passes along the southern edge of the town. • <i>Pampas</i> (LCA F12) is a small rural settlement situated on the Gore Highway approximately 5.3 km southwest of Brookstead. The alignment passes through the town. • <i>Millmerran</i> (LCA F13) is a town situated on the Gore Highway, approximately 75.6 km southwest of Toowoomba and around 2 km at its closest point to the alignment. • <i>Inglewood</i> (LCA F14) is the second largest town in the Goondiwindi region, situated midway between Warwick and Goondiwindi on the Cunningham Highway. It is around 2.5 km from the alignment. • <i>Yelarbon</i> (LCA F15) is a small town situated on the Cunningham Highway, between Goondiwindi and Inglewood, located immediately south of the alignment. • <i>Boggabilla</i> (LCA F16) is a small town in New South Wales located southeast of Goondiwindi and around 9 km west of the alignment. • <i>Toomelah Indigenous Settlement</i> (LCA F17) is situated near the confluence of the Macintyre and Dumaresq Rivers around 2 km from the alignment.
Precedent modifications and infrastructure elements	• Highly modified for urban land uses, including clearing of vegetation and levelling of land for construction. • Presence of roads, railways and bridges. • Telecommunication infrastructure including telegraph poles.
Landscape character sensitivity assessment	• The Rural Settlements landscape type has a settled rural character. Smaller rural communities such as Pampas are very sparsely settled. • Buildings, street trees and vegetation are of local value. • The sensitivity of these settlements is considered to be Moderate. While not valued on account of visual amenity values within planning schemes, these settlements have a distinctive character with some elements of interest (such as heritage buildings and silos) and are also likely to be valued by the people that reside in or visit them.
Impact Assessment	
Magnitude of change assessment	• The Project passes directly through or along the edges of the following towns so therefore only directly affects the character of these areas: Brookstead (LCA F11), Pampas (LCA F12), and Yelarbon (LCA F15). In these settlements the alignment is situated along or close to existing railway infrastructure. • The Project also influences the setting of Pittsworth (LCA F10) and Southbrook (LCA F9) through introducing large scale infrastructure (embankments and bridges into the rural setting of the town). • While Boggabilla and Toomelah are within the impact assessment area, the North Star to NSW/QLD Border section of the Inland Rail is closer and would have a potentially greater influence than this Project so are not considered further here.

Type F: Rural Settlement	
	- Similarly, Gowrie Junction, Highfields and Toowoomba are impacted to a greater extent by the Gowrie to Helidon section of the Inland Rail so are not considered further here. - Meringandan West, Meringandan and Meringandan South (LCA F2, F3 and F4) are situated approximately 8 to 10 km northeast of the alignment and are not anticipated to be affected. - Inglewood is approximately 3.4 km south of the proposed alignment, while Millmerran is approximately 3 km northwest. It is considered unlikely that the setting of these towns would be affected due to the presence of riparian vegetation along Macintyre Brook and Leonard (Back Creek) Creek which limits inter-visibility. - Residents of Southbrook will not be impacted, due to screening topography and vegetation. - Other towns of this LCT will not experience direct impacts although indirect impacts on character may arise on towns close to the alignment due to the possibility of views towards the alignment. For example, elevated areas of Kingsthorpe (LCA F1). - It is noted that the impact of the Project on views from relevant settlements is discussed separately in Section 8. - Overall, the impact on this LCT is considered to be up to High. There would be limited loss of features of value, although in places, such as Kingsthorpe, Pampas, Southbrook and Yelarbon the introduction of large embankments and bridge structures are distinct new elements that will change the perception of rural settlement character.
Potential effect	The effect of the Project on LCT F: Rural Settlement is High during construction and operation.

7.1.7 Landscape Character Type G

Table 27: Landscape impact assessment of LCT G: Rural Living

Type G: Rural Living	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is typically located in elevated parts of the impact assessment area, near major transport infrastructure with access to towns and services, and is characterised by large lot rural residential development, and is typically somewhat vegetated. There are 17 LCAs of this type in the impact assessment area: - Oakey (LCA G1) - Westview Rural Living (LCA G2) - Meringandan West Rural Living (LCA G3) - Glencoe Rural Living (LCA G4) - Redlands Drive Rural Living (LCA G5) - Hilltop Drive Rural Living (LCA G6) - Gowrie Junction Rural Living (LCA G7) - Highfield Ridge Rural Living (LCA G8) - Blue Mountain Heights Rural Living (LCA G9) - Gowrie Mountain Rural Living (LCA G10) - Torrington Rural Living (LCA G11) - Cranley Rural Living (LCA G12) - Westbrook Rural Living (LCA G13) - Wyreema Rural Living (LCA G14) - Southbrook North Rural Living (LCA G15) - Southbrook South Rural Living (LCA G16) - Millmerran Rural Living (LCA G17)

Type G: Rural Living		
Typical character images:		
		
Gowrie Mountain	Kingsthorpe	Gowrie Mountain
Key characteristics	- Private residential dwellings on large lots, typically on elevated and undulating topography, with low-scale built form and limited local services. - Typically, single storey buildings of varying age and condition. - Some rural residential areas are densely vegetated, while others are quite open. - Mixture of native and garden vegetation/street trees. - Generally, an enclosed landscape, with the exception of elevated lots vegetation has been cleared (consequently views towards the alignment can be achieved, particularly evident near Kingsthorpe and Gowrie Junction as discussed in Section 8. - Highly visible landscape type throughout the impact assessment area.	
Precedent modifications and infrastructure elements	- Highly modified for urban land uses, including clearing of vegetation and levelling of land for construction. - Presence of roads, railways and bridges. - Telecommunication infrastructure including telegraph poles.	
Landscape character sensitivity assessment	- The Rural Living landscape type is predominantly visually closed, with a sparsely settled rural character. - Typically, services are limited and in keeping with the rural setting. - Street trees and vegetation provide some screening effect. - The sensitivity of these rural residential areas is considered to be Moderate. These areas have a distinctive character but is valued at the local level, principally by residents.	
Impact Assessment		
Magnitude of change Assessment	- There are no direct impacts on the Rural Living landscape type. However, due to proximity the Project is considered likely to have an effect on the setting on LCA G10: Gowrie Mountain and LCA G15: Southbrook North. - Impacts within this LCT relate to localised vegetation removal, major earthworks (e.g. cuts and embankments) and proposed road and creek bridges, close to the settled landscape. - It is considered that the impact on the Project will be most evident for Gowrie Mountain (LCA G10), which will be affected by the proposed embankment located to the north and west of the settled area (at its closes point around 600 m away) and which includes a new Warrego Highway Rail Bridge which collectively will decrease the inherently rural setting of the area and sense of tranquillity. - The rural residential areas to the north of Southbrook (LCA G15) will also be affected by the proximity of the proposed alignment and embankments but the LCT is only anticipated to be affected along the northern periphery of the area. - The rural residential areas of LCA G1, G2, G3, G4, G13, G14, G16 and G17 are at a significant distance from the alignment so there would be no meaningful direct or indirect impacts on landscape character: Oakey (10 km), Westview (10 km), Meringandan West (10 km), Glencoe (5 km), Westbrook (6 km), and Wyreema (10 km). - Due to the distance of residents of Redlands Drive, Gowrie Junction, Highfield Ridge, Blue Mountain Heights, Torrington and Cranley, (LCA G6, G7, G8, G9, G11 and G12) from the Project, the impact of the Project on these rural residential areas are not considered in this assessment as they lie closer to the Gowrie to Helidon project.	

Type G: Rural Living	
	- Rural residential lots of Millmerran will not be impacted, due to their distance from the alignment and screening riparian vegetation along Leonard (Back Creek) Creek. - It is noted that the impact of the Project on views from relevant settlements is discussed separately in Section 8. - While the Project does not result in any direct impacts on this LCT, the magnitude of change resulting from indirect impacts of the Project on this LCT is considered be Moderate.
Potential effect	The effect of the Project on LCT G: Rural Living is Moderate during construction and operation.

7.1.8 Landscape Character Type H

Table 28: Landscape impact assessment of LCT H: Forested Uplands

Type H: Forested Uplands	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is typically associated with elevated, undulating areas within the impact assessment area, including parts of the Great Dividing Range, West Ridge and South Ridge. There are 20 LCAs of this type in the impact assessment area: - Sugar Loaf Mountain Forested Uplands (LCA H1) - McGregor Mountain Forested Uplands (LCA H2) - Storey Mountain Forested Uplands (LCA H3) - Meringandan West Forested Uplands (LCA H4) - Mount Kingsthorpe Forested Uplands (LCA H5) - Gowrie Mountain Forested Uplands (LCA H6) - Wellcamp Forested Uplands (LCA H7) - Glenvale Mountain Forested Uplands (LCA H8) - Bunkers Hill Forested Uplands (LCA H9) - Umbriam Forested Uplands (LCA H10) - Hodgson Creek Forested Uplands (LCA H11) - Umbriam Creek Forested Uplands (LCA H12) - Scrubby Mountain Forested Uplands (LCA H13) - Captains Mountain Forested Uplands (LCA H14) - Commodore Peak Forested Uplands (LCA H15) - Commodore Peak South Forested Uplands (LCA H16) - Pine Hill Forested Uplands (LCA H17) - Kooroongarra North Forested Uplands (LCA H18) - Kooroongarra Forested Uplands (LCA H19) - Kooroongarra South Forested Uplands (LCA H20)
Typical character images:	
   Looking towards Mount Kingsthorpe Forested hill near Gowrie View along Mount Kingsthorpe trail	

Type H: Forested Uplands	
   <i>Forested ridgeline within rural setting</i> <i>State forest signage</i> <i>View across forested and rural landscape</i>	
Key characteristics	- Elevated and undulating topography, typically above 100 m AHD. - Areas of very steep slopes. - Distinctive landform including mountain peaks and prominent ridgelines, such as those of the Great Dividing Range. - Incised dry creek valleys where waterways drain the elevated area. - Typically, eucalyptus woodland or forest but microclimatic variation includes areas of other vegetation including fragment rainforest. - Generally, an enclosed landscape with limited public access and limited views. - Highly visible landscape type throughout the impact assessment area. - Most elevated areas of this type, including peaks of the Great Dividing Range, are considered to have high scenic amenity and are included on the South East Queensland Regional Significant Scenic Amenity overlay (as shown on Figure 3: Regional scenic amenity and planning designations).
Precedent modifications and infrastructure elements	- Due to the undulating steep terrain, much of the vegetation is remnant due to the inaccessibility to clear the areas. - Natural landscape with very limited settlement and little large-scale infrastructure elements. - Mount Kingsthorpe scenic lookout is located within this character type. - The existing West Moreton System rail line transects the Great Dividing Range at the most northeastern extent of the impact assessment area. - Some telecommunications towers and powerlines in elevated locations. - Some instances of mining and quarrying, typically, these operations are screened by dense native vegetation.
Landscape character sensitivity assessment	- This landscape character type has little capacity to accommodate development as this would require vegetation clearance which would be visually intrusive in this elevated and undulating landscape. - Key areas of this landscape are also protected for their scenic qualities and are of State significance (e.g. peaks of the Great Dividing Range) or are identified in the Toowoomba Regional Council Scenic Amenity Study (Conics, 2019) and Toowoomba Regional Scenic Amenity Study (Lat27, 2021a) as having high value (including the area around Storey Mountain, Mount Kingsthorpe, Gowrie Mountain, Captains Mountain and Commodore Peak). - Therefore, the landscape sensitivity of this landscape type is considered to be up to High.
Impact Assessment	
Magnitude of change Assessment	- The alignment does not directly transect any of the landscape character areas, however LCA H5: Mount Kingsthorpe is impacted due to its proximity to the alignment (approximately 1.4 km) and the presence of Mount Kingsthorpe summit scenic lookout. - Elsewhere this landscape type is not within proximity to the alignment, or views are contained by dense vegetation, therefore the impacts on other parts of this landscape type would be indirect. - There is No Impact on this character type. Views from Mount Kingsthorpe summit scenic lookout are considered elsewhere (Section 8.2).
Potential effect	The effect of the Project on LCT H: Forested Uplands is No impact during construction and operation.

7.1.9 Landscape Character Type I

Table 29: Landscape impact assessment of LCT I: Settled Hills

Type I: Settled Hills	
Landscape Baseline Assessment	
Location and boundaries	This landscape type is associated with the elevated, undulating areas and basaltic uplands of the Darling Downs, surrounding Pittsworth. There is one landscape character area of this type – the <i>Pittsworth Hills</i> (LCA I1).
Typical character images:	
	 
<i>Existing railway track near Murlaggan</i>	<i>Undulating and settled hills</i> <i>Forested and cleared rural areas</i>
Key characteristics	- Elevated and gently undulating topography, typically between 450 m and 680 m AHD and associated with the basalt uplands of the Darling Downs. - Distinctive from the surrounding floodplains of the Condamine River and Gowrie Creek. - Incised dry creek valleys where waterways drain the elevated area. - Typically, grassy open eucalyptus woodland or forest. - Generally, an enclosed landscape with limited views due to undulating topography.
Precedent modifications and infrastructure elements	- Due to the undulating terrain, patches of remnant vegetation remain due to the inaccessibility to clear the areas. - Somewhat natural landscape with very limited settlement (some rural residential lots) and little large-scale infrastructure elements. - The existing Millmerran Branch Line transects the basalt uplands, passing through Pittsworth. - Some telecommunications towers and powerlines in elevated locations.
Landscape character sensitivity assessment	- This landscape character type has some capacity to accommodate development, as views would be visually contained by the undulating landscape, however there are a moderate number of rural residential residents with a specific interest in views within this character area in proximity to the alignment. - Parts of this LCT were identified as having high scenic amenity value in the <i>Toowoomba Regional Scenic Amenity Study</i> (Lat27, 2021a). - Views towards the alignment within this landscape character type will be possible from the Gore Highway. A moderate number of receptors travel along the Gore Highway (AADT around 1,538 per day, of which up to 43.74 per cent are heavy vehicles) and would experience changes to the view. However, it is noted that these viewers are passing at speed and would only experience transient views. - Views towards this landscape character area are also possible for residents on the northern side of Pittsworth overlooking the Gore Highway and for elevated rural residents to the north of Southbrook. - Therefore, the landscape sensitivity of this landscape type is considered to be up to Moderate.

Type I: Settled Hills	
Impact Assessment	
Magnitude of change assessment	- The alignment directly transects LCA I1: Pittsworth Hills. - Within LCA I1, the alignment passes through privately owned land, deviating from the existing railway corridor. The key impact within this area will be due to extensive earthworks and clearing of vegetation to enable the construction of the railway corridor, embankments and new road infrastructure. - The impact will fundamentally change the character of the landscape from natural and rural landscape to a landscape dominated by infrastructure. Views to the alignment will be contained by the undulating topography, therefore impacts will be most apparent for nearby rural residential residents and residents to the north of the towns of Pittsworth and Southbrook. - This represents an overall High magnitude of change.
Potential effect	The effect of the Project on LCT I: Settled Hills is High during construction and operation.

7.1.10 Landscape Character Type J

Table 30: Landscape impact assessment of LCT J: Forested Hills and Plains

Type J: Forested Hills and Plains		
Landscape Baseline Assessment		
Location and boundaries	This landscape type is typically associated with the densely vegetated, lower-lying and gently undulating areas of the impact assessment area, typically west of Millmerran. This landscape type includes Wondul Range National Park, while other areas are predominately designated as State forests, which typically have very limited recreational opportunity. There are 14 character areas of this type: • <i>Turallin (LCA J1)</i> • <i>Millmerran Downs (LCA J2)</i> • <i>Wondul Creek State Forest (LCA J3)</i> • <i>Kooroongarra Road (LCA J4)</i> • <i>Mingimarny Creek West (LCA J5)</i> • <i>Mingimarny Creek East (LCA J6)</i> • <i>Bringalily Creek North (LCA J7)</i> • <i>Bringalily Creek South (LCA J8)</i> • <i>Canning Creek (LCA J9)</i> • <i>Bringalily State Forest West (LCA J10)</i> • <i>Bringalily State Forest East (LCA J11)</i> • <i>Devine State Forest (LCA J12)</i> • <i>Yelarbon State Forest North (LCA J13)</i> • <i>Yelarbon State Forest South (LCA J14)</i>	
Typical character images:		
		
Existing sealed road through State forest	Existing gate to access State forest	Unsealed road within State forest

Type J: Forested Hills and Plains	
  	
<i>Wondul Range National Park</i> <i>Existing access within State forest</i> <i>State forest adjacent road corridor</i>	
Key characteristics	• Undulating to low hilly country on deeply weather sandstones, typically between 250 m and 450 m AHD. • Incised dry, typically sandy creek valleys where waterways drain elevated areas. • Vegetation typically is dominated by narrow-leaved ironbark (<i>Eucalyptus crebra</i>) on hillsides, cypress pine (<i>Callitris glaucophylla</i>) and bullock (<i>Allocasuarina luehmannii</i>) on solodic soils in gently undulating parts and poplar box (E. populnea) on lower slopes and flats. There are also minor areas of brigalow (<i>Acacia harpophylla</i>) — belah (<i>Casuarina cristata</i>). • Generally, an enclosed landscape with limited public access and limited views. • Comprises a high level of naturalness and remoteness and is a highly visible landscape type throughout the western extent of the impact assessment area, between Yelarbon and Bringalily.
Precedent modifications and infrastructure elements	• Natural landscape with very limited settlement and little large-scale infrastructure elements. • Limited recreational facilities within national park and State forest areas, typically utilised for wildlife watching and bushwalking. • The existing South Western Line transects the western most extent of Whetstone State Forest, near Whetstone. • Some telecommunications towers and powerlines in elevated locations. • Some instances of clearing for grazing, agriculture and forestry, as well as minor mining operations (borrow pits). Typically, these operations are screened by dense native vegetation.
Landscape character sensitivity assessment	• This landscape character type has some capacity to accommodate development, due to its heavily vegetated nature and enclosed views. • Development would however require vegetation clearance which would be visually intrusive in this densely vegetated and gently undulating landscape. • This landscape offers a refuge from clearing and increasing mining pressures and is, therefore, a locally and regionally valued landscape. • Therefore, the landscape sensitivity of this landscape type is considered to be up to Moderate.
Impact Assessment	
Magnitude of change Assessment	• The alignment transects LCA J10: Bringalily State Forest West, which includes parts of Bringalily State Forest and Whetstone State Forest to the west of Millmerran-Inglewood Road and the Cunningham Highway. • The key impact within this area will be due to extensive clearing due to proposed earth works to facilitate the construction of the railway corridor, embankments and new road infrastructure. • Elsewhere this landscape type is not within proximity to the alignment, therefore, the impacts on this landscape type would be indirect. • The impact will be localised and will not fundamentally change the character of the landscape, as there is existing rail infrastructure within Whetstone State Forest and the surrounding area and, for the most part, the corridor skirts the edges of the forest. This results in an overall Low magnitude of change.
Potential effect	• The effect of the Project on LCT J: Forested Hills and Plains is Low during construction and operation.

7.1.11 Landscape Character Type K

Table 31: Landscape impact assessment of LCT K: Salinity Scald

Type K: Salinity Scald			
Landscape Baseline Assessment			
Location and boundaries		This landscape type is associated with the dryland salinity scald surrounding Yelarbon, in the western extent of the impact assessment area. There is one landscape character area of this type – the <i>Yelarbon Salinity Scald</i> (LCA K1).	
Typical character images:			
			
Salinity Scald near Yelarbon		Salinity Scald near Yelarbon	
			
Salinity Scald near Yelarbon		Salinity Scald near Yelarbon	
			
Salinity Scald near Yelarbon		Salinity Scald near Yelarbon	
			
Salinity Scald near Yelarbon		Salinity Scald near Yelarbon	
Key characteristics		• Low-lying and flat landscape, typically above 100 m AHD. • Multiple streams, such as Desert Creek, drain the area. • Distinctive landscape, easily identified from the surrounding areas due to the characteristic white tone of soils, caused by the severe erosion of top soil and salt encrustation. • Salt tolerant vegetation including grasses such as Spinifex Grass are well established between patches of bare ground. • Generally, an open landscape with limited public access and limited views.	
Precedent modifications and infrastructure elements		• Dryland salinity in this region is caused by a major fault beneath the scald, that has allowed saline groundwater to leak upwards. • Erosion of the geologically caused saline scald has been aggravated by overgrazing. • The existing South Western Line transects the northern extent of the scald near Yelarbon, while Yelarbon-Keetah Road transects the scald in a north-south direction. • Very limited development.	
Landscape character Sensitivity Assessment		• This landscape character type is typically inaccessible to the public. • Therefore, the landscape sensitivity of this landscape type is considered to be up to Low.	

Type K: Salinity Scald	
Impact Assessment	
Magnitude of change assessment	- The alignment directly transects LCA K1: Yelarbon Salinity Scald. - The alignment follows the existing rail corridor and the key impact within this area will be the realignment of the Cunningham Highway and construction of the Cunningham Highway Road Bridge, due to selective vegetation clearing and earthworks required to facilitate the construction of the railway corridor, embankments and new road infrastructure. - The impact will be clearly evident, however restricted to a small area near Yelarbon, and will therefore not fundamentally change the character of the landscape. This represents an overall Low magnitude of change.
Potential effect	The effect of the Project on LCT K: Salinity Scald is Negligible during construction and operation.

7.1.12 Landscape Character Type L

LCT L: Transitional Landscapes falls within the impact assessment area but is not affected by the Project so is not assessed. These landscapes comprise disturbed and developing landscapes such as around Commodore Mine near Millmerran that are not valued for their existing landscape character or quality.

8 Visual impact assessment

8.1 Visibility analysis mapping

The visibility mapping is shown on the following figures:

- Figure 10: Visual analysis map – infrastructure
- Figure 11: Visual analysis map – rolling stock
- Figure 12: Visual analysis map – difference.

Figure 10: Visual analysis map – infrastructure and Figure 11: Visual analysis map – rolling stock show that the Project is theoretically visible for a wide area within the impact assessment area. As would be anticipated due to the increased height of the rolling stock, the rolling stock map shows a slightly higher extent of theoretical visibility than the railway track infrastructure at formation level (track). However, the general pattern is the same with visibility contained by relatively small changes in elevation. It is noted that those parts of the impact assessment area with potential to experience views are typically of between 1 and 20 observation points (areas shown as blue or turquoise on the figure). However, an area around Millmerran, Pampas and Brookstead is theoretically likely to have greater visibility of the Project – because the rail is elevated on embankment and structure through parts of the Condamine River floodplain.

In interpreting this data, it is also important to note that remnant vegetation, vegetated creek lines and roadside shelter belts are extremely effective in containing views. Therefore, the actual visibility will be substantially less than indicated based on theoretical landform modelling.

Figure 12 shows that the difference in visibility to passing rolling stock compared to permanent infrastructure is more pronounced within elevated parts of the impact assessment area. Low-lying creeks and drainage channels have considerably reduced visual sensitivity. It is also important to consider that parts of the proposed alignment will replace existing infrastructure, utilising the existing rail corridor.

8.2 Viewpoint assessment

The impact of the Project on selected receptors, illustrating the effects of actual ground conditions on visibility is described below. This includes an assessment of the impact of the Project on selected representative viewpoints during construction and during operation, with views to both permanent infrastructure and passing train movements considered.

Refer to Appendix 2 for full sized and annotated images and visualisations (where provided).

8.2.1 Viewpoint 1

Table 32: Likely visual effect of the Project on Viewpoint 1

VP1: Rainbow Reserve near Kildonan Road, Kurumbul	
Visual baseline assessment	
	
Existing view from Viewpoint 1 Refer to Figure 22: Viewpoint 1 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°38'35.52" S 150°27'15.948" E • Elevation: 220 m • Easterly view from the edge of Rainbow Lagoon, within Rainbow Reserve, which is a site of importance to Traditional Owners, located off Kildonan Road. • Proposed rail alignment is approximately 300 m to the east of this viewpoint. • Realignment of Eukabilla Road is situated approximately 180 m to the northeast of this viewpoint. • The Macintyre River and proposed Macintyre River Rail Bridge crossing is situated approximately 2.5 km to the south of this viewpoint. • Represents typical and accessible views of visitors and campers staying at Rainbow Reserve. • Easterly views from this point provide open views towards the proposed alignment and landscapes typical of LCT A: Vegetated Watercourses – Rivers. • Views are contained due to riparian vegetation.
Key visual sensitivities	• Moderate sensitivity of receptors, including people camping at or visiting Rainbow Reserve. • Rainbow Reserve is situated adjacent to the <i>Border Rivers</i> local tourist drive, which follows Kildonan Road. • Rainbow Reserve and lagoon are sites of potential cultural value and are known to be of value to the local Aboriginal community, particularly the Bigambul, as the traditional Native Title Holders. • The lack of existing infrastructure, high scenic value of the reserve and the Indigenous significance of this site increase the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the type and number of viewers (e.g. visitors to the reserve which accommodates overnight camping).
Visual evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	• Areas proposed as construction laydown areas within this vicinity are partially screened from this location due to existing vegetation. • Rainbow Reserve is a popular camping spot and recreational reserve; therefore, construction works could impact on the views of visitors to the area.

VP1: Rainbow Reserve near Kildonan Road, Kurumbul	
	- The proposed location of a bridge construction laydown area approximately 410 m to the southeast of this viewpoint has the potential to cause a temporary reduction in visual amenity from this viewpoint, however, it is anticipated that views to this laydown area are anticipated to be predominately screened by existing vegetation. - Construction of proposed embankments, rail and bridge infrastructure, access roads, vegetation clearing, realignment of Eukabilla Road and provision of an active level crossing will cause disturbance within the landscape. - At this distance, construction works and laydown areas will be noticeable; however, they will be largely screened by existing vegetation and topography. While noticeable, it will not fundamentally change the visual character of the landscape. - This represents a Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP1 during construction works is considered to be Low .
Operation	
Magnitude of change assessment - permanent infrastructure	- The nearest section of the alignment is approximately 300 m to the east of this viewpoint. The proposed alignment, active level crossing and realignment of Eukabilla Road will be mostly screened by existing vegetation. - The magnitude of change on this receptor is anticipated to be noticeable, due to the following factors: - Noticeable change due to proposed earthworks and the provision of new rail infrastructure, including the Macintyre Floodplain 2 Bridge within what is currently a landscape with high scenic value. - The height of the alignment is approximately 0.5 m above the existing level of Kildonan Road and embankments reach heights of approximately 2.4 m above the existing level in the vicinity of this viewpoint. - Fencing is to be provided for the majority of the rail corridor (except for the Condamine River floodplain), typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, whilst the alignment and proposed access road alongside it will be evident, the Project will not change the fundamental visual character of the landscape, as it will be predominately screened by existing vegetation. The alignment will 'blend' into the existing view to a considerable extent. Therefore, the magnitude of change is considered to be Low.
Magnitude of change assessment - train	- Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will have a noticeable impact on people within the reserve. These views will be experienced by, at worst, a moderate number of people with an interest in their surroundings and prolonged viewing opportunities (as camping is permitted within the reserve). - Trains will be evident to travellers on Kildonan Road, part of the <i>Border Rivers Tourist Drive</i>, but only experienced occasionally due to the low number and transient nature of travellers on this road. - The magnitude of change is considered to be, at most, Moderate.
Potential effect (operations)	The effect of the Project on VP1 during operations is considered to be Moderate .

8.2.2 Viewpoint 2

Table 33: Likely visual effect of the Project on Viewpoint 2

VP2: Cunningham Highway near Yelarbon towards proposed Yelarbon non-resident workforce accommodation facility	
Visual baseline assessment	
	
Existing view from Viewpoint 2 Refer to Figure 23: Viewpoint 2 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°33'19.134" S 150°43'38.82" E • Elevation: 249.8 m • North-westerly view in the direction of Goondiwindi from the Cunningham Highway, towards the proposed Yelarbon non-resident workforce accommodation site. • Proposed rail infrastructure is not evident within this view. • Proposed non-resident workforce accommodation facility is located approximately 750 m to the north of this viewpoint, while proposed road realignment works are approximately 340 m northwest of this viewpoint. • Represents typical and accessible views of those travelling along the Cunningham Highway towards Goondiwindi. • North-westerly views from this viewpoint provide close views towards the proposed non-resident workforce accommodation facility and landscapes typical of LCT D: Dry Croplands and Pastures (D34: Yelarbon).
Key visual sensitivities	• Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along the Cunningham Highway (AADT around 1,538 per day, of which up to 43.74 per cent are heavy vehicles) would experience changes to the view. • This viewpoint is not located on or near any tourist drives. • The presence of existing road infrastructure somewhat reduces the overall sensitivity of this view. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the low number of nearby isolated rural receptors, and the relatively low interest of a moderate number of travellers passing at some speed along the Cunningham Highway, who are the primary visual audience in this location.

VP2: Cunningham Highway near Yelarbon towards proposed Yelarbon non-resident workforce accommodation facility	
Visual Evaluation	
Construction	
Magnitude of change Assessment	- The construction of the non-resident workforce accommodation facility will include the provision of a sewage treatment plant, amenities building, dining room, accommodation units with associated communal areas and other associated service infrastructure. The nominal 20 ha area has been allocated to accommodate the non-resident workforce accommodation site. Some additional clearing is anticipated to facilitate the establishment of the accommodation facility, noting that the site has been subject to historical clearance for agricultural purposes. - Due to the proximity of this viewpoint to the proposed non-resident workforce accommodation site, it is anticipated that views towards the construction of the site will be clearly evident from this location, however, these views will typically be transient views experienced by drivers passing along the Cunningham Highway and will be partially screened by foreground vegetation. - Vegetation clearing for the construction of the proposed non-resident workforce accommodation facility will remove some existing vegetation, however, due to the generally cleared nature of the rural landscape within the site's footprint, it is not anticipated that this will noticeably increase the visibility of the alignment from the Cunningham Highway and surrounding isolated rural residential lots. - At this distance, the construction of a non-resident workforce accommodation facility will be clearly perceptible; however, construction activities will be partly screened by existing vegetation. - The impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP2 during construction works is considered to be Low .
Operation	
Magnitude of change assessment - permanent infrastructure	- The non-resident workforce accommodation facility is approximately 750 m to the north of this viewpoint and will be partially screened by existing vegetation. - The magnitude of change on this receptor is anticipated to be no impact, as the non-resident workforce accommodation facility will be decommissioned and rehabilitated. - At this distance, it is anticipated that over time, evidence of the construction camp non-resident workforce accommodation facility would be negligible. In addition, views to the site from this location will be partially obscured by existing vegetation, and other opportunities for more open views towards the site are available along the Cunningham Highway at a further distance. Therefore, the magnitude of change is considered to be No Impact.
Magnitude of change assessment - train	As rail infrastructure is not evident from this location, the magnitude of change is No impact.
Potential effect (operations)	As the Yelarbon non-resident workforce accommodation facility would be decommissioned and rehabilitated, it is considered that the effect of the Project on VP2 during operations would be No Impact .

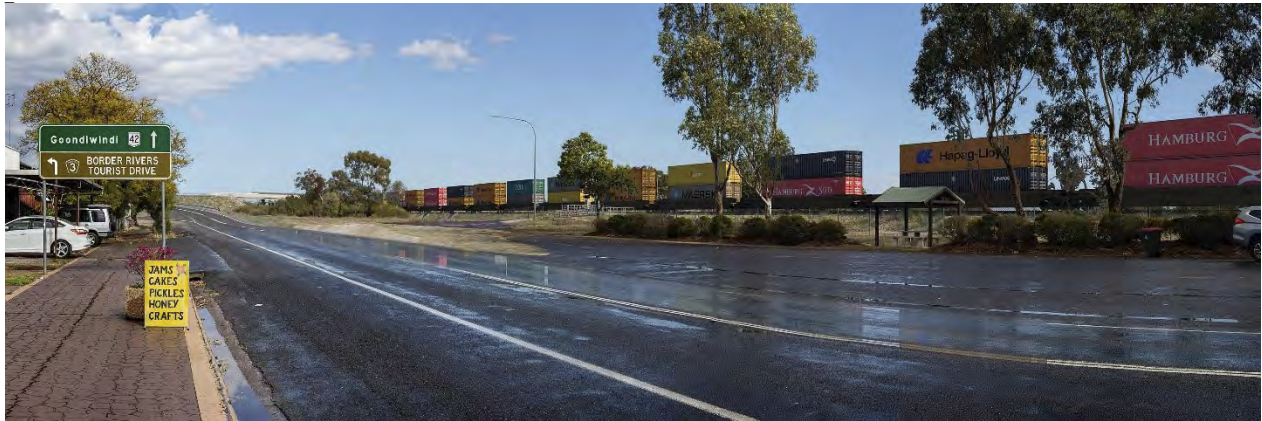
8.2.3 Viewpoint 3

Table 34: Likely visual effect of the Project on Viewpoint 3

VP3: Yelarbon Rest Area	
Visual baseline assessment	
	
Existing view from Viewpoint 3 Refer to Figure 24: Viewpoint 3 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°34'21.767" S 150°45'6.636" E • Elevation: 240 m • Westerly view in the direction of Goondiwindi from the Cunningham Highway, where it passes through Yelarbon. • Proposed rail alignment is approximately 50 m to the north of this viewpoint, while proposed road realignment works begin approximately 30 m west of this viewpoint. • Proposed non-resident workforce accommodation facility is located approximately 3.5 km to the northwest of this viewpoint. • Represents typical and accessible views of residents and of visitors, workers and tourists in Yelarbon, as well as those travelling along the Cunningham Highway. • Location is adjacent to the Yelarbon Rest Area, and represents views from the Cunningham Highway, main street of Yelarbon and is intended to represent more generally the views from the rest of the town towards the alignment. • Westerly views from this point provide close views towards the proposed alignment, Cunningham Highway Bridge, non-resident workforce accommodation facility and laydown area, including landscapes typical of LCT F: Rural Settlement (F15: Yelarbon), LCT K: Salinity Scald (K1) and LCT D: Dry Croplands and Pastures (D34: Yelarbon).
Key visual sensitivities	• Receptors include a relatively high number of nearby residents, workers and travellers driving along the Cunningham Highway and visitors to Yelarbon utilising rest stop facilities. • Yelarbon is located on the <i>Border Rivers</i> local tourist drive. • A moderate number of receptors travel along the Cunningham Highway (AADT around 1,538 per day, of which up to 43.74 per cent are heavy vehicles) and would experience changes to the view. However, it is noted that these viewers are typically passing at speed and would only experience transient views. • This viewpoint is considered to have a Moderate sensitivity overall to the change proposed, due to the Yelarbon town centre location with a medium number of receptors, most of whom would have an interest in views from this location (e.g. nearby residents, commercial operators and people utilising the rest stop); albeit that this is not a particularly scenic viewpoint which already includes existing railway infrastructure and is not specifically visited for its scenic amenity value.

VP3: Yelarbon Rest Area

Visual Evaluation



Photomontage view from Viewpoint 3

Refer to Figure 24: Viewpoint 3 and visualisation in Appendix 2 for full sized image.

Note: Visualisation of level crossing is indicative only, showing a schematic option for the provision of a pedestrian crossing in this location. Design and extent of crossing subject to development at detailed design stage.



Photomontage view from Viewpoint 3 – noise wall option

Refer to Figure 25: Viewpoint 3 and visualisation (noise wall option) in Appendix 2 for full sized image.

Note: Visualisation of noise wall shown is indicative only, showing a schematic option for the instalment of noise barriers in this location. Design of noise barriers subject to development at detailed design stage.

Construction

Magnitude of change assessment

- The provision of two major multi-use construction laydown areas (including satellite offices, fuel storage, storage of rail, bridge and road construction materials) and construction of the alignment, the Cunningham Highway Road Bridge, pedestrian railway crossing and the realignment of the Cunningham Highway, Yelarbon-Kurumbul Road, Yelarbon-Keetah Road and Kera Street will result in extensive disturbance, creating a considerable temporary change in the visual character of this viewpoint.
- The proposed non-resident workforce accommodation facility is approximately 3.5 km northwest of this viewpoint, with access off the Cunningham Highway, and will include the provision a sewage treatment plant, amenities building, dining room, accommodation units with associated communal areas and other associated service infrastructure.
- Due to the distance from this viewpoint and the presence of screening vegetation, it is not anticipated that views towards the proposed non-resident workforce accommodation facility will be evident from this location, however transient views will be possible for drivers passing along the Cunningham Highway.

VP3: Yelarbon Rest Area	
	- Vegetation clearing for the construction of the proposed alignment, bridge structures and laydown areas will remove some existing vegetation that provides some visual screening of the existing rail alignment, increasing the visibility of the alignment from the Cunningham Highway and surrounding residential lots. - Earthworks associated with the proposed alignment will require the movement of large volumes of material. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP3 during construction works is considered to be Moderate .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the rail alignment is approximately 50 m to the north of this viewpoint, while the proposed Cunningham Highway Road Bridge is approximately 460 m to the west. - The skyline is already affected by the presence of powerlines, power poles and existing rail infrastructure. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Dominant change due to the provision of a new single track dual-gauge railway to the north of the existing rail line. - Existing residential lots within Yelarbon, particularly those on Kera Street will have direct, close views to the proposed new road bridge and realigned local roads. - Existing active level crossing will be removed and replaced by the realignment of the Cunningham Highway, including the provision of large embankments and the Cunningham Highway Bridge (7.1 m min clearance over rail) in the centre of the view. - Vegetation clearing for the construction of the proposed alignment, bridge structures and laydown area will increase the visibility of the alignment from the Cunningham Highway and surrounding residential lots. - Fencing is to be provided for the extent of the rail corridor. Fencing is to extend between the corridor and private land adjoining the railway and will be a standard chain link boundary fence. - At this distance, the alignment, embankments and the Cunningham Highway Road Bridge will be highly evident and will have a dominant impact on this viewpoint as it will be introducing new road infrastructure within close proximity to residential lots on the western side of Yelarbon. This represents a High magnitude of change. - Options for noise attenuation are currently being explored, including the provision of a noise barrier within the vicinity of this location at the rail corridor boundary between the western extent of the town and to the east. - It is noted that if noise barriers were installed in this location (regardless of the extent), the magnitude of change would the magnitude of change would further increase, however remain High (as it is the highest magnitude of change possible).
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the proximity of the rail alignment to nearby residential and commercial lots of Yelarbon, particularly those on Taloom Street and Kera Street. Close views to the alignment will be possible for travellers passing over the new Cunningham Highway Road Bridge. While anticipated to be experienced by numerous motorists, these views are of transient nature, and the key visual receptors will be nearby residents. It is noted that the existing rail line currently facilitates freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be Low.

VP3: Yelarbon Rest Area	
Potential effect (operations)	The effect of the Project on VP3 during operations is considered to be High. It is noted that if noise barriers are installed in this location, the effect of the Project during operation would remain High.

8.2.4 Viewpoint 4

Table 35: Likely visual effect of the Project on Viewpoint 3a

VP4: Yelarbon silo artwork viewing area	
Visual baseline assessment	
	
Existing view from Viewpoint 4 Refer to Figure 26: Viewpoint 4 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°34'19.11" S 150°45'20.424" E • Elevation: 242 m • Northerly view towards the GrainCorp silos, with the silo artwork viewing area and the Cunningham Highway visible in the foreground. • Proposed rail alignment is approximately 80 m to the north of this viewpoint, while proposed road realignment works for East Sawmill Road are approximately 180 m to the east of this location (not visible within this view). • Proposed non-resident workforce accommodation facility is located approximately 3.7 km to the northwest of this viewpoint. • Represents typical and accessible views of residents and of visitors, workers and tourists in Yelarbon, as well as those travelling along the Cunningham Highway. • Location is within the GrainCorp silo artwork viewing area and is also considered representative of views from the Cunningham Highway and the eastern part of the town towards the alignment. • Northerly views from this point provide close views towards the proposed alignment and realignment of East Sawmill Road, including landscapes typical of LCT F: Rural Settlement (F15: Yelarbon), LCT K: Salinity Scald (K1) and LCT D: Dry Croplands and Pastures (D34: Yelarbon).

VP4: Yelarbon silo artwork viewing area	
Key visual sensitivities	• Receptors, including a relatively low number of nearby residents on the eastern side of Yelarbon, workers and travellers driving along the Cunningham Highway and visitors to Yelarbon GrainCorp silo artwork viewing area. • Yelarbon and the silo artwork viewing area are located on the <i>Border Rivers</i> local tourist drive. • A moderate number of receptors travel along the Cunningham Highway (AADT around 1,538 per day, of which up to 43.74 per cent are heavy vehicles) and would experience changes to the view. However, it is noted that these viewers are typically passing at speed and would only experience transient views. • This viewpoint is considered to have a Moderate sensitivity overall to the change proposed, as the GrainCorp silos artwork viewing area is a destination for visitors to Yelarbon. It is situated close to the Yelarbon town centre and is considered to have a medium number of receptors, most of whom would have an interest in views from this location (e.g. nearby residents and people visiting the silo viewing area). It is however noted that views from this location are already impacted by the presence of the Cunningham Highway in the foreground and existing railway infrastructure.
Visual Evaluation	
 Photomontage view from Viewpoint 4 <i>in Appendix 2 for full sized image.</i>  Photomontage view from Viewpoint 4 – noise wall option (no train) with clear noise barriers to retain views to silo artwork from viewing area <i>Refer to Figure 27: Viewpoint 4 and visualisation (noise wall option) in Appendix 2 for full sized image</i>	

VP4: Yelarbon silo artwork viewing area



Photomontage view from Viewpoint 4 – noise wall option (train passing)

Refer to Figure 27: Viewpoint 4 and visualisation (noise wall option in Appendix 2 for full sized image.

Note: Visualisation of noise wall shown is indicative only, showing a schematic option for the instalment of noise barriers in this location. Design of noise barriers including confirmation of length and materials is subject to development at detailed design stage. It is possible that noise barriers will not need to extend in front of the silos as Yelarbon but this option has been visualised as a indicative solution should this be required.

Construction

Magnitude of change assessment	- The construction of the alignment and realignment of the nearby East Sawmill Road will result in a noticeable temporary change in the landscape character of this viewpoint and other potential views from this location. - No laydown areas are located in the immediate vicinity of this viewpoint. - The proposed non-resident workforce accommodation facility is approximately 3.7 km northwest of this viewpoint, with access off the Cunningham Highway, and will include the provision a sewage treatment plant, amenities building, dining room, accommodation units with associated communal areas and other associated service infrastructure. - Due to the distance of this viewpoint from the proposed non-resident workforce accommodation camp, it is not anticipated that views towards it will be evident from this location. - Due to the limited amount of existing vegetation in this location, vegetation clearing for the construction of the proposed alignment is considered to have negligible impact. - Earthworks associated with the proposed alignment will require the movement of large volumes of material. - The presence of plant constructing the alignment and embankments will temporarily change the visual character this viewpoint. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a noticeable change and Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP4 during construction works is considered to be Low .

Operation

Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 80 m to the north of this viewpoint, while the proposed realignment of East Sawmill Road is approximately 180 m to the east. - The skyline is already affected by the presence of powerlines, power poles, telecommunications infrastructure and the existing rail infrastructure and the GrainCorp silos, which are part of the GrainCorp 'Australian Silo Art Trail'.
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VP4: Yelarbon silo artwork viewing area	
	- The magnitude of change on this receptor is anticipated to be considerable, therefore moderate, due to the following factors: - Provision of a new single track dual-gauge railway to the north of the existing rail line, on low embankments up to around +0.7 m high). - Existing residential lots within Yelarbon, particularly those on Bengalla Street and Taloom Street (Cunningham Highway) will have direct, close views to the proposed rail alignment (on low embankments up to approximately +0.7 m) and realigned East Sawmill Road. - Due to the sparse nature of existing vegetation, vegetation clearance will have minimal impact on the screening of the alignment. - Fencing is to be provided for the extent of the rail corridor. Fencing is to extend between the corridor and private land adjoining the railway and will be a standard chain link boundary fence. - At this distance, the alignment, low embankments and the realignment of East Sawmill Road will be clearly evident, and represent a considerable change to the view, although will largely accord with the existing character of the landscape. This represents a Moderate magnitude of change. - Options for noise attenuation are currently being explored. In order to represent the potential 'worst case' scenario with regards to visual impacts, potential impacts between the western extent of the town and to the existing silos evident within this view (as per the revised draft EIS design) have been assessed. - It is noted that if noise barriers were installed in this location (regardless of the extent), the magnitude of change would increase and be High.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the proximity of the rail alignment to the silo artwork viewing area and nearby residential and lots of Yelarbon, particularly those on Bengalla Street and Taloom Street. Close views to the alignment will be possible for travellers passing along the Cunningham Highway. While anticipated to be experienced by numerous motorists, these views are of transient nature, and the key visual receptors will be nearby residents and visitors to the silo artwork viewing area. It is noted that the existing rail line currently facilitates freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be Low.
Potential effect (operations)	The effect of the Project on VP4 during operations is considered to be Moderate. It is noted that if noise barriers are installed in this location, the effect of the Project during operation would be High.

8.2.5 Viewpoint 5

Table 36: Likely visual effect of the Project on Viewpoint 5

VP5: Cunningham Highway near Whetstone Rest Area	
Visual baseline assessment	
	
Existing view from Viewpoint 5 Refer to Figure 28: Viewpoint 5 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°30'55.451" S 150°55'2.214" E • Elevation: 260 m • Northerly view towards Whetstone State Forest from the Cunningham Highway near Whetstone Rest Area. Proposed rail alignment is approximately 1 km to the northwest of this viewpoint. • Represents typical and accessible views of those travelling along the Cunningham Highway, as well as those stopping at the rest area. • Northerly views from this point provide open views towards the existing railway line, the proposed alignment, as well as landscapes typical of LCT D: Dry Croplands and Pastures (D28: Whetstone East) and LCT J: Forested Hills and Plains (J10: Bringalily West).
Key visual sensitivities	• Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along the Cunningham Highway (AADT around 1,538 per day, of which up to 43.74 per cent are heavy vehicles) as well as drivers utilising rest stop facilities. • This viewpoint is not located on or near any tourist drives. • The presence of existing infrastructure (railway line) reduces the overall sensitivity of this view. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the low number of isolated rural lots near this viewpoint, and the relatively low interest of travellers passing at some speed along the Cunningham Highway, who are the primary visual audience in this location.
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• Due to the distance from the highway, the construction of the Project within the existing rail corridor and the presence of construction plant constructing the alignment will create a barely perceptible change to this viewpoint. • No laydown areas are located in the immediate vicinity of this viewpoint. • Due to the open nature of grazing land the alignment passes through in this location, vegetation clearing for the construction of the proposed alignment is considered to have negligible impact upon screening vegetation. • This temporary impact represents a Negligible magnitude of change.

VP5: Cunningham Highway near Whetstone Rest Area	
Potential effect (construction works)	The effect of the Project on VP5 during construction is considered to be Negligible .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 1 km to the northwest of this viewpoint. The skyline is already affected by the presence of existing rail infrastructure. - The magnitude of change on this receptor is anticipated to be barely perceptible, therefore Negligible, due to the following factors: - Provision of new rail infrastructure within the existing rail corridor, in shallow cut and on low embankment up to around 2.8 m high. - Provision of an active level crossing to Whetstone Access Road, noting that views from this viewpoint towards the active level crossing will be distant and typically be screened by existing vegetation. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. A combination of standard rural chain wire fencing and wild dog check fencing is proposed throughout this section, consistent with existing provision. - At this distance, the alignment will be barely perceptible and will blend into the existing rural view to some extent. This represents a Negligible magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be noticeable due to the slightly elevated situation of the railway track. Distant views to the alignment will be possible for travellers along the Cunningham Highway and those stopping at the Whetstone Rest Area. While anticipated to be experienced by numerous motorists, these views are of transient nature. It is noted that the existing rail line currently facilitates freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be Low.
Potential effect (operation)	The effect of the Project on VP5 during operations is considered to be Negligible .

8.2.6 Viewpoint 6

Table 37: Likely visual effect of the Project on Viewpoint 6

VP6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road active level crossing
Visual baseline assessment
 Existing view from Viewpoint 6 Refer to Figure 29: Viewpoint 6 in Appendix 2 for full sized image.

VP6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road active level crossing	
Location and description	• GPS Location: 28°21'26.267" S 151°8'20.957" E • Elevation: 300 m • North-easterly view towards Millmerran-Inglewood Road and proposed active level crossing. • Proposed rail alignment is approximately 70 m to the northwest of this viewpoint. • Proposed Inglewood non-resident workforce accommodation facility is located approximately 3.8 km to the northeast of this viewpoint. • Represents typical and accessible views of those travelling north along Millmerran-Inglewood Road towards Millmerran. • North-easterly views from this point provide open views towards the proposed alignment and active level crossing. • Views encompass LCT J: Forested Hills and Plains (J10: Bringalily West). • Views are contained due to dense vegetation.
Key visual sensitivities	• Receptors include workers and travellers experiencing transient views at speed along Millmerran-Inglewood Road (AADT around 303 per day, of which up to 32.27 per cent are heavy vehicles) and visitors of Bringalily State Forest. • This viewpoint is located on the <i>Rural Getaway</i> regional tourist drive. • The lack of existing infrastructure and natural setting increases the overall sensitivity of this view. • This viewpoint is considered to have a Low sensitivity overall to the change proposed, due to the relatively low interest of viewers (i.e. very low numbers of travellers passing at some speed along Millmerran-Inglewood Road and isolated rural residential receptors).
Visual evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	• The proposed alignment, minor roadworks to Millmerran-Inglewood Road, associated earthworks and provision of the Millmerran-Inglewood Road active level crossing will introduce considerable construction works into the view. • The proposed location of a laydown area (including site offices and fuel storage) approximately 400 m to the northeast of this viewpoint and an additional bridge construction laydown area located to the immediate west of this viewpoint location would cause a temporary reduction in visual amenity from this viewpoint. The proposed Inglewood non-resident workforce accommodation facility is located approximately 3.8 km northeast of this viewpoint on cleared rural land adjacent to Bringalily State Forest, with access off Millmerran-Inglewood Road. The Inglewood non-resident workforce accommodation facility will include the provision a sewage treatment plant, amenities building, dining room, accommodation units with associated communal areas and other associated service infrastructure. • Due to the distance from this viewpoint and the presence of screening vegetation, it is not anticipated that views towards the proposed Inglewood non-resident workforce accommodation facility will be evident from this location, however transient views will be possible for drivers passing along Millmerran-Inglewood Road. • Due to the forested nature of this viewpoint, the most evident construction impact will be the clearance of vegetation for the construction of the alignment, provision of proposed laydown areas, earthworks to facilitate the construction of the rail alignment including cuts and embankments and roadworks associated with the active level crossing. • The presence of plant constructing the alignment, cuts, embankments and road and rail infrastructure will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint. • While construction work and plant will be clearly evident from this vantage point, the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP6 during construction works is considered to be Low .

VP6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road active level crossing	
Operation	
Magnitude of change assessment – permanent infrastructure	• The nearest section of the alignment is approximately 70 m to the northwest of this viewpoint. • The magnitude of change on this receptor is anticipated to be clearly evident, due to the following factors: ○ Introduction of new rail infrastructure, including the Millmerran-Inglewood Road Rail active level crossing within what is currently a densely vegetated road reserve, adjacent to Bringalily State Forest. ○ Rail infrastructure is with cut to the west of Millmerran-Inglewood Road, with depths of up to approximately -4.8 m, and on low embankment to the east of Millmerran-Inglewood Road, with heights of up to approximately 6.8 m, noting that adjacent to Millmerran-Inglewood Road cut and embankment depths and heights are less. ○ Due to the dense nature of existing vegetation and localised clearing associated with the construction of the Project, existing retained vegetation will screen views of the active level crossing and rail infrastructure until close range views are afforded and will provide screening of the active level crossing from all nearby isolated rural lots. ○ Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed in this location and will be in keeping with the existing rural character. • At this distance, the alignment and Millmerran-Inglewood Road active level crossing and alignment will be clearly evident, however, this type of infrastructure is considered to accord with the character of the road. This represents a Moderate magnitude of change.
Magnitude of change assessment – train	• Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be clearly evident due to the proximity of the railway track to Millmerran-Inglewood Road. Close views to the alignment and Millmerran-Inglewood Road Rail active level crossing will be possible for travellers along Millmerran-Inglewood Road. These views are experienced by a low number of motorists and are of transient nature. Therefore, the magnitude of change is considered to be Low.
Potential effect (operations)	The effect of the Project on VP6 during operations is considered to be Low .

8.2.7 Viewpoint 7

Table 38: Likely visual effect of the Project on Viewpoint 7

VP7: Millmerran-Inglewood Road towards proposed Inglewood non-resident workforce accommodation facility	
Visual baseline assessment	
	
Existing view from Viewpoint 7 Refer to Figure 30: Viewpoint 7 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°19'29.622" S 151°9'29.304" E • Elevation: 313.6 m • Westerly view from Millmerran-Inglewood Road towards the proposed Inglewood non-resident workforce accommodation site. • Proposed rail infrastructure is not evident within this view. • Proposed Inglewood non-resident workforce accommodation facility is located approximately 740 m to the west of this viewpoint, while this viewpoint is located in close proximity to the proposed access road. • Represents typical and accessible views of those travelling north along Millmerran-Inglewood Road towards Millmerran. • Westerly views from this viewpoint provide close open views towards the proposed Inglewood non-resident workforce accommodation facility and landscapes typical of LCT D: Dry Croplands and Pastures (D23: Canning Creek West) and LCT J: Forested Hills and Plains (J10: Bringalily West).
Key visual sensitivities	• Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along Millmerran-Inglewood Road (AADT around 303 per day, of which up to 32.27 per cent are heavy vehicles) and visitors of Bringalily State Forest. • This viewpoint is located on the <i>Rural Getaway</i> regional tourist drive. • The lack of existing infrastructure and natural setting increases the overall sensitivity of this view. • This viewpoint is considered to have a Low sensitivity overall to the change proposed, due to the relatively low interest of viewers (i.e. very low numbers of travellers passing at some speed along Millmerran-Inglewood Road and isolated rural residential receptors).
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• The construction of the Inglewood non-resident workforce accommodation facility will include the provision of a sewage treatment plant, amenities building, dining room, accommodation units with associated communal areas and other associated service infrastructure. The nominal 20 ha area has been allocated to accommodate the Inglewood non-resident workforce accommodation site. Some additional clearing is anticipated to facilitate the establishment of the

VP7: Millmerran-Inglewood Road towards proposed Inglewood non-resident workforce accommodation facility	
	accommodation facility, noting that the site has been subject to historical clearance for agricultural purposes. • Due to the proximity of this viewpoint to the proposed Inglewood non-resident workforce accommodation site, it is anticipated that views towards the construction of the site will be clearly evident from this location, however, these views will typically be transient views experienced by drivers passing along Millmerran-Inglewood Road. • Vegetation clearing for the construction of the proposed Inglewood non-resident workforce accommodation facility will remove some existing vegetation, however, due to the generally cleared nature of the rural landscape within the site's footprint, it is not anticipated that this will noticeably increase the visibility of the alignment from Millmerran-Inglewood Road and surrounding isolated rural residential lots. • At this distance, the construction of the Inglewood non-resident workforce accommodation facility will be clearly perceptible; however, construction activities will be partly screened by existing vegetation. • The impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP7 during construction works is considered to be Low .
Operation	
Magnitude of change Assessment – permanent infrastructure	• The Inglewood non-resident workforce accommodation facility is approximately 740 m to the west of this viewpoint. • The magnitude of change on this receptor is anticipated to be no impact, as the non-resident workforce accommodation facility will be decommissioned and rehabilitated. • At this distance, it is anticipated that over time, evidence of the construction camp non-resident workforce accommodation facility would be negligible. In addition, views to the site from this location will be partially obscured by existing vegetation, and other opportunities for more open views towards the site are available along the Cunningham Highway at a further distance. Therefore, the magnitude of change is considered to be No Impact.
Magnitude of change assessment – train	• As rail infrastructure is not evident from this location, the magnitude of change is No impact. However, it is noted that the rail alignment is located behind the viewer, and views to passing trains would be possible when looking in the other direction.
Potential effect (operations)	As the non-resident workforce accommodation facility would be decommissioned and rehabilitated, it is considered that the effect of the Project on VP7 during operations would be No Impact .

8.2.8 Viewpoint 8

Table 39: Likely visual effect of the Project on Viewpoint 8

VP8: Millmerran-Inglewood Road near Nicol Creek Road	
Visual baseline assessment	
	
Existing view from Viewpoint 8 Refer to Figure 31: Viewpoint 8 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°3'50.663" S 151°11'57.906" E • Elevation: 400 m • North-easterly view towards Millmerran State Forest from Millmerran-Inglewood Road. • Proposed rail alignment is located approximately 1 km to the east of this viewpoint. • Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Millmerran-Inglewood Road. • North-easterly views from this point provide open views towards the proposed alignment within LCT D: Dry Croplands and Pastures (D14: Millmerran).
Key visual sensitivities	• Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along Millmerran-Inglewood Road (AADT around 1,020 per day, of which up to 24.92 per cent are heavy vehicles). • This viewpoint is located on the <i>Rural Getaway</i> regional tourist drive and the local <i>Millmerran Tourist Drive</i>. • This view comprises a strong character due to the views to Millmerran State Forest, Pine Hill, Mount Domville and Mt Basalt Reserve beyond and rural character in the foreground. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the relatively low interest of viewers (i.e. very low numbers of nearby rural residents and travellers passing at some speed along Millmerran-Inglewood Road).
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• Significant construction areas are proposed within this viewpoint. • Vegetation clearing to facilitate development will be minimal due to the open nature of the rural landscape. • Construction of proposed embankments, cuts, rail infrastructure, realignment of Nicol Creek Road and an active level crossing will cause disturbance within the landscape. • While construction works will be evident from this vantage point the impact of these is temporary which represents a noticeable change and Low magnitude of change.

VP8: Millmerran-Inglewood Road near Nicol Creek Road	
Potential effect (construction works)	The effect of the Project on VP8 during construction works is considered to be Negligible
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is located approximately 1 km to the east of this viewpoint. - The magnitude of change on this receptor is anticipated to be considerable, due to the following factors: - Widespread change in the view due to the introduction of new rail infrastructure into the rural landscape, with embankments reaching heights up to around 7.2 m above the existing surface level, and the deepest cut being approximately -5.2 m below existing surveyed level. - Realignment of Nicol Creek Road, including provision of an active level crossing. - Due to the sparse nature of existing vegetation, vegetation clearance will have minimal impact on the screening of the alignment. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed in this location that will be in keeping with the existing rural character. - At this distance, the alignment and associated infrastructure will be clearly evident, and represent a considerable change to the view, although will largely accord with the existing character of the landscape. This represents a Moderate magnitude of change.
Magnitude of change assessment – train	- Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be clearly evident from this vantage point. - Trains will be evident to nearby isolated rural residents and travellers on Millmerran-Inglewood Road and Nicol Creek Road. Driver views will be experienced intermittently due to the moderate number and transient nature of travellers on these roads. Therefore, the magnitude of impact is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP8 during operations is considered to be Low .

8.2.9 Viewpoint 9

Table 40: Likely visual effect of the Project on Viewpoint 9

VP9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	
Visual Baseline Assessment	
	
Existing view from Viewpoint 9 Refer to Figure 32: Viewpoint 9 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°59'43.434" S 151°13'6.773" E • Elevation: 460 m • South-westerly view towards the proposed alignment and Millmerran-Inglewood Road Rail Bridge #2. • Nearest section of the proposed rail alignment is approximately 240 m to the west of this viewpoint while the Millmerran-Inglewood Road Rail Bridge #2 is located approximately 640 m southwest of this location. • Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling north along Millmerran-Inglewood Road towards Millmerran. • South-westerly views from this point provide contained views towards the proposed alignment, including landscapes typical of LCT D: Dry Croplands and Pastures (D14: Millmerran). • Views are contained due to dense roadside vegetation.
Key visual sensitivities	• Low sensitivity of receptors, including isolated rural residents, workers and travellers experiencing transient views at speed along Millmerran-Inglewood Road (AADT around 1,020 per day, of which up to 24.92 per cent are heavy vehicles). • This viewpoint is located on the <i>Rural Getaway</i> regional tourist drive and the local <i>Millmerran Tourist Drive</i>. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the relatively low interest of viewers (i.e. very low numbers of nearby rural residents and travellers passing at some speed along Millmerran-Inglewood Road).
Visual Evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• Considerable construction areas within proximity to nearby isolated rural residential lots are proposed to the west that would be visible from this viewpoint, including a bridge construction laydown area visible within this view and a major laydown area (including site offices and fuel storage) approximately 90 m to the north of this viewpoint. • Construction of proposed embankments, cuts, Millmerran-Inglewood Road Rail Bridge #2 and the provision of the Heckendorf Road road-over-rail bridge grade separated crossing (part of the local tourist route <i>Rolling Hills and Scenic Lookouts Drive</i>) will cause temporary disturbance within the landscape.

VP9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	
	- Earthworks associated with the proposed alignment will require large volumes of material and vegetation to be removed. - At this distance, construction works and laydown areas will be highly evident and change the visual character of the landscape, albeit temporarily. This is considered to be a Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP9 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 210 m to the west of this viewpoint. - The magnitude of change on this receptor is anticipated to be dominant, therefore high, due to the following factors: - Dominant change due to proposed earthworks and the provision of significant new rail infrastructure, including the Millmerran-Inglewood Road Rail Bridge #2 (rail-over-road), Heckendorf Road road-over-rail bridge and the resurfacing and regrading of Millmerran-Inglewood Road. - Height of proposed embankments varies, with the maximum proposed height approximately 11 m above surveyed surface level at the northern end of the bridge structure. - The deepest cut in this area will be approximately -11.6 m below surveyed surface level. - Due to the dense nature of existing roadside vegetation, vegetation removal will greatly enhance the visibility of the alignment from Millmerran-Inglewood Road. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed in this location and will be in keeping with the existing rural character. - At this distance, the alignment and associated infrastructure will be clearly evident, and represent a dominant change the visual character of the landscape introducing new, dominant visual elements into the landscape, considered to be up to High magnitude of change.
Magnitude of change assessment – train	- Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be clearly evident from this vantage point. - Trains will be evident to nearby isolated rural residents and travellers on Millmerran-Inglewood Road and Heckendorf Road. Driver views will be experienced intermittently due to the moderate number and transient nature of travellers on these roads. Therefore, the magnitude of impact is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP9 during operations is considered to be at most Moderate .

8.2.10 Viewpoint 10

Table 41: Likely visual effect of the Project on Viewpoint 10

VP10: Mount Basalt Reserve, looking towards Millmerran	
Visual Baseline Assessment	
	
Existing view from Viewpoint 10 Refer to Figure 33: Viewpoint 10 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 28°0'54.569" S 151°16'23.297" E • Elevation: 530 m • North-westerly view towards Commodore Peak, Commodore Mine, Millmerran Power Station and Millmerran. • Proposed rail alignment is approximately 5.5 km to the west of this viewpoint. • Represents typical and accessible views of those visiting Mount Basalt Reserve (a destination on the local <i>Rolling Hills and Scenic Lookouts Drive</i>) and walking on the Mount Basalt Circuit, a walking track with lookouts and elevated views. • North-westerly views from this point provide views towards the proposed alignment, as well as landscapes typical LCT D: Dry Croplands and Pastures (D14: Millmerran) and distant views towards landscapes typical of LCT H: Forested Uplands (H15: Commodore Peak and H16: Commodore Peak South) and LCT L: Transitional Landscapes (L:7 Commodore Mine and L8: Millmerran Power Station).
Key visual sensitivities	• Low number of visitors undertaking the Mount Basalt Circuit hiking track, due to its classification as a Class 4 – rough track and its remote location. However, these visitors have a very high level of interest in this environment and views obtained from the summit and trail. • Mount Basalt Reserve is a destination on the local <i>Rolling Hills and Scenic Lookouts Drive</i> and <i>Millmerran Tourist Drive</i>. • Representative of views obtained from the picnic facilities at the Mount Basalt Reserve car park. • Although this view comprises a strong rural character, the presence of the existing rural infrastructure and distant views of Commodore Mine (an open cut coal mine) and Millmerran Power Station detract from the rural and natural qualities and sense of remoteness. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the low number, but high sensitivity of viewers (e.g. hikers) who are walking specifically to obtain panoramic views from the elevated points within Mount Basalt Reserve, a unique geological and environmental area (identified as an area with high scenic amenity value in the <i>Toowoomba Regional Council Scenic Amenity Study</i> (Conics, 2019)).

VP10: Mount Basalt Reserve, looking towards Millmerran	
Visual Evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	- The proposed alignment and associated earthworks will introduce new rail infrastructure into and the existing rural landscape, creating a noticeable change in the landscape character of this viewpoint. - Due to the distance from the alignment, the most evident construction impact will be the clearance of vegetation for the construction of the Project. - This represents a Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP10 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 5.5 km to the west of this viewpoint. The skyline is already affected by the presence of transmission towers, the Commodore Mine and the Millmerran Power Station. - The magnitude of change on this receptor is anticipated to be barely perceptible due to the following factors: - Barely perceptible change due to the provision of new rail infrastructure, which will at this distance become another element in the rural landscape. - Vegetation clearing during bulk earthworks and for the construction of the proposed alignment will have limited impact due to how sparse vegetation is at this location. - At this distance, the alignment will be barely perceptible and will not change the fundamental visual character of the landscape, as it will 'blend' into the existing rural landscape to a considerable extent. - This represents a Negligible magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will only be experienced occasionally due to the low number of people undertaking the Mount Basalt Circuit hiking track. Therefore, the magnitude of impact is considered to be Low.
Potential effect (operations)	The effect of the Project on VP10 during operations is considered to be Low .

8.2.11 Viewpoint 11

Table 42: Likely visual effect of the Project on Viewpoint 11

VP11: Blackwell Road looking towards Millmerran-Inglewood Road	
Visual Baseline Assessment	
	
Existing view from Viewpoint 11 Refer to Figure 34: Viewpoint 11 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°57'30.204" S 151°14'8.213" E • Elevation: 450 m • Northerly view towards Commodore Peak and Millmerran-Inglewood Road. • Proposed rail alignment is approximately 400 m to the west of this viewpoint. • Represents typical and accessible views of nearby isolated rural residents, as well as visitors, workers and tourists travelling along Blackwell Road. • Northerly views from this point provide close views towards the proposed alignment, as well as landscapes typical LCT D: Dry Croplands and Pastures (D14: Millmerran) and distant views towards landscapes typical of LCT H: Forested Uplands (H15: <i>Commodore Peak</i> and H16: <i>Commodore Peak South</i>).
Key visual sensitivities	• Receptors, including isolated rural residents, workers and travellers experiencing transient views along Blackwell Road. • Also representative of views from Millmerran-Inglewood Road (AADT around 1041 per day, of which up to 14.5 per cent are heavy vehicles). • This viewpoint is not located on any tourist drives. • The presence of existing infrastructure (transmission towers) reduces the overall sensitivity of this view. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the relatively low interest of viewers (i.e. very low numbers of nearby rural residents and travellers passing at some speed along Blackwell Road and Millmerran-Inglewood Road).
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the relatively open and flat nature of the landscape in this location. • The proposed location of a large multi-use laydown area to the immediate north of this viewpoint would cause a reduction in visual amenity from this viewpoint. • The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment and associated cuts and embankments. • Earthworks associated with the proposed alignment will require the movement of large volumes of material.

VP11: Blackwell Road looking towards Millmerran-Inglewood Road	
	- Due to the sparse nature of vegetation within the rural landscape, clearing for the construction of the proposed alignment and laydown areas will not greatly reduce the density of screening vegetation, however or impact the visibility of the alignment from Blackwell Road and surrounding isolated rural lots. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP11 during construction works is considered to have Low impact.
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 400 m to the west of this viewpoint. The skyline is already affected by the presence of transmission towers. - The magnitude of change on this receptor is anticipated to be considerable due to the following factors: - Introduction of significant new rail infrastructure on low embankment (up to approximately 1.9 m high in the vicinity of this viewpoint). - Provision of an active level crossing on Blackwell Road. - Vegetation clearing for the construction of the proposed alignment, will have marginal impact on the density of screening vegetation due to the open rural character of this location. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed in this location and will be in keeping with the existing rural character. - At this distance, the alignment, embankments and active level crossing will be clearly perceptible and will have a considerable impact on the character of the landscape as it will be introducing new rail infrastructure into the existing rural setting. This represents a Moderate magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be experienced by a small number of isolated rural residents and by those travelling on Blackwell Road and Millmerran-Inglewood Road. While experienced by a moderate number of motorists, these views are of transient nature. Therefore, the magnitude of change is considered to be Moderate .
Potential effect (operations)	The effect of the Project on VP11 during operations is considered to be Low .

8.2.12 Viewpoint 12

Table 43: Likely visual effect of the Project on Viewpoint 12

VP12: Commodore Peak picnic area looking towards Millmerran Power Station	
Visual baseline assessment	
	
Existing view from Viewpoint 12 Refer to Figure 35: Viewpoint 12 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°56'13.763" S 151°13'59.183" E • Elevation: 500 m • South-easterly view towards Millmerran-Inglewood Road and Commodore Mine. • Proposed rail alignment is approximately 390 m to the southeast of this viewpoint. • Represents typical and accessible views of those visiting Commodore Peak picnic area, a destination on the local <i>Rolling Hills and Scenic Lookouts Drive</i>. • Views towards the proposed alignment from LCT D: Dry Croplands and pastures (D14: Millmerran), including views towards landscapes typical of LCT L: Transitional Landscapes (L7: Commodore Mine and L8: Millmerran Power Station).
Key visual sensitivities	• Moderate number of visitors to Commodore Peak picnic area who have a high level of interest in views obtained from the picnic area, which is a destination on the local <i>Rolling Hills and Scenic Lookouts Drive</i> and the <i>Millmerran Tourist Drive</i>. • Also representative of views obtained from nearby isolated rural residential lots. • Although this view comprises a strong rural character; the presence of the existing rural infrastructure and views towards Commodore Mine and Millmerran Power Station detract from the rural and natural qualities and sense of remoteness. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the medium number, but high sensitivity of viewers (e.g. those utilising Commodore Peak picnic facilities).
Visual Evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• The proposed alignment and associated earthworks will introduce considerable construction works into the view and require the resumption of a nearby rural residential lot. • No laydown areas are located in the immediate vicinity of this viewpoint. • The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment, and associated cuts and embankments. • Earthworks associated with the proposed alignment will require the movement of large volumes of material. • Minor vegetation clearing to facilitate development is anticipated to be negligible, due to the open nature of the rural landscape in this location. • While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.

VP12: Commodore Peak picnic area looking towards Millmerran Power Station	
Potential effect (construction works)	The effect of the Project on VP12 during construction works is considered to have Moderate impact.
Operation	
Magnitude of change assessment – permanent infrastructure	• The nearest section of the alignment is approximately 390 m to the southeast of this viewpoint. • The magnitude of change on this receptor is anticipated to be noticeable due to the following factors: ○ Widespread change due to the introduction of significant new rail infrastructure and the realignment of Rifle Range Road and Scraggs Road (not evident within this view but used to access the lookout). ○ Views towards Millmerran-Inglewood Road are partially obscured due to foreground vegetation and topography. ○ Open, close views to the alignment from Commodore Peak picnic area will be possible, however, as the alignment is at a lower elevation and in cut within the view (depths up to approximately – 12.8 m) it is anticipated that the alignment will blend somewhat into the existing rural landscape. ○ Vegetation clearing for the construction of the proposed alignment will have marginal impact on the density of screening vegetation due to the open rural character of this location. ○ Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway, including Commodore Mine. Standard rural chain wire fencing is proposed along both boundaries in this location and will be in keeping with the existing rural character. At this distance, the new rail infrastructure will be noticeable, while views to the alignment will be limited due to its lower elevation. This represents a Low magnitude of change.
Magnitude of change assessment – train	• Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be limited and partially screened due to the lower design level of the railway track and screening foreground vegetation. Therefore, the magnitude of impact is considered to be Low.
Potential effect (operations)	The effect of the Project on VP12 during operations is considered to be Low .

8.2.13 Viewpoint 13

Table 44: Likely visual effect of the Project on Viewpoint 13

VP13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	
Visual Baseline Assessment	
	
Existing view from Viewpoint 13 Refer to Figure 36: Viewpoint 13 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°54'24.233" S 151°15'53.718" E • Elevation: 410 m • Southerly view towards Millmerran-Inglewood Road and Millmerran-Inglewood Road Rail Bridge #3. • Proposed rail alignment and Millmerran-Inglewood Road Rail Bridge #3 is approximately 210 m to the south of this viewpoint whilst roadworks associated with Millmerran-Inglewood Road being approximately 90 m to the south of this location. • Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling south along Millmerran-Inglewood Road towards Inglewood. • Southerly views from this point provide views towards the proposed alignment, including landscapes typical of LCT B: Vegetated Watercourses – Creeks (B17: Leonard (Back Creek)) and LCT D: Dry Croplands and Pastures (D14 Millmerran).
Key visual sensitivities	• Low sensitivity of receptors, including isolated rural residents, workers and travellers experiencing transient views at speed along Millmerran-Inglewood Road (AADT around 1,020 per day, of which up to 24.92 per cent are heavy vehicles). • This viewpoint is located on the <i>Rural Getaway</i> regional tourist drive and local <i>Rolling Hills and Scenic Lookouts Drive</i>, <i>Brigalow Belt Power Station Drive</i> and <i>Millmerran Tourist Drive</i>. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the relatively low interest of viewers (i.e. very low numbers of nearby rural residents and travellers passing at some speed along Millmerran-Inglewood Road).
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• Considerable construction areas including a laydown area are proposed within proximity to this viewpoint, to the southern side of the tributary of Back Creek. These would be visible from this viewpoint and nearby isolated rural residential lots. • Substantial vegetation clearing for the construction of the proposed alignment and Millmerran-Inglewood Road Rail Bridge #3 will reduce the density of screening vegetation, increasing the visibility of the alignment from Millmerran-Inglewood Road and surrounding isolated rural residential lots.

VP13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	
	• Earthworks associated with the proposed alignment will require the movement of large volumes of material. • The presence of plant constructing the alignment, Millmerran-Inglewood Road Rail Bridge # 3 and embankments will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint. • While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The significance of the effect of the Project on VP13 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	• The nearest section of the alignment is approximately 210 m to the south of this viewpoint. • The magnitude of change on this receptor is anticipated to be considerable, therefore moderate, due to the following factors: ○ Dominant change due to proposed earthworks and the provision of significant new rail infrastructure, including the Millmerran-Inglewood Road Rail Bridge #3 (rail-over-road). ○ Height of proposed embankments varies, with the maximum proposed height being approximately 10.9 m above surveyed surface level at the western end of the bridge structure. ○ Selective clearing of roadside and riparian vegetation will enhance the visibility of the alignment from Millmerran-Inglewood Road and nearby isolated rural residential lots. ○ Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural fencing is proposed and will be in keeping with the existing rural character. • At this distance, the alignment and Millmerran-Inglewood Road Rail Bridge #3 will be clearly evident, as it will be introducing new rail infrastructure into the existing rural setting. This represents a High magnitude of change.
Magnitude of change assessment – train	• Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be clearly evident from this vantage point. • Trains will be evident to nearby isolated rural residents and to a moderate number of travellers on the Millmerran-Inglewood Road. Views obtained by drivers would be transient as cars are moving at speed along this road. Therefore, the magnitude of impact is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP13 during operations is considered to be Moderate .

8.2.14 Viewpoint 14

Table 45: Likely visual effect of the Project on Viewpoint 14

VP14: Nardoo Street edge of Millmerran	
Visual baseline assessment	
	
Existing view from Viewpoint 14 Refer to Figure 37: Viewpoint 14 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°52'42.036" S 151°16'18.162" E • Elevation: 400 m • South-easterly view towards Back Creek, showing lots of Nardoo Street in the foreground. • Proposed rail alignment is approximately 3.1 km to the southeast of this viewpoint. • Represents typical and accessible views of residents of Millmerran. • South-easterly views from this viewpoint provide views towards the proposed alignment and Back Creek, including landscapes typical of F: Rural Settlement (F13: Millmerran) and LCT B: Vegetated Watercourses – Creeks and Channels (B17: Leonard (Back Creek)).
Key visual sensitivities	• Receptors include residents of Millmerran, particularly lots on Nardoo Street and Margaret Street. • This view is also representative of views from Millmerran Golf Course, approximately 670 m to the south of this viewpoint. • This viewpoint is located close to the Open Plains Country Dive local tourist route. • The presence of residential lots and existing infrastructure (power poles and powerlines) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and the proximity of this viewpoint to the alignment.
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• Due to the distance of this viewpoint from the alignment and screening vegetation along Back Creek, construction works (including several laydown areas located in the vicinity of Owens Scrub Road) are anticipated to be barely perceptible. • The proposed Turallin facility is located approximately 7.9 km northwest of this viewpoint (beyond the boundary of the LVIA impact assessment area) and will not be evident from this location or the settlement of Millmerran. • It is also acknowledged that a non-resident workforce accommodation facility is proposed in the vicinity of Millmerran, however as the location of this site is not known it has not been considered further in this assessment. • This represents a Negligible magnitude of change.

VP14: Nardoo Street edge of Millmerran	
Potential effect (construction works)	The effect of the Project on VP14 during construction works is considered to have Low impact.
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 3.1 km to the southeast of this viewpoint. - The magnitude of change on this receptor is anticipated to be negligible, due to the following factors: - Negligible change due to the distance of the viewpoint from the alignment and screening of the alignment by existing riparian vegetation along Back Creek. - This represents a Negligible magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be typically screened by riparian vegetation along Back Creek. Therefore, the magnitude of impact is considered to be Negligible.
Potential effect (operations)	The effect of the Project on VP14 during operations is considered to be Low .

8.2.15 Viewpoint 15

Table 46: Likely visual effect of the Project on Viewpoint 15

VP15: Turallin Road towards the proposed Turallin facility	
Visual baseline assessment	
	
Existing view from Viewpoint 15 Refer to Figure 38: Viewpoint 15 in Appendix 2 for full sized image.	
Location and description	- GPS Location: 27°50'2.832" S 151°12'32.448" E - Elevation: 405.3 m - Westerly view towards the proposed Turallin facility. - Proposed rail infrastructure is not evident within this view. - The proposed Turallin facility is located approximately 200 m to the southwest of this viewpoint, while the proposed access road is located approximately 110 m to the northwest of this viewpoint. - Represents typical and accessible views of those travelling along Turallin Road. - Westerly views from this viewpoint provide close open views towards the proposed Turallin facility and landscapes typical of LCT D: Dry Croplands and Pastures (D14: Millmerran).

VP15: Turallin Road towards the proposed Turallin facility	
Key visual sensitivities	- Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along Turallin Road. - This viewpoint is not located on or near any tourist drives. - This viewpoint it is considered to have a Low sensitivity overall to the change proposed, due to the relatively low number of nearby rural residential viewers with a specific interest in this view and the low number of travellers on Turallin Road with a transient interest in views from this location.
Visual evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	- The construction of the Turallin facility to accommodate a range of potential uses including a native plants nursery, traditional land management training facility, training and material testing facility and general construction laydown and storage. A nominal 20 ha area has been allocated to accommodate the facility; however, it is not anticipated that the whole area would be required to be cleared. - Due to the proximity of this viewpoint to the proposed, it is anticipated that views towards the construction of the site will be clearly evident from this location, however, these views will typically be transient views experienced by drivers passing along Turallin Road. - Vegetation clearing for the construction of the proposed Turallin facility footprint will remove some existing vegetation, including existing mature vegetation adjacent Turallin Road. However, due to the generally cleared nature of the rural landscape within the site's footprint, it is not anticipated that this will noticeably increase the visibility of the alignment from Turallin Road and surrounding isolated rural residential lots. - At this distance, the construction of the Turallin facility will be clearly perceptible; however, construction activities will be partly screened by existing vegetation. - The impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP15 during construction works is considered to have Low impact.
Operation	
Magnitude of change assessment – permanent infrastructure	- The Turallin facility is approximately 200 m to the southwest of this viewpoint. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Dominant change due to proposed earthworks and the provision of the facility and access road within what is currently a largely undeveloped rural landscape. - It is noted that the facility will be decommissioned and rehabilitated, and therefore it is anticipated that the magnitude of change during operation will be No Impact.
Magnitude of change assessment – train	As rail infrastructure is not evident from this location, the magnitude of change is No impact.
Potential effect (operations)	The effect of the Project on VP15 during operations is considered to be No Impact .

8.2.16 Viewpoint 16

Table 47: Likely visual effect of the Project on Viewpoint 16

VP16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	
Visual baseline assessment	
	
Existing view from Viewpoint 16 Refer to Figure 39: Viewpoint 16 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°50'14.982" S 151°21'59.676" E • Elevation: 390.2 m • South-easterly view towards the existing non-operational QR South Western System railway. • Proposed rail alignment is approximately 170 m to the southeast of this viewpoint. • Represents typical and accessible views of those travelling along Millmerran-Leyburn Road which is part of several local tourist drives including <i>Condamine River Flats Drive</i> and <i>Historic Owen's Scrub Drive</i> and also provides access to Yarramalong Weir and the associated camping area. • South-easterly views from this viewpoint provide views towards the proposed alignment and landscapes typical of LCT B: Vegetated Watercourses – Creeks and Channels (B18: Grass Tree Creek) and LCT C: Irrigated Croplands (C35: Grass Tree Creek).
Key visual sensitivities	• Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along Millmerran-Leyburn Road (AADT around 174 per day, of which up to 23.97 per cent are heavy vehicles). • This viewpoint is located on the <i>Condamine River Flats Drive</i> and <i>Historic Owen's Scrub Drive</i> local tourist routes and provides access to Yarramalong Weir. • The presence of existing infrastructure (including the existing (non-operational) railway, silos, power poles and powerlines) reduces the overall sensitivity of this view. • Overall, this viewpoint it is considered to have a Low sensitivity overall to the change proposed, due to the low number of isolated rural lots near this viewpoint, and the low number of travellers passing at some speed along Millmerran-Leyburn Road. Whilst it is acknowledged that some travellers may have an elevated interest in their surroundings if following scenic routes, it is noted that these viewers would only experience transient views.

VP16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	
Visual evaluation	
	
Photomontage view from Viewpoint 16 Refer to <i>in Appendix 2 for full sized image.</i>	
Construction	
Magnitude of change assessment	- The construction of the proposed alignment and associated infrastructure will introduce considerable construction works into the view. This change will be exacerbated by the open flat landscape and lack of screening vegetation in this location. - Whilst vegetation clearing to facilitate development will be minimal due to the open nature of the rural landscape, existing trees within the road reserve and construction footprint will be removed. - The proposed location of a large laydown area for the storage of precast concrete immediately to the north of this viewpoint would cause a temporary reduction in visual amenity from this viewpoint. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP16 during construction works is considered to have Low impact.
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 170 m to the southeast of this viewpoint. - The magnitude of change on this receptor is anticipated to be considerable, due to the following factors: - Provision of new rail infrastructure within the existing rail corridor, on low embankment up to around 3.1 m high. - High visibility towards the proposed alignment from Millmerran-Leyburn Road due to the lack of existing vegetation. - Provision of an active level crossing to Millmerran-Leyburn Road. - Fencing is not anticipated to be provided within the Condamine River floodplain (guide posts only will be provided). However, there will be fencing associated with bridge structures. - At this distance, the alignment and Millmerran-Leyburn Road active level crossing will be clearly evident, however will not change the visual character of the landscape, as it will be replacing existing rail infrastructure within what is highly modified agricultural setting. This represents a Moderate magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be experienced by a small number of rural residents and by those travelling on Millmerran-Leyburn Road. While experienced by a small number of motorists, these views are of transient nature. Therefore, the magnitude of change is considered to be Moderate.

VP16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	
Potential effect (operations)	The effect of the Project on VP16 during operations is considered to be Low .

8.2.17 Viewpoint 17

Table 48: Likely visual effect of the Project on Viewpoint 17

VP17: Gore Highway towards Condamine River crossing and floodplain	
Visual baseline assessment	
	
Existing view from Viewpoint 17 Refer to Figure 40: Viewpoint 17 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°48'6.336" S 151°22'46.547" E • Elevation: 370 m • Southerly views towards the Condamine River and private rural lots. • Proposed rail alignment is approximately 1.2 km to the southeast of this viewpoint. • Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along the Gore Highway. • Southerly views from this point provide open views towards landscapes typical of LCT C: Irrigated Croplands (C33: Pampas) and distant views to LCT A: Vegetated Watercourses – Rivers (A2: Condamine River).
Key visual sensitivities	• Receptors include isolated rural residents, workers and travellers experiencing distant transient views at speed along the Gore Highway (AADT around 2,666 per day, of which up to 30.16 per cent are heavy vehicles). • This viewpoint is located on the local <i>Open Plains Country Drive</i> and <i>Condamine River Flats Drive</i>. • Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the low number of nearby isolated rural receptors, and the relatively low interest of a moderate number of travellers passing at some speed along the Gore Highway, who are the primary visual audience in this location. Whilst it is acknowledged that some travellers may have an elevated interest in their surroundings if following scenic routes, it is noted that these viewers would only experience transient views.

VP17: Gore Highway towards Condamine River crossing and floodplain	
Visual evaluation	
	
Photomontage view from Viewpoint 17 Refer to Figure 40: Viewpoint 17 and visualisation Appendix 2 for full sized image.	
Construction	
Magnitude of change assessment	- The construction of the proposed alignment and Condamine River Main Branch Rail Bridge and associated infrastructure will introduce considerable construction works into the view. This change will be exacerbated by the open flat landscape and lack of screening vegetation. - The proposed location of two laydown areas for bridge construction approximately 1 km to the east and 1.3 km to the south of this viewpoint would cause a temporary reduction in visual amenity from this viewpoint, however, visibility towards these laydowns is considered to be limited due to the distance of these sites from this location and the presence of screening vegetation and infrastructure associated with the homestead evident in the left hand side of the view. - Due to the distance from the alignment and temporary nature of construction work, the impact represents a noticeable change and Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP17 during construction works is considered to have Negligible impact.
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 1.2 km to the southeast of this viewpoint. - The magnitude of change on this receptor is anticipated to be noticeable change due to the following factors: - Noticeable change due to the provision of new rail infrastructure on bridge structure (Condamine River Main Branch Rail Bridge) within the existing rail corridor. - High visibility towards the proposed alignment from the Gore Highway due to the lack of existing vegetation. - It is not considered that isolated vegetation removal for the construction of the Condamine River crossing will have a noticeable impact on the density of screening vegetation, as views towards the river crossing are partially screened by an existing dam on private lot. - Fencing is not anticipated to be provided within the Condamine River floodplain (guide posts only will be provided). However, there will be fencing associated with the bridge structure.

VP17: Gore Highway towards Condamine River crossing and floodplain	
	At this distance, the alignment and new Condamine River Main Branch Rail Bridge (with a maximum height of approximately 8.4 m above existing ground level where it crosses Gilgai Lane) will be noticeable, and will somewhat change the visual character of the landscape, as it will be replacing existing rail infrastructure on embankment with new rail infrastructure on large bridge structure. As this is within what is a highly modified agricultural setting, this is considered to represent a Moderate magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be experienced by a small number of rural residents and by those travelling on the Gore Highway. While experienced by a moderate number of motorists, these views are of transient nature. Therefore, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP17 during operations is considered to be Low .

8.2.18 Viewpoint 18

Table 49: Likely visual effect of the Project on Viewpoint 18

VP18: Gore Highway near service station, Pampas	
Visual baseline assessment	
	
Existing view from Viewpoint 18 Refer to Figure 41: Viewpoint 18 in Appendix 2 for full sized image.	
Location and description	- GPS Location: 27°47'25.625" S 151°24'42.882" E - Elevation: 380 m - North-easterly view towards lots of Pampas and distant views to the Condamine River (north branch). - Proposed rail alignment is approximately 80 m to the southeast of this viewpoint. - Represents typical and accessible views of nearby residents of Pampas and of visitors, workers and tourists travelling along the Gore Highway. - North-easterly view from this point provides open views towards the proposed alignment, as well as landscapes typical of LCT C: Irrigated Croplands (C33: Pampas) and distant views to LCT A: Vegetated Watercourses – Rivers (A1: Condamine River (North Branch)).
Key visual sensitivities	- Receptors include low number of residents of Pampas who are located in very close proximity to the alignment, workers and travellers experiencing transient views at speed along the Gore Highway (AADT around 2,666 per day, of which up to 30.16 per cent are heavy vehicles). - This viewpoint is located on the local <i>Open Plains Country Drive</i> and <i>Condamine River Flats Drive</i>. - The presence of existing infrastructure (power poles, powerlines, and the existing Millmerran Branch Line (disused) reduces the overall sensitivity of this view.

VP18: Gore Highway near service station, Pampas	
	This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view, the proximity of this viewpoint to the alignment and the relatively low interest of a moderate number of travellers passing at some speed along the Gore Highway (which includes some travellers following scenic routes).
Visual evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the relatively open and flat nature of the landscape in this location, lack of screening vegetation and the high visibility and proximity of construction works to the Gore Highway and nearby residential lots of Pampas. - The proposed location of a laydown immediately southeast of this viewpoint would cause a reduction in visual amenity from this viewpoint, however this would be temporary. - The key impacts will relate to the presence of construction plant and disturbance due to the construction of the proposed alignment, realignment of Elsdon Road, Fysh Road and the construction of a proposed active level crossing. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP18 during construction works is considered to have Moderate impact.
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 80 m to the southeast of this viewpoint. The skyline is already affected by the presence of powerlines, power poles and existing rail infrastructure. - The magnitude of change on this receptor is anticipated to be noticeable change due to the following factors: - Noticeable change due to the provision of new rail infrastructure within the existing rail corridor, realignment of Elsdon Road and Fysh Road and provision of a new active level crossing. - Infrastructure is on low embankment, typically around 0.7 m in the vicinity of this viewpoint and up to around 2.1 m high (in the vicinity of the Condamine River North Branch Rail Bridge), so will blend with the exiting rural view to some extent. It is noted that there is existing rail infrastructure in this view, and that rail infrastructure is part of the existing visual character of the wider area. - Due to the open nature of agricultural land the alignment passes through in this location, vegetation clearing for the construction of the proposed alignment is considered to have negligible impact upon screening vegetation. - Fencing is not anticipated to be provided within the Condamine River floodplain, however, through Pampas a standard chain link boundary fence will be provided to enhance safety. - At this close distance, the alignment and the provision of an active level crossing and realignment of Elsdon Road and Fysh Road will be noticeable, however will not change the visual character of the landscape, as it will be replacing and formalising road infrastructure within the existing road reserves and replacing existing rail infrastructure within the existing railway corridor, within a highly modified agricultural setting. This represents a Low magnitude of change.

VP18: Gore Highway near service station, Pampas	
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the open views of the railway track from this viewpoint. Close views to the alignment will be possible for nearby residents of Pampas. While experienced by close residential lots and by a moderate number of motorists travelling on the Gore Highway, these views are of transient nature. It is noted that the existing rail line is not in use. Therefore, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP18 during operations is considered to be Moderate .

8.2.19 Viewpoint 19

Table 50: Likely visual effect of the Project on Viewpoint 19

VP19: Gore Highway towards Condamine River (north branch) crossing	
Visual baseline assessment	
	
Existing view from Viewpoint 19 Refer to Figure 42: Viewpoint 19 in Appendix 2 for full sized image.	
Location and description	- GPS Location: 27°46'49.236" S 151°25'25.577" E - Elevation: 380 m - Southerly view towards the Condamine River North Branch Rail Bridge and distant views towards Pampas. - Proposed rail alignment is approximately 70 m to the southeast of this viewpoint. - Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along the Gore Highway. - Southerly views from this point provide open views towards the existing rail line and proposed alignment, as well as landscapes typical of LCT C: Irrigated Croplands (C33: Pampas) and close views towards LCT A: Vegetated Watercourses – Rivers (A1: Condamine River (North Branch)).
Key visual sensitivities	- Receptors include isolated rural residents, workers and travellers experiencing transient views at speed along the Gore Highway (AADT around 2,666 per day, of which up to 30.16 per cent are heavy vehicles). - This viewpoint is located on the local <i>Open Plains Country Drive</i>. - Overall, this viewpoint is considered to have a Low sensitivity to the change proposed, due to the relatively low interest of viewers (i.e. small numbers of nearby rural residents and travellers passing at some speed along the Gore Highway).
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	

VP19: Gore Highway towards Condamine River (north branch) crossing	
Construction	
Magnitude of change assessment	- The provision of a laydown area and construction of the proposed alignment and Condamine River North Branch Rail Bridge and associated infrastructure will create a considerable change in the landscape character of this viewpoint. - This change will be exacerbated by the relatively open and flat nature of the landscape in this location, sparse nature of vegetation (restricted to river channel) and the high visibility and proximity of construction works to the Gore Highway. - Selective vegetation clearing will reduce the density of riparian vegetation, increasing the visibility of the alignment from the Gore Highway. - The proposed location of a laydown area immediately southeast of this viewpoint would cause a reduction in visual amenity from this viewpoint, however this would be temporary. - The presence of plant constructing the alignment and Condamine River North Branch Rail Bridge will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP19 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 70 m to the southeast of this viewpoint. - The magnitude of change on this receptor is anticipated to be noticeable, due to the following factors: - There is already a road and rail bridge present over the Condamine River (north branch) in this location. - The skyline is already affected by the presence of power poles and powerlines. - Noticeable change due to the provision of new rail infrastructure on bridge structure (approximately 2 m above the existing ground level) within the existing rail corridor. - High visibility towards and proximity to the proposed alignment from the Gore Highway. - Localised vegetation removal for the construction of the Condamine River crossing will have a noticeable impact on the density of screening vegetation. - Fencing will not be constructed within the Condamine River floodplain; only guide posts will be provided. - At this distance, the alignment and new Condamine River North Branch Rail Bridge (typically approximately 2 m above existing rail line) will be clearly evident, however will not change the visual character of the landscape, as it will be replacing existing rail infrastructure within what is highly modified agricultural setting. This represents a Low magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the open views of the railway track from this viewpoint. Close views to the alignment will be possible for those travelling on the Gore Highway. While experienced by a moderate number of motorists, these views are of transient nature. Therefore, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP19 during operations is considered to be Low .

8.2.20 Viewpoint 20

Table 51: Likely visual effect of the Project on Viewpoint 20

VP20: Near Brookstead State School	
Visual baseline assessment	
	
Existing view from Viewpoint 20 Refer to Figure 43: Viewpoint 20 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°45'27.563" S 151°27'7.205" E • Elevation: 390 m • North-easterly view towards the Gore Highway from Ware Street, near Brookstead State School. • Proposed rail alignment is approximately 90 m to the southeast of this viewpoint. • Represents typical and accessible views of school patrons, residents of Brookstead and of visitors, workers and tourists travelling along Ware Street and utilising nearby facilities (playground, amenities and BBQ/picnic facilities) at the historic railway station. • North-easterly views from this point provide open views towards the existing rail line and proposed alignment from LCT F: Rural Settlement (F11: Brookstead) across LCT C: Irrigated Croplands (C32: Brookstead).
Key visual sensitivities	• Moderate sensitivity of receptors, including a relatively low number of residents of Brookstead with residential lots situated in very close proximity to the alignment and the Gore Highway Road Bridge. • This viewpoint is located on the local <i>Open Plains Country Drive</i>. • The presence of existing infrastructure (existing railway tracks and railway sidings) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and the proximity of this viewpoint to the alignment.
Visual evaluation	
	

VP20: Near Brookstead State School

Photomontage view from Viewpoint 20

Refer to Figure 43: Viewpoint 20 and visualisation in Appendix 2 for full sized image.



Photomontage view from Viewpoint 20 – noise wall option

Refer to Figure 44: Viewpoint 20 and visualisation (noise wall option and post-mitigation) in Appendix 2 for full sized image.



Photomontage view from Viewpoint 20 – indicative mitigation and noise wall option

Refer to Figure 44: Viewpoint 20 and visualisation (noise wall option and post-mitigation) in Appendix 2 for full sized image.

Note: Visualisation of noise wall shown is indicative only, showing a schematic option for the instalment of noise barriers and vegetative screening in this location. Design of noise barriers and provision of planting subject to development at detailed design stage and liaison with land owners and managers.

VP20: Near Brookstead State School



Aerial visualisation looking southwest towards Brookstead from vicinity of Viewpoint 20 – indicative image only (showing revised draft EIS design)

Refer to Figure 45: Viewpoint 20 – aerial visualisation in Appendix 2 for full sized image.

Construction

Magnitude of change assessment	- The construction of the proposed alignment will be within greenfield land, approximately 50 m to the southeast of the existing rail corridor and 90 m to the southeast of this viewpoint will create a noticeable change in the landscape character of this viewpoint. - No laydown areas are located in the immediate vicinity of this viewpoint. - Existing vegetation along Ware Street provides some screening of views from nearby residential lots and the school towards the proposed alignment, however vegetation within the construction footprint will be removed to facilitate the construction of the new rail alignment and provision of the new rail corridor. - Vegetation clearance and earthworks to construct embankments, the Gore Highway Road Bridge, the alignment and facilitate the reconfiguration of local roads will cause a reduction in visual amenity, particularly within consideration of nearby views obtained from the Gore Highway. - The presence of construction plant constructing the alignment and Gore Highway Road Bridge will temporarily change the character of the landscape, creating a noticeable change in the landscape character of this viewpoint. - This represents a Moderate magnitude of change.
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Potential effect (construction works)	The effect of the Project on VP20 during construction works is considered to be Moderate .
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Operation

Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 90 m to the southeast of this viewpoint. The view is already affected by the presence of existing rail infrastructure. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Considerable change due to the provision of a new single track dual-gauge railway to the south of the existing rail line, Gore Highway Road Bridge and the realignment of Saal Road and Ware Street. The rail line will be largely at
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VP20: Near Brookstead State School	
	grade and on low embankment (up to 1.4 m above existing grade) so will be similar in appearance to the existing rail line. ○ Vegetation clearing for the construction of the proposed alignment will increase the visibility of the alignment from lots situated on Ware Street. ○ Fencing will extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed where the corridor adjoins agricultural land that will be in keeping with the existing rural character. Within the Brookstead settlement area (including in this view) standard chain link boundary fence will be provided. • At this distance, the alignment and associated infrastructure will be clearly evident, and represent a considerable change to the view (primarily due to the removal of existing vegetation), although will largely accord with the existing character of the landscape. Therefore, it is considered to be up to High magnitude of change. • Options for noise attenuation include the potential for the provision of noise barriers within the vicinity of this location to the north of the proposed railway centreline adjacent Ware Street. • It is noted that if noise barriers were installed in this location, the magnitude of change would the magnitude of change would further increase, however remain High (as it is the highest magnitude of change possible).
Magnitude of change assessment – train	• Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the proximity of the railway track to this viewpoint. Close views to the alignment will be possible for nearby residents of Brookstead and from Brookstead State School. While experienced by close residential lots these views are of transient nature. It is noted that while the existing Millmerran Branch Line currently facilitates freight train movements (single stacked), the line to the south of Brookstead is disused, while the existing GrainCorp Silo Facility, siding and Millmerran Branch Line to the north of Brookstead are currently operational. Therefore, the magnitude of change is considered to be Low.
Potential effect (operations)	The effect of the Project on VP20 during operations is considered to be High. It is noted that if noise barriers are installed in this location, the effect of the Project during operation would remain High.

8.2.21 Viewpoint 21

Table 52: Likely visual effect of the Project on Viewpoint 21

VP21: Glen Devon Road looking south from elevated private residential lots	
Visual Baseline Assessment	
	
Existing view from Viewpoint 21 Refer to Figure 46: Viewpoint 21 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°42'45.551" S 151°33'57.708" E • Elevation: 490 m • South-westerly view towards Murlaggan Road and the existing railway line. • Proposed rail alignment is approximately 210 m to the south of this viewpoint. • Represents typical and accessible views of nearby elevated and isolated rural residential lots. • South-westerly views from this point provide open views towards the existing rail line and proposed alignment, and views of LCT I: Settled Hills (I1: Pittsworth Hills).
Key visual sensitivities	• Low sensitivity of receptors, particularly very low number of nearby rural residents who are, however, located in very close proximity to the alignment. • There are no tourist drives located close to this viewpoint. • The presence of existing infrastructure (existing railway tracks) reduces the overall sensitivity of this view. • This viewpoint is considered to have a Low sensitivity overall to the change proposed, due to the very low number of nearby rural residential viewers with a specific interest in this view and the proximity of this viewpoint to the alignment.
Visual evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	• The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the proximity of the isolated rural residences to the works in this location. • The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment, associated cuts and embankments and the realignment of Murlaggan Road and new tie into the existing Millmerran Branch Line. • The construction of the proposed alignment will require the resumption and removal of a nearby lot (close to but not visible in this viewpoint). • The proposed location of a large laydown area approximately 430 m to the southwest of this viewpoint would cause a temporary reduction in visual amenity. • During construction, demolition of the existing railway is likely to occur. The fate of the existing Millmerran branch Line south of Ch 167.8 km will be determined by QR. Where the Project overlaps the existing rail link it will be decommissioned. However where they are separate, QR may opt to leave the redundant rail infrastructure in place.

VP21: Glen Devon Road looking south from elevated private residential lots	
	- Earthworks associated with the proposed alignment will require large volumes of material and isolated pockets of vegetation to be removed. - While construction works will be clearly evident and occupy a large proportion of the view from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP21 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 210 m to the south of this viewpoint. The view is already affected by the presence of existing rail infrastructure. - The magnitude of change on this receptor is anticipated to be considerable due to the following factors: - Considerable change due to the provision of a new single track dual-gauge railway primarily to the north of the existing rail line, realignment of Murlaggan Road and new tie in to the existing Millmerran branch Line. - The rail line will be largely in cut, at depths up to approximately -21 m below the existing surface level, however distant views to large embankments and the Roche Road rail-over-road bridge may be possible from nearby rural residential lots. - Vegetation clearing for the construction of the proposed alignment, cuts, embankments and road infrastructure will be noticeable. Removal of this vegetation will open views towards the embankment and the Roche Road rail-over-road bridge. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the proposed alignment, realignment of Murlaggan Road and new tie into the existing Millmerran Branch Line will be clearly evident, however will not change the fundamental visual character of the landscape, as the additional rail and road infrastructure will blend somewhat into the existing rural setting. It is anticipated that close views to the alignment and cuts will be possible from nearby rural residential lots, while distant views towards the alignment, embankments and Roche Road Rail Bridge may be possible. This represents a Moderate magnitude of change.
Magnitude of change assessment – train	The existing rail line is in current use. Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be partially screened due to the lower elevation of the railway track in the proximity of this viewpoint. It is anticipated that close views towards the alignment in cut will be possible from nearby isolated rural residential lots, while distant views towards embankments and the Roche Road Rail Bridge may also be possible. Therefore, overall, the magnitude of change is considered to be Low.
Potential effect (operations)	The effect of the Project on VP21 during operations is considered to be Low .

8.2.22 Viewpoint 22

Table 53: Likely visual effect of the Project on Viewpoint 22

VP22: Pittsworth-Felton Road near Pittsworth Motor Inn	
Visual baseline assessment	
	
Existing view from Viewpoint 22 Refer to Figure 47: Viewpoint 22 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°42'30.6" S 151°37'36.299" E • Elevation: 510 m • Northerly view from Pittsworth-Felton Road near Pittsworth Motor Inn towards the Gore Highway and elevated lots situated on Dallman Road. • Proposed rail alignment is approximately 200 m to the northwest of this viewpoint. • Represents accessible views typically obtained by residents on the northern edge of Pittsworth, guest of Pittsworth Motor Inn and of visitors, workers and tourists travelling along Pittsworth-Felton Road. It is also representative of travellers on the A39 Gore Highway. • Northerly views from this point provide open views from LCT F: Rural Settlement (F10: Pittsworth) across of LCT I: Settled Hills (I1: Pittsworth Hills) towards proposed alignment.
Key visual sensitivities	• Moderate sensitivity of receptors, particularly residents of Pittsworth who are located in very close proximity to the alignment. • This viewpoint is located close to the local <i>Open Plains Country Drive</i> tourist route. • The presence of existing infrastructure (power poles, powerlines, and street lights) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the proximity of nearby residential viewers with a specific interest in this view, including those staying at Pittsworth Motor Inn.
Visual evaluation	
	
Photomontage view from Viewpoint 22	

VP22: Pittsworth-Felton Road near Pittsworth Motor Inn

Refer to Figure 47: Viewpoint 22 and visualisation in Appendix 2 for full sized image.



Photomontage view from Viewpoint 22 – indicative noise wall option

Refer to Figure 48: Viewpoint 22 and visualisation (noise wall option and post-mitigation) in Appendix 2 for full sized image.



Photomontage view from Viewpoint 22 – Indicative mitigation and noise wall option

Refer to Figure 48: Viewpoint 22 and visualisation (noise wall option and post-mitigation) in Appendix 2 for full sized image.

Note: Visualisation of noise wall and mitigation measures shown are indicative only, showing a schematic option for the instalment of noise barriers and vegetative screening, Adin this location. Design of noise barriers subject to development at detailed design stage and liaison with land owners and managers.

Construction

Magnitude of change assessment

- The construction of the proposed alignment, Oakey-Pittsworth Road rail-over-road bridge and realignment of Quibet/Dallman Road will create a considerable change in the landscape character and views obtained from this viewpoint.
- A small bridge laydown area will be evident within this view.
- Earthworks associated with the proposed alignment will require the movement of large volumes of material.
- The lack of existing mature vegetation provides open views from nearby residential lots and the Pittsworth Motor Inn to the proposed alignment.
- The presence of plant constructing the alignment, roads, cuts, embankments and Oakey-Pittsworth Road Rail Bridge and will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint.
- While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and **Moderate** magnitude of change.

VP22: Pittsworth-Felton Road near Pittsworth Motor Inn	
Potential effect (construction works)	The effect of the Project on VP22 during construction works is considered to be Moderate .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 200 m to the northwest of this viewpoint. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Dominant change due to the provision of a new single track dual-gauge railway on private land on a large embankment and the provision of a rail-over-road bridge over Oakey-Pittsworth Road. - Proposed earthworks include large embankments and cuts. The height of proposed embankments varies, with the maximum proposed height being approximately 13.9 m above natural ground, and the deepest cut (to the right hand side of the view) being approximately -6 m below existing surveyed level. - Due to the sparse nature of existing vegetation, vegetation clearance will have minimal impact on the screening of the alignment. - Provision of a new rail-over-road bridge over Oakey-Pittsworth Road will introduce new infrastructure into the view. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the alignment, realignment of Quibet/Dallman Road and new rail-over-road bridge will be clearly evident and will have a considerable impact on the character of the landscape as it will be introducing new rail infrastructure into the current view. This represents a High magnitude of change. - Options for noise attenuation include the potential for the provision of noise barriers within the vicinity of this location to the south of the proposed railway centreline adjacent the Gore Highway. - It is noted that if noise barriers were installed in this location, the magnitude of change would further increase, however remain High (as it is the highest magnitude of change possible).
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the open, elevated views of the railway track from this viewpoint. Close views to the alignment will be possible for nearby residents of Pittsworth and residents on Dallman Road and Quibet Road. While experienced by close residential lots these views are of transient nature. Due to the lack of existing rail infrastructure, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP22 during operations is considered to be High. It is noted that if noise barriers are installed in this location, the effect of the Project during operation would remain High.

8.2.23 Viewpoint 23

Table 54: Likely visual effect of the Project on Viewpoint 23

VP23: Stanley Street near local park, Pittsworth	
Visual baseline assessment	
	
Existing view from Viewpoint 23 Refer to Figure 49: Viewpoint 23 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°42'26.32"S 151°37'58.56"E • Elevation: 525 m • Northerly view from the small park on Stanley Street on the northern outskirts of Pittsworth, towards the Gore Highway and elevated lots situated on Dallman Road. • Proposed rail alignment is approximately 380 m to the northwest of this viewpoint. • Represents accessible views typically obtained by residents on the northern edge of Pittsworth, visitors to the park and of those utilising the nearby playing fields accessed via Short Street. • Northerly views from this point provide open views from LCT F: Rural Settlement (F10: Pittsworth) across of LCT I: Settled Hills (I1: Pittsworth Hills) towards proposed alignment.
Key visual sensitivities	• Moderate sensitivity of receptors, particularly residents of Pittsworth who are located in very close proximity to the alignment. • The presence of existing infrastructure (the Gore Highway and flood lights located at the playing fields) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the proximity of nearby residential viewers and recreational users with a specific interest in this view.
Visual evaluation	
	
Photomontage view from Viewpoint 23 Refer to Figure 49: Viewpoint 23 and visualisation in Appendix 2 for full sized image.	

VP23: Stanley Street near local park, Pittsworth



Photomontage view from Viewpoint 23 – indicative noise wall option

Refer to Figure 50: Viewpoint 23 and visualisation (noise wall option and post-mitigation) in Appendix 2 for full sized image.



Photomontage view from Viewpoint 23 – indicative mitigation and noise wall option

Refer to Figure 50: Viewpoint 23 and visualisation (noise wall option and post-mitigation) in Appendix 2 for full sized image.

Note: Visualisation of noise wall and mitigation measures shown are indicative only, showing a schematic option for the instalment of noise barriers and vegetative screening in this location. Design of noise barriers subject to development at the detailed design stage and liaison with land owners and managers.

Construction

Magnitude of change assessment	- The construction of the proposed alignment will create a noticeable change in the landscape character and views obtained from this viewpoint. - Earthworks associated with the proposed alignment will require the movement of large volumes of material. - The lack of existing mature vegetation provides open views from nearby residential lots, the park and playing fields towards the proposed alignment. - The presence of plant constructing the alignment which is in cut in this location, will temporarily change the character of the landscape, creating a noticeable change in the landscape character of this viewpoint. - While construction works will be noticeable from this vantage point the impact of these is temporary which represents a considerable change and Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP23 during construction works is considered to be Low .

VP23: Stanley Street near local park, Pittsworth	
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 200 m to the northwest of this viewpoint. - The magnitude of change on this receptor is anticipated to be noticeable change due to the following factors: - Considerable change due to the provision of a new single track dual-gauge railway on private land in cut to the north of the Gore Highway. - Proposed earthworks include large cuts, with the deepest cut being approximately -6 m below existing surveyed level. Large embankments also occur to the right of this view, with heights up to 15 m. - Due to the sparse nature of existing vegetation, vegetation clearance will have minimal impact on the screening of the alignment. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the alignment will be noticeable, as it will be introducing new rail infrastructure into the current view, however, it is anticipated to blend somewhat into the existing view as it is located in cut. This represents a Low magnitude of change. - Options for noise attenuation include the potential for the provision of noise barriers within the vicinity of this location, 10 m to the south of the proposed railway centreline adjacent the Gore Highway. - It is noted that if noise barriers were installed in this location, the magnitude of change would increase to Moderate.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the open views of the railway track from this viewpoint. Close views to the alignment will be possible for nearby residents of Pittsworth and residents on Dallman Road and Quibet Road. While experienced by close residential lots these views are of transient nature. Due to the lack of existing rail infrastructure, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP23 during operations is considered to be Moderate. It is noted that if noise barriers are installed in this location, the effect of the Project during operation would remain Moderate.

8.2.24 Viewpoint 24

Table 55: Likely visual effect of the Project on Viewpoint 24

VP24: Pittsworth and District Assembly of God, Pittsworth	
Visual baseline assessment	
	
Existing view from Viewpoint 24 Refer to Figure 51: Viewpoint 24 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°42'14.08"S 151°38'5.17"E • Elevation: 535.3 m • North-easterly view from the Pittsworth and District Pittsworth and District Assembly of God in Pittsworth towards the Gore Highway. • Proposed rail alignment is approximately 190 m to the northwest of this viewpoint. • Represents accessible views typically obtained by those visiting the Pittsworth and District Assembly of God, nearby residents of the northern edge of Pittsworth and of visitors, workers and tourists travelling along Short Street. It is also representative of travellers on the A39 Gore Highway. • Northerly views from this point provide open views from LCT F: Rural Settlement (F10: Pittsworth) across of LCT I: Settled Hills (I1: Pittsworth Hills) towards the proposed alignment.
Key visual sensitivities	• Moderate sensitivity of receptors, particularly visitors to the Pittsworth and District Assembly of God and residents on the outskirts of Pittsworth who are located in very close proximity to the alignment. • This viewpoint is not located on any tourist routes. • The presence of existing infrastructure (Gore Highway) somewhat reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the proximity of nearby residential viewers with a specific interest in this view and moderate number of visitors to the Pittsworth and District Assembly of God.

VP24: Pittsworth and District Assembly of God, Pittsworth	
Visual evaluation	
	
Photomontage view from Viewpoint 24 Refer to Figure 51: Viewpoint 24 and visualisation in Appendix 2 for full sized image.	
	
Photomontage view from Viewpoint 24 – Indicative mitigation Refer to Figure 52: Viewpoint 24 and visualisation (post-mitigation) in Appendix 2 for full sized image.	
Construction	
Magnitude of change assessment	- The provision of two construction laydown areas and construction of the proposed alignment, Lochaber Road rail-over-road bridge and realignment of Lochaber Road will create a considerable change in the landscape character and views obtained from this viewpoint. - Earthworks associated with the proposed alignment will require the movement of large volumes of material. - The general lack of existing mature vegetation provides open views from the church lot and nearby residential lots to the proposed alignment. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP24 during construction works is considered to be Moderate .
Operation	
Magnitude of change assessment – permanent infrastructure	The nearest section of the alignment is approximately 190 m to the northwest of this viewpoint.

VP24: Pittsworth and District Assembly of God, Pittsworth	
	- The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Dominant change due to the provision of a new single track dual-gauge railway on private land within cut and on embankment and the provision of a rail-over-road bridge over Lochaber Road. - Proposed earthworks include large embankments and cuts. The height of proposed embankments varies, with the maximum proposed height being approximately 13.5 m above natural ground (to the west of the Lochaber Road Rail Bridge), and the deepest cut being approximately -6 m below existing surveyed level (to the left hand side of the view). - Due to the sparse nature of existing vegetation, vegetation clearance will have minimal impact on the screening of the alignment. - Provision of a new rail-over-road bridge over Lochaber Road will introduce new infrastructure into the view. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the alignment, realignment of Lochaber Road and new rail-over-road bridge will be clearly evident and will have a considerable impact on the character of the landscape as it will be introducing new rail infrastructure into the current view, which will reduce the extent of views available towards the backdrop of vegetated hills associated with McEwan State Forest. This represents a High magnitude of change. - Options for noise attenuation include the potential for the provision of noise barriers within the vicinity of this location (to the left hand side of this view – refer Viewpoint 22 and 23 for further information). - It is noted that if noise barriers were installed near this location, the magnitude of change would further increase, however remain High (as it is the highest magnitude of change possible).
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.50 m will be highly evident due to the open, elevated views of the railway track from this viewpoint. Close views to the alignment will be possible for nearby residents of Pittsworth and nearby rural residents. While experienced by close residential lots these views are of transient nature. Due to the lack of existing rail infrastructure, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP24 during operations is considered to be High. It is noted that if noise barriers are installed near this location, the effect of the Project during operation would remain High.

8.2.25 Viewpoint 25

Table 56: Likely visual effect of the Project on Viewpoint 25

VP25: Gore Highway near Southbrook	
Visual baseline assessment	
	
Existing view from Viewpoint 25 Refer to Figure 53: Viewpoint 25 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°40'14.352" S 151°42'47.502" E • Elevation: 540 m • South-westerly view towards Southbrook. • Proposed rail alignment is approximately 1.5 km northwest of this viewpoint. • Represents typical and accessible views of nearby isolated rural residents, elevated residential lots of Southbrook and of visitors, workers and tourists travelling along the Gore Highway. • South-westerly views from this point provide open views from the Gore Highway near Southbrook towards the Project encompassing landscapes of LCT I: Settled Hills (I1: Pittsworth Hills).
Key visual sensitivities	• Moderate numbers of isolated rural residential lots and a high number of receptors travel along the Gore Highway (AADT around 4,503 per day, of which up to 19.45 per cent are heavy vehicles) and would experience changes to the view. However, it is noted that these viewers are passing at speed and would only experience transient views. • This viewpoint is located along the local <i>Open Plains Country Drive</i>. • Also representative of close views possible from isolated rural residential lots and residential lots on the outskirts of Southbrook. • The presence of existing infrastructure (power poles, powerlines) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and the large number of travellers passing at some speed along the Gore Highway with a transient view and lack of specific interest in the views.
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• The proposed alignment and associated earthworks will introduce considerable construction works into the view. • Substantial vegetation clearing for the construction of the proposed alignment will reduce the density of screening vegetation, increasing the visibility of the alignment from the Gore Highway and surrounding rural lots. • Earthworks associated with the proposed alignment will require the movement of large volumes of material.

VP25: Gore Highway near Southbrook	
	- The presence of plant constructing the alignment, cuts and embankments will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint. - While construction works will be clearly evident from this vantage point the impact of these is temporary which represents a considerable change and Moderate magnitude of change
Potential effect (construction works)	The effect of the Project on VP25 during construction works is considered to be Moderate .
Operation	
Magnitude of change assessment – permanent Infrastructure	- The nearest section of the alignment is approximately 1.5 km northwest of this viewpoint. The skyline is already affected by the presence of powerlines. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Widespread change in the view due to the introduction of new rail infrastructure into the rural landscape, with embankments reaching heights up to around 14.8 m above the existing surface level, and the deepest cut being approximately -24.7 m below existing surveyed level. - Vegetation clearing for the construction of the proposed alignment will reduce the density of screening vegetation and open views to areas of extensive cut and embankment from surrounding elevated rural residential lots and the Gore Highway. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the proposed alignment will be highly evident and will change the fundamental visual character of the landscape, as it will be introducing new rail infrastructure into what is a relatively intact natural / rural residential setting. It is noted that close views to the alignment, major cut and embankments will be possible from nearby rural residential lots. This represents a High magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident from the Gore Highway due to the elevated design level of the railway track. Close views to the alignment will be possible for nearby rural residents and for elevated residents on the northern outskirts of Southbrook. While experienced by close residential lots and a large number of motorists travelling on the Gore Highway, these views are of transient nature and will be only occasional. Therefore, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP25 during operations is considered to be High .

8.2.26 Viewpoint 26

Table 57: Likely visual effect of the Project on Viewpoint 26

VP26: View from Athol School Road	
Visual baseline assessment	
	
Existing view from Viewpoint 26 Refer to Figure 54: Viewpoint 26 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°37'8.808" S 151°45'34.991" E • Elevation: 520 m • Westerly view towards rural residential lots of Athol. • Proposed rail alignment is approximately 230 m to the west of this viewpoint. • Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Athol School Road. • Westerly views from this point provide open views of LCT D: Dry Croplands and Pastures (D9: Biddeston), and distant views towards LCT I: Settled Hills (I1: Pittsworth Hills).
Key visual sensitivities	• Moderate sensitivity of receptors, particularly rural residential lots of Athol who are located in very close proximity to the alignment. • This viewpoint is not located on any local tourist drives. • The presence of existing infrastructure (power poles, powerlines) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and the proximity of this viewpoint to the alignment.
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• The proposed alignment, associated earthworks, construction of the Athol School Road rail-over-road bridge and realignment of Purcell Road will introduce considerable construction works into the view. • The proposed location of a major laydown area (including site offices and fuel storage) immediately north of this viewpoint would cause a temporary reduction in visual amenity from this viewpoint. • The lack of existing vegetation provides open views from nearby residential lots to the proposed alignment. • Earthworks associated with the proposed alignment will require the movement of large volumes of material. • The presence of plant constructing the alignment, cuts, embankments and realigned Purcell Road will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint.

VP26: View from Athol School Road	
	While construction work and plant will be clearly evident from this vantage point, the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP26 during construction works is considered to be Moderate .
Operation	
Magnitude of change assessment – permanent infrastructure	- This viewpoint is on the edge of the Project footprint, approximately 230 m to the west of the proposed alignment and approximately 400 m west of the realignment of Purcell Road. The skyline is already affected by the presence of powerlines. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Widespread change in the view due to the introduction of new road and rail infrastructure including the Athol School Road rail-over-road bridge into the rural landscape. - Proposed embankments will be up to around 16.5 m above the existing surface level (to the right of this view) and up to approximately 10.7 m in the vicinity of Athol School Road. - Realignment of Purcell Road to connect with Athol School Road on the western side of the proposed alignment. No crossing will be provided on the existing Purcell Road. - Due to the sparse nature of existing vegetation within the rail corridor, the effect of vegetation clearing for the construction of the proposed alignment is considered to be negligible. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the proposed alignment and realignment of Purcell Road will be highly evident and will change the fundamental visual character of the landscape, as it will be introducing new road and rail infrastructure into what is a relatively intact rural residential setting. It is noted that close views to the alignment, bridge structure, cuts and embankments will be possible from nearby rural residential lots. This represents a High magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the open views of the railway track from this viewpoint. Close views to the alignment will be possible for nearby rural residents of Athol. While experienced by close residential lots and a small number of motorists travelling along Athol School Road, these views are of transient nature. Therefore, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP26 during operations is considered to be High .

8.2.27 Viewpoint 27

Table 58: Likely visual effect of the Project on Viewpoint 27

VP27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	
Visual baseline assessment	
	
Existing view from Viewpoint 27 Refer to Figure 55: Viewpoint 27 in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°32'51.809" S 151°46'12.761" E • Elevation: 430 m • Easterly view towards Toowoomba Wellcamp Airport, Gowrie Mountain and the undulating foothills of the outskirts of Toowoomba. • Proposed rail alignment is approximately 200 m to the northeast of this viewpoint. • Represents typical and accessible views of nearby isolated rural residents and of visitors, workers and tourists travelling along Toowoomba-Cecil Plains Road. • Easterly views from this point provide open views from LCT D: Dry Croplands and Pastures (D9: Biddeston), towards LCT B: Vegetated Watercourses – Creeks and Channels (B3: Westbrook Creek), LCT C: Irrigated Croplands (C14: Brimblecombe Road and C15: Wellcamp Airport), LCT L: Transitional Landscapes (L1: Wellcamp Airport and L2: Boral Quarry), and distant views towards LCT H: Forested Uplands (H5: Mount Kingsthorpe, H6: Gowrie Mountain, H7: Wellcamp and H8: Bunkers Hill).
Key visual sensitivities	• Relatively low number of isolated rural residential lots and a moderate number of receptors travelling along Toowoomba-Cecil Plains Road (AADT around 1,944 per day, of which up to 17.35 per cent are heavy vehicles) are likely to experience changes to this view. However, it is noted that these viewers are passing at speed and would only experience transient views. • This viewpoint is not located on any local tourist drives. • The presence of existing infrastructure (power poles, powerlines and Wellcamp Airport) reduces the overall sensitivity of this view. • This viewpoint it is considered to have a Low sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and the moderate number of travellers passing at some speed along Toowoomba-Cecil Plains Road with a transient view and lack of specific interest in the views.
Visual evaluation	
Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.	
Construction	
Magnitude of change assessment	• The proposed alignment and associated earthworks will introduce considerable construction works into the view. • The proposed location of a laydown area approximately 150 m to the southeast of this viewpoint would cause a temporary reduction in visual amenity from this viewpoint.

VP27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	
	- The lack of existing vegetation provides open views from nearby residential lots to the proposed alignment. - Earthworks associated with the proposed alignment will require the movement of large volumes of material. - The presence of plant constructing the alignment, Toowoomba Cecil Plains Road Rail Bridge and embankments will temporarily change the character of the landscape, creating a considerable change in the landscape character of this viewpoint. - While construction work and plant will be clearly evident from this vantage point, the impact of these is temporary which represents a considerable change and Moderate magnitude of change.
Potential effect (construction works)	The effect of the Project on VP27 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 200 m to the northeast of this viewpoint. The skyline is already affected by the presence of powerlines. - The magnitude of change on this receptor is anticipated to be dominant due to the following factors: - Widespread change in the view due to the introduction of new rail infrastructure into the rural landscape, including the Toowoomba-Cecil Plains Road Rail Bridge (rail-over-road) and embankments up to around 13.2 m above the existing surface level. - Due to the sparse nature of existing vegetation within the rail corridor, the effect of vegetation clearing for the construction of the proposed alignment is considered to be negligible. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed and will be in keeping with the existing rural character. - At this distance, the proposed alignment and Toowoomba-Cecil Plains Road Rail Bridge will be highly evident and will change the fundamental visual character of the landscape, as it will be introducing new rail infrastructure into what is a relatively intact natural / rural residential setting. It is noted that close views to the alignment and embankments will be possible from nearby rural residential lots. This represents a High magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be highly evident due to the open views of the railway track, embankments and Toowoomba-Cecil Plains Road Rail Bridge from this viewpoint. Close views to the alignment will be possible for nearby rural residents of Athol. While experienced by close residential lots and a medium number of motorists travelling along Toowoomba-Cecil Plains Road, these views are of transient nature. Therefore, the magnitude of change is considered to be Moderate.
Potential effect (operations)	The effect of the Project on VP27 during operations is considered to be Moderate .

8.2.28 Viewpoint 28

Table 59: Likely visual effect of the Project on Viewpoint 28

VP28: Linora Drive, Gowrie Mountain	
Visual baseline assessment	
	
Existing view from Viewpoint 28 Refer to Figure 56: Viewpoint 28 and visualisation in Appendix 2 for full sized image.	
Location and description	• GPS Location: 27°30'45.299" S 151°49'26.555" E • Elevation: 550 m • North-westerly view towards lots of Gowrie Mountain and the Warrego Highway. • Proposed rail alignment is approximately 1 km to the northwest of this viewpoint. • Represents typical and accessible views of nearby elevated residential lots of Gowrie Mountain. • North-westerly views from this point provide elevated views from LCT F: Rural Settlement (F10: Calvert) across LCT D: Dry Croplands and Pastures towards the existing rail line and proposed alignment, and distant views to LCT H: Forested Uplands (H10: Little Liverpool Range).
Key visual sensitivities	• Moderate sensitivity of receptors, particularly relatively low number of residents of Gowrie Mountain who have elevated views over the alignment. • The presence of existing infrastructure (Warrego Highway) reduces the overall sensitivity of this view. • This viewpoint is located close to the national <i>Warrego Way</i> tourist drive. • This viewpoint it is considered to have a Moderate sensitivity overall to the change proposed, due to the relatively low number of nearby residential viewers with a specific interest in this view and expansive, elevated views obtained from residential lots of Gowrie Mountain.

VP28: Linora Drive, Gowrie Mountain	
Visual evaluation	
	
Photomontage view from Viewpoint 28: Linora Drive, Gowrie Mountain (75° field of view) Refer to Figure 56: Viewpoint 28 and visualisation in Appendix 2 for full sized image.	
Construction	
Magnitude of change assessment	- The proposed alignment and associated earthworks will introduce considerable construction works into the view. This change will be exacerbated by the proximity of elevated residences of Gowrie Mountain to the works in this location. - The proposed location of a laydown area near the Warrego Highway for the construction of the Warrego Highway Rail Bridge would cause a reduction in visual amenity from this viewpoint, however this would be temporary. - Earthworks associated with the proposed alignment will require large volumes of material to be removed and brought in. - The key impacts will relate to the presence of construction plant and disturbance due to the construction of the alignment, rail bridge, cuts and embankments. - Due to the distance of this viewpoint from the alignment, construction works will be noticeable, while the impact of these is temporary which represents a noticeable change and Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP28 during construction works is considered to be Low .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the alignment is approximately 1 km to the northwest of this viewpoint. The view is already affected by the presence of powerlines, power poles and the Warrego Highway. - The magnitude of change on this receptor is anticipated to be considerable, therefore Moderate, due to the following factors: - Considerable change due to the introduction of new rail infrastructure into the rural landscape, including the Warrego Highway Rail Bridge (rail-over-road). - The rail line will be in largely in cut and on embankment, with heights varying from approximately -7 m below to 12.4 m above the existing surface level. - Due to the sparse nature of existing vegetation within the rail corridor, the effect of vegetation clearing for the construction of the proposed alignment is considered to be negligible. - While the alignment will be fenced with standard rural chain wire fencing, it is unlikely to be clearly discernible at this distance. - At this distance, the alignment will be visible and considerably change the visual character of the landscape, as it will be introducing new rail infrastructure into what is currently a relatively intact rural setting. This represents a Moderate magnitude of change.

VP28: Linora Drive, Gowrie Mountain	
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will be clearly evident due to the open and elevated views of the railway track from this viewpoint. Elevated views to the alignment will be possible for nearby residents of Gowrie Mountain and isolated rural lots situated on Gowrie Mountain School Road. While experienced by a medium number of nearby residential lots these views are of transient nature. Therefore, the magnitude of change is considered to be Low.
Potential effect (operations)	The effect of the Project on VP28 during operations is considered to be Moderate .

8.2.29 Viewpoint 29

Table 60: Likely visual effect of the Project on Viewpoint 29

VP29: Mount Kingsthorpe summit scenic lookout	
Visual baseline assessment	
 Existing view from Viewpoint 29A Refer to Figure 57: Viewpoint 29a in Appendix 2 for full sized image.	
 Existing view from Viewpoint 29B Refer to Figure 58: Viewpoint 29b in Appendix 2 for full sized image.	
Location and description	- GPS Location: 27°28'47.495" S 151°49'53.129" E - Elevation: 600 m - Southerly view from the summit of Mount Kingsthorpe towards Gowrie Creek, the existing rail line and distant views towards lots of Gowrie Mountain. - Proposed rail alignment is approximately 1.4 km south of this viewpoint.

VP29: Mount Kingsthorpe summit scenic lookout	
	- Represents typical and accessible views of those visiting Mount Kingsthorpe Bushland Park and walking on the Mount Kingsthorpe Walk, a walking track to the summit which provides expansive elevated views. - Also representative of typical and accessible views of nearby elevated residential areas of Kingsthorpe (1.2 to 3 km to the north of the alignment). - Westerly views from this point provide open views from LCT H: Forested Uplands (H5: Mount Kingsthorpe) across LCT C: Irrigated Croplands (C2: Yalungur and C8: Kingsthorpe) towards the existing rail line and proposed alignment, and distant views to LCT H: Forested Uplands (H6: Gowrie Mountain), LCT D: Dry Croplands and Pastures (D8: Charlton) and LCT G: Rural Living (G10: Gowrie Mountain).
Key visual sensitivities	- Moderate number of visitors to Mount Kingsthorpe Bushland Park undertaking the Mount Kingsthorpe Walk, due to its classification as a Class 4 – rough trail. However, these visitors have a very high level of interest in this environment and views obtained from the summit and trail. - This viewpoint is not located on any tourist drives. - Although this view comprises a strong forested and rural character; the presence of the existing rural infrastructure (power poles, powerlines and existing rail infrastructure), and views of residential lots detract from the rural and natural qualities and sense of remoteness. - This viewpoint it is considered to have a High sensitivity overall to the change proposed, due to the moderate number, but very high sensitivity of viewers (e.g. hikers) who are walking specifically to obtain panoramic views from the summit of Mount Kingsthorpe (identified as an area with high scenic amenity value in the <i>Toowoomba Regional Council Scenic Amenity Study</i> (Conics, 2009)).
Visual evaluation	
<i>Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.</i>	
Construction	
Magnitude of change assessment	- The construction of the proposed alignment and associated earthworks will introduce new rail infrastructure into the existing rural landscape, creating a noticeable change in the landscape character of this viewpoint. - The lack of existing vegetation provides open views from the summit of Mount Kingsthorpe and from nearby residential lots to the proposed alignment. - Earthworks associated with the proposed alignment will require the movement of large volumes of material. - The presence of construction plant constructing the alignment will temporarily change the character of the landscape, creating a noticeable change in the landscape character of this viewpoint. - This represents a Low magnitude of change.
Potential effect (construction works)	The effect of the Project on VP29 during construction works is considered to be Moderate .
Operation	
Magnitude of change assessment – permanent infrastructure	- The nearest section of the proposed alignment is approximately 1.4 km south of this viewpoint. The skyline is already affected by the presence of powerlines, power poles and the existing rail line. - The magnitude of change on this receptor is anticipated to be considerable, therefore Moderate, due to the following factors: - Considerable change due to the provision of a new single track dual-gauge railway on embankment to the south of the existing rail line with associated localised culverts. The rail line will be largely on embankment, with heights up to 17.9 m above the existing surface level. A new rail-over-road bridge will be constructed on Chamberlain Road. - Distant views will be possible to the proposed Warrego Highway Rail Bridge (rail-over-road).

VP29: Mount Kingsthorpe summit scenic lookout	
	- Due to the sparse nature of existing vegetation within the rail corridor, the effect of vegetation clearing for the construction of the proposed alignment is considered to be negligible. - Fencing is to be provided for the extent of the rail corridor, typically located on the corridor boundary. Fencing is to extend between the corridor and private land adjoining the railway. Standard rural chain wire fencing is proposed that will be in keeping with the existing rural character. However, it is likely that this will only just be discernible at this distance. - At this distance, the alignment will be visible and will represent a considerable change the visual character of the landscape as it will be introducing new rail and road infrastructure into the existing rural setting. This represents a Moderate magnitude of change.
Magnitude of change assessment – train	Movement of double stacked freight trains up to 1.8 km long with a height of 6.5 m will only be experienced occasionally from the summit of Mount Kingsthorpe. Views to the alignment will be possible for nearby elevated residents of Kingsthorpe. While experienced by a relatively large number of residential lots these views are of transient nature. It is noted that the existing rail line currently facilitates passenger, coal and freight train movements, albeit single stacked. Therefore, the magnitude of change is considered to be Low.
Potential effect (operations)	The effect of the Project on VP29 during operations is considered to be High .

9 Lighting impact

This section considers the potential qualitative impacts of Project lighting during both construction and operation. A quantitative lighting impact assessment has been prepared as supplementary material to this LVIA report, and is provided in Appendix 3 and summarised below in Section 9.2

As described in Section 6, temporary lighting impacts from night works will be associated with the non-resident workforce accommodation facilities near Yelarbon, Inglewood and Millmerran, the Turallin facility, site offices and fuel storage areas. Temporary construction lighting may also be used at bridge laydown areas. In terms of operational lighting, the only proposed permanent lighting is associated with safety lighting associated with standard road lighting required for the Cunningham Highway Road Bridge near Yelarbon and at the controlled active level crossing at the following locations:

- Kildonan Road, Kurumbul
- South Kurumbul Road, Kurumbul
- Whetstone Access Road, Whetstone
- Cremascos Road, Whetstone
- Lovells Crossing Road, Inglewood
- Millmerran-Inglewood Road, Inglewood
- Unnamed Road, Canning Creek
- Kooroongarra Road, Bringalilly
- Paton Road, Bringalilly
- Nicol Creek Road, Millwood
- Millwood Road, Millwood
- Blackwell Road, Millmerran
- Millmerran-Leyburn Road, Yandilla
- Harris Road, Pampas
- Elsdon Road, Brookstead
- Mann Silo Road, Brookstead
- Longhurst Road, Brookstead
- Tip Road, Pittsworth
- Linthorpe Valley Road, Southbrook
- Leeson's Road, Charlton

There would also be transient lighting associated with train headlights, the potential impacts of which have been considered in Appendix 3 and noted below.

The representative viewpoints selected for the Visual Impact Assessment have been assessed for potential to both construction and operational lighting impacts, as in Table 61 to Table 80.

9.1 Qualitative lighting assessment

9.1.1 Viewpoint 1

Table 61: Likely visual effect of the Project lighting on Viewpoint 1

VP1: Rainbow Reserve near Kildonan Road, Kurumbul	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	• Moderate as described for daytime assessment. There will be very few receptors in this location at night – limited to those camping at Rainbow Reserve.
Magnitude of change assessment (construction works)	• This viewpoint is situated near a large bridge construction laydown area, however views towards the laydown area are filtered due to riparian vegetation. • During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. • The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaires, shielding to control light spill) it is anticipated that levels would remain 'predominantly dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (construction works)	• Low
Magnitude of change assessment (operations)	• The new active crossing proposed would be controlled by automatic warning systems including flashing lights and would be visible to people travelling along Kildonan Road as well as visiting and camping at Rainbow Reserve.

VP1: Rainbow Reserve near Kildonan Road, Kurumbul	
	- There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location, however it is not anticipated that transient train lighting would be clearly visible due to existing vegetation that will provide some screening effect. - The current light levels are assumed to be 'dark' and it is assumed that, due to temporal impacts associated with an active level crossing and transient impacts associated with train headlights, the levels would remain 'dark', representing a Negligible magnitude of change.
Potential effect (operations)	Low

9.1.2 Viewpoint 2

Table 62: Likely visual effect of the Project lighting on Viewpoint 2

VP2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation facility	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will be very few receptors in this location at night – limited to travellers passing along the Cunningham Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of the Cunningham Highway is not lit with permanent street lighting, however, existing traffic on the highway introduces transient light.
Magnitude of change assessment (construction works)	- This viewpoint is situated near the proposed Yelarbon non-resident workforce accommodation site. - During construction it is anticipated that the Yelarbon non-resident workforce accommodation facility within this view would be lit with security lighting. However, it is anticipated that existing vegetation within may provide some limited screening effect to potential light sources. - The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding to control light spill) it is anticipated that levels would be up to 'predominantly lit' representing a noticeable Low magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	If the Yelarbon non-resident workforce accommodation facility is decommissioned, there would be No Impact.
Potential effect (operations)	No Impact if the Yelarbon non-resident workforce accommodation facility is decommissioned and rehabilitated.

9.1.3 Viewpoint 3

Table 63: Likely visual effect of the Project lighting on Viewpoint 3

VP3: Yelarbon Rest Area	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby residents of Yelarbon and travellers passing along the Cunningham Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest.

VP3: Yelarbon Rest Area	
	- The Cunningham Highway as it passes through Yelarbon (Taloos Street) is lit with permanent street lighting and one isolated street light is provided at the current active level crossing where the Cunningham Highway crosses the existing rail line. - In addition, existing traffic on the highway and passing freight trains utilising the existing rail corridor introduces transient light. - Within Yelarbon, street lights are currently provided along Taloos Street
Magnitude of change assessment (construction)	- This location is adjacent to two major laydown areas and a non-resident workforce accommodation facility is situated approximately 3.5 km to the northwest. - During construction it is anticipated that the Yelarbon non-resident workforce accommodation facility and laydown areas would be lit with security lighting. - The current light levels are assumed to be 'predominantly lit' and it is assumed that, with careful planning, the levels would remain up to 'predominantly lit' representing a Negligible magnitude of change.
Potential effect (construction works)	Low
Magnitude of change assessment (operations)	- Existing traffic on the highway and railway introduces some transient light due to vehicle and train headlights. - Permanent standard road lighting will be required for the Cunningham Highway Road Bridge. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'predominately lit' and it is assumed that, with the implementation of light spill controls (e.g. downward angling of luminaries, shielding to control light spill), the levels would remain 'predominately lit' representing a Negligible magnitude of change. - In addition, should noise barriers be provided in this location, it is anticipated that transient lighting impacts associated with the train headlights would be less apparent.
Potential effect (operations)	Low

9.1.4 Viewpoint 4

Table 64: Likely visual effect of the Project lighting on Viewpoint 4

VP4: Yelarbon silo artwork viewing area	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby residents of Yelarbon and travellers passing along the Cunningham Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - The Cunningham Highway as it passes through Yelarbon is lit with permanent street lighting, while existing traffic on the highway and passing freight trains utilising the existing rail corridor introduces transient light.
Magnitude of change assessment (construction works)	- This location is not located immediately adjacent any proposed laydown areas, however there are two major laydown areas located approximately 510 m and 630 m to the northwest. In addition, a Yelarbon non-resident workforce accommodation facility is situated approximately 3.7 km to the northwest. - During construction it is anticipated that the Yelarbon non-resident workforce accommodation facility and laydown areas proposed would be lit with security lighting.

VP4: Yelarbon silo artwork viewing area	
	The current light levels are assumed to be 'predominantly lit' and it is assumed that and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'predominantly lit' representing a Negligible magnitude of change.
Potential effect (construction works)	Low
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'predominately lit', and it is assumed that due to the transient nature of impacts associated with train headlights, the levels would remain 'predominately lit' representing a Negligible magnitude of change. - In addition, should noise barriers be provided in this location, it is anticipated that transient lighting impacts associated with the train headlights would be less apparent (where opaque barriers are installed).
Potential effect (operations)	Low

9.1.5 Viewpoint 5

Table 65: Likely visual effect of the Project lighting on Viewpoint 5

VP5: Cunningham Highway Near Whetstone Rest Area	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. Travellers passing along the Cunningham Highway at night, whose interest in the transient views obtained at night is expected to be very low, even compared to daytime interest. - This section of the Cunningham Highway is not lit with permanent street lighting, however, existing traffic on the highway introduces transient light.
Magnitude of change assessment (construction works)	- Potential location for a flash butt welding facility. - If the flash butt welding facility is utilised during construction, it is anticipated that there would be site security lighting. - The current light levels are assumed to be 'dark' and it is assumed that the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of Change Assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark', and it is assumed that due to the transient nature of impacts associated with train headlights and distance of sensitive receptors from the alignment in this location, the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.6 Viewpoint 6

Table 66: Likely visual effect of the Project lighting on Viewpoint 6

VP6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road active level crossing	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. Travellers passing along the Millmerran-Inglewood Road at night, whose interest in the transient views obtained at night is expected to be very low, even compared to daytime interest. - This section of Millmerran-Inglewood Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.
Magnitude of change assessment (construction works)	- During construction it is anticipated that laydown areas proposed in the vicinity of this viewpoint would be lit with security lighting. However, it is anticipated that existing vegetation within the construction footprint may provide some screening effect to potential light sources. - The current light levels are assumed to be 'dark' and it is assumed that the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of Change Assessment (operations)	- The active crossing proposed would be controlled by automatic warning systems including flashing lights and would be visible to people travelling along Millmerran-Inglewood Road. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that due to the transient nature of impacts associated with train headlights and lights associated with the active level crossing and distance of sensitive receptors from the alignment in this location, the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.7 Viewpoint 7

Table 67: Likely visual effect of the Project lighting on Viewpoint 7

VP7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation facility	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. Travellers passing along the Millmerran-Inglewood Road at night, whose interest in the transient views obtained at night is expected to be very low, even compared to daytime interest. - This section of Millmerran-Inglewood Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.
Magnitude of change assessment (construction works)	- During construction it is anticipated that the Inglewood non-resident workforce accommodation facility within this view would be lit with security lighting. However, it is anticipated that existing vegetation within may provide some limited screening effect to potential light sources. - The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding to control light spill) it is anticipated that levels would be up to 'predominantly lit' representing a noticeable Low magnitude of change.
Potential effect (construction works)	Negligible

VP7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation facility	
Magnitude of Change Assessment (operations)	If the Inglewood non-resident workforce accommodation facility is decommissioned, there would be No Impact.
Potential effect (operations)	No Impact if the Inglewood non-resident workforce accommodation facility is decommissioned and rehabilitated.

9.1.8 Viewpoint 8

Table 68: Likely visual effect of the Project lighting on Viewpoint 8

VP8: Millmerran-Inglewood Road near Nicol Creek Road	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including isolated rural residents and travellers passing along Millmerran-Inglewood Road at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of Millmerran-Inglewood Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- The new active crossing proposed would be controlled by automatic warning systems including flashing lights and would be visible to people travelling along Millmerran-Inglewood Road and Nicol Creek Road as well as isolated local rural residents in this area, the closed of which is approximately 440 m northeast of the proposed active crossing location. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - Due to the transient nature of impacts associated with train headlights and distance of sensitive receptors from the alignment in this location, it is assumed that the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.9 Viewpoint 9

Table 69: Likely visual effect of the Project lighting on Viewpoint 9

VP9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including isolated rural residents and travellers passing along Millmerran-Inglewood Road at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of Millmerran-Inglewood Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.

VP9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	
Magnitude of change assessment (construction works)	- This location is near a major laydown area, including main site offices and fuel storage. - During construction it is anticipated that the laydown area proposed would be lit with security lighting. - The current light levels are assumed to be 'dark' and it is assumed that the levels would be up to 'predominately lit' representing a noticeable Low magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - Due to the transient nature of impacts associated with train headlights and distance of sensitive receptors from the alignment in this location, it is assumed that the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.10 Viewpoint 10

Table 70: Likely visual effect of the Project lighting on Viewpoint 10

VP10: Mount Basalt Reserve, looking towards Millmerran	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low, as it is anticipated there will be a lower number of visitors to Mount Basalt Reserve at night, whose interest in views obtained at night is expected to be lower compared to daytime interest. - This viewpoint is situated approximately 7.6 km from the Commodore Mine and 5.9 km from the Millmerran Power Station, both of which provide sources of permanent and temporary night-time lighting, associated with plant, machinery and site lighting.
Magnitude of change assessment (construction works)	- During construction it is anticipated that the major construction laydown area proposed approximately 5.6 km from this location, which would be lit with security lighting. - The current light levels are assumed to be 'dark'. Due to the distance of this viewpoint from proposed light sources, with the implementation of light spill controls (e.g. downward angling of luminaries, shielding to control light spill) it is anticipated that levels would remain 'predominantly dark' representing a Negligible magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - Due to the transient nature of impacts associated with train headlights and distance of sensitive receptors from the alignment in this location, it is assumed that the levels would remain 'dark' representing a barely perceptible Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.11 Viewpoint 11

Table 71: Likely visual effect of the Project lighting on Viewpoint 11

VP11: Blackwell Road looking towards Millmerran-Inglewood Road	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will be local residents and travellers on Blackwell Road in this location at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of Blackwell Road is not lit with permanent street lighting, however, existing traffic on the road and nearby Millmerran-Inglewood Road introduces transient light. - It is noted that this viewpoint is located in close proximity to the Commodore Mine (approximately 800 m away) and Millmerran Power Station (approximately 4 km away), both of which provide sources of permanent and temporary night-time lighting, associated with plant, machinery and site lighting.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- The new active crossing proposed would be controlled by automatic warning systems including flashing lights and would be visible to people travelling along Blackwell Road as well as isolated local rural residents in this area (further than 1 km away). - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that, due to temporal impacts associated with an active level crossing and transient impacts associated with train headlights, the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.12 Viewpoint 12

Table 72: Likely visual effect of the Project lighting on Viewpoint 12

VP12: Commodore Peak picnic area looking towards Millmerran Power Station	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low, as it is anticipated there will be a lower number of visitors to Commodore Peak picnic area at night, whose interest in views obtained at night is expected to be lower compared to daytime interest. - It is noted that this viewpoint is located in close proximity to and overlooks the Commodore Mine (approximately 800 m away) and Millmerran Power Station (approximately 5 km away), both of which provide sources of permanent and temporary night-time lighting, associated with plant, machinery and site lighting.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	No permanent lighting near this viewpoint.

VP12: Commodore Peak picnic area looking towards Millmerran Power Station	
	- There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location (noting that in the vicinity of this viewpoint the train will be in cut). - The current light levels are assumed to be 'dark' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain up to 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.13 Viewpoint 13

Table 73: Likely visual effect of the Project lighting on Viewpoint 13

VP13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. Travellers passing along the Cunningham Highway at night, whose interest in the transient views obtained at night is expected to be very low, even compared to daytime interest. - This section of Millmerran-Inglewood Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light. - It is noted that this viewpoint is located in close proximity to the Commodore Mine (approximately 750 m away) and Millmerran Power Station (approximately 6 km away), both of which provide sources of permanent and temporary night-time lighting, associated with plant, machinery and site lighting.
Magnitude of change assessment (construction works)	- This location is near a bridge construction laydown area. - During construction it is anticipated that the laydown area proposed would be lit with security lighting. - The current light levels are assumed to be 'dark' and it is assumed that the levels would be up to 'predominately lit' representing a noticeable Low magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark', and it is assumed that due to the transient nature of impacts associated with train headlights and distance of sensitive receptors from the alignment in this location, the levels would remain up to 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.14 Viewpoint 14

Table 74: Likely visual effect of the Project lighting on Viewpoint 14

VP14: Nardoo Street edge of Millmerran	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby residents of Millmerran. - Nardoo Street is lit with permanent street lighting and existing traffic on the street introduces transient light.

VP14: Nardoo Street edge of Millmerran	
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - Whilst there would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location, due to the distance of this viewpoint from the proposed rail alignment and presence of screening vegetation, it is considered that lights associated with train headlights are unlikely to be experienced from this location. - The current light levels are assumed to be 'predominately lit' and it is assumed that due to the transient nature of impacts associated with train headlights and the distance of this viewpoint from the light sources, the levels would remain 'predominately lit' representing a Negligible magnitude of change.
Potential effect (operations)	Low

9.1.15 Viewpoint 15

Table 75: Likely visual effect of the Project lighting on Viewpoint 15

VP15: Turallin Road towards the proposed Turallin facility	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. Noting that there will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby isolated rural residents and travellers passing along Turallin Road at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - Turallin Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.
Magnitude of change assessment (construction works)	- This viewpoint is situated near the proposed Turallin facility. - During construction it is anticipated that the facility within this view would be lit with security lighting. - The current light levels are assumed to be 'dark' and it is assumed that with the implementation of light spill controls (e.g. downward angling of luminaries, shielding to control light spill) the levels would be up to 'predominantly lit' representing a noticeable Low magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint, as it is anticipated that the Turallin facility will be decommissioned. - No short-term impacts due to headlights of passing freight trains near this viewpoint due to distance from rail alignment. - As the facility will be decommissioned, there would be No Impact.
Potential effect (operations)	No Impact as it is anticipated the Turallin facility will be decommissioned and rehabilitated.

9.1.16 Viewpoint 16

Table 76: Likely visual effect of the Project lighting on Viewpoint 16

VP16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby isolated rural residents and travellers passing along Millmerran-Leyburn Road at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of Millmerran-Leyburn Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that due to the transient nature of impacts associated with train headlights, with careful planning, the levels would remain up to 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.17 Viewpoint 17

Table 77: Likely visual effect of the Project lighting on Viewpoint 17

VP17: Gore Highway towards Condamine River crossing and floodplain	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including isolated rural residents and travellers passing along the Gore Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of the Gore Highway is not lit with permanent road lighting, however, existing traffic on the highway introduces transient light.
Magnitude of change assessment (construction works)	- Distant views towards a construction laydown area. - During construction it is anticipated the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. - The current light levels are assumed to be 'predominantly dark'. With the implementation of light spill controls (e.g. downward angling of luminaires, shielding of light spill) it is anticipated that levels would remain up to 'predominantly dark' representing a Negligible magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location.

VP17: Gore Highway towards Condamine River crossing and floodplain	
	The current light levels are assumed to be 'dark' and it is assumed that due to the transient nature of impacts associated with train headlights and distance of sensitive receptors from the alignment in this location, with careful planning, the levels would remain up to 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.18 Viewpoint 18

Table 78: Likely visual effect of the Project lighting on Viewpoint 18

VP18: Gore Highway near service station, Pampas	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby residents of Pampas and travellers passing along the Gore Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - The Gore Highway as it passes through Pampas is not lit with permanent street lighting, with the exception of one isolated street light at the intersection of the Gore Highway and Fysh Road, while existing traffic on the highway introduces some transient light due to vehicle headlights.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- The new active crossing proposed would be controlled by automatic warning systems including flashing lights and would be visible to local residents of Pampas in very close proximity to the crossing, as well as to people travelling along the Gore Highway and Elsdon Road. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that due to the transient nature of impacts associated with train headlights and the active level crossing, that the levels would remain 'predominately dark' representing a Negligible magnitude of change.
Potential effect (operations)	Low

9.1.19 Viewpoint 19

Table 79: Likely visual effect of the Project lighting on Viewpoint 19

VP19: Gore Highway towards Condamine River (north branch) crossing	
Lighting Assessment	
Visual Evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will be few receptors in this location at night – including nearby isolated rural residents and travellers passing along the Gore Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of the Gore Highway is not lit with permanent road lighting, however, existing traffic on the highway introduces transient light.

VP19: Gore Highway towards Condamine River (north branch) crossing	
Magnitude of change assessment (construction works)	- During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. - The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would be at greatest 'predominantly lit' representing a noticeable Low magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'predominantly dark' and it is assumed that and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'predominantly dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible

9.1.20 Viewpoint 20

Table 80: Likely visual effect of the Project lighting on Viewpoint 20

VP20: Near Brookstead State School	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will be few receptors in this specific location at night as the school will not be in use. However, there are several residential lots whose residents are likely to be concerned about night-time lighting. - There is currently no permanent street lighting associated with the Gore Highway as it passes through Brookstead, however there is some limited standard road lighting located along Ware Street, including outside the school. - In addition, existing traffic on the highway and local streets and passing freight trains utilising the existing rail corridor introduces transient light.
Magnitude of change assessment (construction works)	- During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. - The current light levels are assumed to be 'predominately dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would remain 'predominantly dark' representing a Negligible magnitude of change.
Potential effect (construction works)	Low
Magnitude of change assessment (operations)	- Permanent standard road lighting will be required for the Gore Highway Road Bridge. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'predominately dark' and it is assumed that, with careful planning, the levels would be up to 'predominately lit' representing a Low magnitude of change. - In addition, should noise barriers be provided in this location, it is anticipated that transient lighting impacts associated with the train headlights would be less apparent.
Potential effect (operations)	Low

9.1.21 Viewpoint 21

Table 81: Likely visual effect of the Project lighting on Viewpoint 21

VP21: Glen Devon Road looking south from elevated private residential lots	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will be few receptors in this specific location at night. However, there are several residential lots whose residents are likely to be concerned about night-time lighting. - In addition, existing traffic on the highway and local streets and passing freight trains utilising the existing rail corridor introduces transient light.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible.

9.1.22 Viewpoint 22

Table 82: Likely visual effect of the Project lighting on Viewpoint 22

VP22: Pittsworth-Felton Road near Pittsworth Motor Inn	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night, including those at the Pittsworth Motor Inn and nearby residential lots whose residents are likely to be concerned about night-time lighting. - The Gore Highway as it passes through Pittsworth is lit with permanent street lighting, while existing traffic on the highway introduces transient light.
Magnitude of change assessment (construction works)	- During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. - The current light levels are assumed to be 'predominately lit'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would remain up to 'predominately lit' representing a Negligible magnitude of change.
Potential effect (construction works)	Low
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'predominately lit' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'predominately lit' representing a Negligible magnitude of change.

VP22: Pittsworth-Felton Road near Pittsworth Motor Inn	
	In addition, should noise barriers be provided in this location, it is anticipated that transient lighting impacts associated with the train headlights would be less apparent.
Potential effect (operations)	Low

9.1.23 Viewpoint 23

Table 83: Likely visual effect of the Project lighting on Viewpoint 23

VP23: Stanley Street near local park, Pittsworth	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night, including nearby residential lots whose residents are likely to be concerned about night-time lighting. - This section of the Gore Highway as it passes through Pittsworth is not lit with permanent street lighting, however, existing traffic on the highway introduces transient light. - In addition, there are some street lights located within the nearby residential area and the nearby playing fields have standard floodlights installed.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'predominately lit' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'predominately lit' representing a Negligible magnitude of change. - In addition, should noise barriers be provided in this location, it is anticipated that transient lighting impacts associated with the train headlights would be less apparent.
Potential effect (operations)	Low

9.1.24 Viewpoint 24

Table 84: Likely visual effect of the Project lighting on Viewpoint 24

VP24: Pittsworth and District Assembly of God, Pittsworth	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night, including those at the church and utilising nearby playing fields. - This section of the Gore Highway as it passes through Pittsworth is not lit with permanent street lighting, however, existing traffic on the highway introduces transient light. - The nearby playing fields have standard floodlights installed.
Magnitude of change assessment (construction works)	During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area.

VP24: Pittsworth and District Assembly of God, Pittsworth	
	The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would remain up to 'dark' representing a Negligible magnitude of change.
Potential effect (construction works)	Low
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Low

9.1.25 Viewpoint 25

Table 85: Likely visual effect of the Project lighting on Viewpoint 25

VP25: Gore Highway near Southbrook	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including isolated rural residents and travellers passing along the Gore Highway at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of the Gore Highway is not lit with permanent street lighting, however, existing traffic on the highway introduces transient light.
Magnitude of change assessment (construction works)	No temporary construction lighting near this viewpoint, therefore, No Impact.
Potential effect (construction works)	No Impact
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that due to the transient nature of impacts associated with train headlights distance of sensitive receptors from the alignment in this location, the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Low

9.1.26 Viewpoint 26

Table 86: Likely visual effect of the Project lighting on Viewpoint 26

VP26: View from Athol School Road	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby residents of Athol and travellers passing along Athol School Road at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - Athol School Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light.
Magnitude of change assessment (construction works)	- This location is near a major laydown area, including main site offices and fuel storage and several rural residential lots are within proximity to the proposed laydown area. - During construction it is anticipated that the laydown area proposed would be lit with security lighting. - The current light levels are assumed to be 'dark' and it is assumed that, with careful planning, the levels would be up to 'predominately lit' representing a Low magnitude of change.
Potential effect (construction works)	Low
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that due to the transient nature of impacts associated with train headlights, the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	Low

9.1.27 Viewpoint 27

Table 87: Likely visual effect of the Project lighting on Viewpoint 27

VP27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	Low as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby isolated rural residents and travellers passing along Toowoomba-Cecil Plains Road at night, whose interest in the transient views obtained at night is expected to be low even compared to daytime interest. - This section of Toowoomba-Cecil Plains Road is not lit with permanent street lighting, however, existing traffic on the road introduces transient light. - In addition, the nearby Wellcamp Airport introduces both permanent and transient light associated with vehicular and plane movements.
Magnitude of change assessment (construction works)	- During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. - The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would remain 'predominantly dark' representing a Negligible magnitude of change.

VP27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	
Potential effect (construction works)	• Negligible
Magnitude of change assessment (operations)	• No permanent lighting near this viewpoint. • There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. • The current light levels are assumed to be 'dark' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	• Negligible.

9.1.28 Viewpoint 28

Table 88: Likely visual effect of the Project lighting on Viewpoint 28

VP28: Linora Drive, Gowrie Mountain	
Lighting assessment	
Visual evaluation	
Sensitivity assessment	• Moderate as described for daytime assessment. There will still be receptors in this location at night who will be interested in the view and presence of lighting – including nearby elevated residents of Gowrie Mountain. • Parts of the Warrego Highway visible within this view are lit with permanent street lighting, and existing traffic on the highway and other local roads introduces transient light.
Magnitude of change assessment (construction works)	• Distant views to the existing Warrego Highway and a proposed laydown area (approximately 1 km). • During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. • The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would remain 'predominantly dark' representing a Negligible magnitude of change
Potential effect (construction works)	• Low
Magnitude of change assessment (operations)	• No permanent lighting near this viewpoint. • There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. • The current light levels are assumed to be 'dark' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (operations)	• Low

9.1.29 Viewpoint 29

Table 89: Likely visual effect of the Project lighting on Viewpoint 29

VP29: Mount Kingsthorpe summit scenic lookout	
Lighting Assessment	
Visual Evaluation	
Sensitivity assessment	Low, as it is anticipated that there will be less people will be accessing Mount Kingsthorpe Reserve at night, whose interest in views obtained at night is expected to be lower compared to daytime interest. - Parts of the Warrego Highway visible within this view are lit with permanent street lighting, and existing traffic on the highway and other local roads introduces transient light.
Magnitude of change assessment (construction works)	- Distant views to the existing Warrego Highway and a proposed laydown area (approximately 3 km). - During construction it is anticipated that the laydown area proposed within this view would be lit with security lighting due to the presence of the bridge laydown area. - The current light levels are assumed to be 'dark'. With the implementation of light spill controls (e.g. downward angling of luminaries, shielding of light spill) it is anticipated that levels would remain 'dark' representing a Negligible magnitude of change.
Potential effect (construction works)	Negligible
Magnitude of change assessment (operations)	- No permanent lighting near this viewpoint. - There would be short-term impacts due to the headlight on the passing freight train. It is anticipated that a train travelling at 80 km/hr would take approximately 1 minute 16 seconds to pass this location. - The current light levels are assumed to be 'dark' and it is assumed that, due to the transient nature of impacts associated with train headlights, the levels would remain dark' representing a Negligible magnitude of change.
Potential effect (operations)	Negligible.

9.2 Quantitative lighting assessment summary

To support this LVIA, an obtrusive lighting assessment (Appendix 3) has been prepared. However, as noted in this report, there are no known references defining acceptable visual 'amenity' at night, and the study defines 'amenity' in this context to be the *'state of pleasantness of the night-time environment or a particular night-time view'* and loss of amenity to mean *'change to the existing view or environment'*.

In the absence of any other known information and technical light criteria, Australian New Zealand Standard, AS/NZS 4282:2019 Control of Obtrusive Effects of Outdoor Lighting has been used as a general guide, and the AS/NZS 4282:2019 criteria have been applied to this analysis of potential quantitative lighting impacts associated with the Project (noting that many aspects of the standard are not applicable or appropriate as noted in Appendix 3).

In addition, it is also recognised that the human visual system perceives visual brightness relative to the state of adaptation to ambient conditions, and is influenced by many factors, including the relative health and well-being of that observer. For example, a young healthy observer may perceive a specific quantity of light (illuminance or luminance) to be excessive in a dark environment, yet may perceive the same quantity of light in a suburban area to be far more acceptable.

9.2.1 *Summary of the quantitative lighting assessment findings*

The assessment identified 151 lots as having the potential to be impacted by Project lighting, and 60 potential non-compliances with the AS/NZS 4282:2019 standard. Depending on the track alignment relative to the lot and the environmental zone classification, some non-compliances are for travel in one direction only, while a smaller number of non-compliances apply to both directions of train travel. It is also acknowledged that whilst 60 technical non-compliances have been identified through this desktop assessment, (i.e. the assessed lot is closer than the recommended distance), it is noted that the varying presence of potential screening vegetation may result in some of the identified 'non-compliances' being compliant.

However, three (3) of these locations have been identified as being directly in the path of the track alignment and/or proposed associated road works which will require acquisition of these properties.

Recommendations for mitigation of lighting impacts identified in the quantitative assessment have been incorporated into Section 11.

10 Cumulative impacts

Cumulative impacts are those that result from the successive, incremental and or combined effects of an action, project or activity when added to other existing, planned and or reasonably anticipated future ones (World Bank IFC, 2013). 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.

This section provides a discussion on the potential for cumulative impacts in relation to landscape and visual amenity. Details on the assessment methodology for cumulative impacts is presented in Section 10.1.

Projects that have been considered for inclusion in the cumulative impact assessment are introduced in Section 10.2.

A summary of the significance of cumulative landscape and visual impacts is provided in Section 10.3.

10.1 Cumulative LVIA methodology

The aim of the cumulative LVIA, is to describe and assess the ways in which the Project could have additional impacts when considered in combination with other proposed built developments in the area. For the purposes of cumulative LVIA, the assessment considers if the cumulative impact would be:

- Combined: for example, two or more projects visible from one viewpoint
- Successive: two or more projects visible from one location and with the same viewfield
- Sequential: developments viewed at different times, for example passing along a road.

The cumulative impact assessment methodology follows a qualitative method based on a three-step process, as follows:

- Identification of proposed developments lying within or around the impact assessment area
- Identification of area of influence for the landscape and visual assessment, within which it is anticipated that cumulative effects could occur
- Cumulative impact assessment based on the assessment matrix set out in Table 90 and impact significance assessment matrix set out in Table 91.

Table 90: Relevance factors for assessing cumulative impact

Aspect	Relevance Factors		
	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 91: Impact significance for assessing cumulative impact

Aspect	Sum of relevance factors	Consequences
Low	1-6	Negative impacts need to be managed by standard environmental management practices. Special approval conditions unlikely to be necessary. 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. Specific approval conditions are likely. Targeted monitoring program required, where appropriate.
High	10-12	Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Specific approval conditions required, Targeted monitoring program necessary, where appropriate.

10.2 Cumulative impact area and project inclusion

The cumulative LVIA is based on descriptions of other similar scale projects to the extent that such data was publicly available at the time of this assessment. The cumulative situation may change as applications are made or withdrawn.

A provisional review has been conducted to streamline the assessment process to eliminate, or scope out projects, which are anticipated to generate negligible landscape and visual impacts. Due to the potential for sequential impacts, for example when driving through the landscape, a wider area of influence than the impact assessment area was considered, extending 50 km (approximately 30 mins drive or more). Beyond this distance, it is considered that there would be no reasonable expectation of cumulative landscape or visual impact being registered by a receptor.

Twenty nine projects were initially identified as having potential to contribute to 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. Table 92 sets out the criteria for inclusion of a project. A full list of the 29 projects, with a description of each, is presented in Table 93.

Table 92: Project inclusion criteria – cumulative impact assessment

No.	Consequences
a)	Are currently being assessed under Part 1 of the Chapter 3 of the <i>Environmental Protection Act 1994</i> (Qld) (EP Act) and, as a minimum, have an initial advice statement (IAS) available on the Queensland Department of Environment, Science and Innovation's website.
b)	Have been declared a 'coordinated project' by the Coordinator-General under the SDPWO Act and an EIS is currently being prepared or is complete, or an IAS is available on the Queensland Department of State Development and Infrastructure's website.
c)	May use resources located within the region (including materials, groundwater, road networks or workforces) that are the same as those to be used by the ARTC Inland Rail Project.
d)	Could potentially compound residual impacts that the ARTC Inland Rail project may have on environmental or social values.

Table 93: Projects included in the LVIA cumulative impact assessment

Project	Location	Description	Project status	Lifespan (years)	Relationship to the Project
North Star to NSW/QLD Border section of Inland Rail (ARTC)	Rail alignment from North Star, NSW to NSW/QLD border	37 km single-track dual-gauge freight rail line as part of the ARTC Inland Rail Program.	Draft EIS being prepared by proponent	>100 years	Potential overlap in construction of the projects. Potential for cumulative landscape and visual effects.
Gowrie to Helidon section of Inland Rail (ARTC)	Rail alignment from Gowrie to Helidon	26 km single-track dual-gauge freight railway, including 6.8 km of tunnel, as part of the ARTC Inland Rail Program	Draft EIS being prepared by proponent	>100 years	Potential overlap in construction of the projects. Directly adjoins current alignment.
Helidon to Calvert section of Inland Rail (ARTC)	Rail alignment from Helidon to Calvert	47 km single-track dual-gauge freight railway, including 1.1 km of tunnel, as part of the ARTC Inland Rail Program	Draft EIS being prepared by proponent	>100 years	Potential overlap in construction of the projects.
Calvert to Kagaru (Inland Rail)	Rail alignment from Calvert to Kagaru	New 53 km dual-gauge track from Calvert to Kagaru to provide convenient access for freight to major proposed industrial developments at Ebenezer in the City of Ipswich, and at Bromelton near Beaudesert in the Scenic Rim Region. The project includes a 1.1 km tunnel through the Teviot Range.	Reference design and draft EIS	>100 years	70 km to the southeast of the Project footprint. Potential overlap in construction of the projects.
Cross River Rail	Brisbane	New 10.2 km passenger rail line from Dutton Park to Bowen Hills, which includes 5.9 km of tunnel under the Brisbane River and the CBD.	Construction	100 years	120 km to the east of the Project footprint. Potential overlap in construction of the projects.
Goondiwindi Abattoir	Goondiwindi	12 km east of Goondiwindi on the Cunningham Highway	DA approved with conditions by Goondiwindi Regional Council.	>50 years	Located around 15 km from the Project. Potential overlap of construction.
Sapphire Feedlot	Kildonan	A large cattle feedlot which currently has a 6,000 head capacity, with plans to expand to 8,700 and in the future.	Operational with plans for expansion	Ongoing	Immediately adjacent to the south of the Project rail alignment at Kildonan. Potential for operational visual impacts.
Yarranbrook Feedlot	Whetstone	The Yarranbrook feedlot is a large cattle feedlot licenced for 25,000 head.	Operational	Ongoing	The alignment passes through the Yarranbrook Feedlot. Potential for operational visual impacts.

Project	Location	Description	Project status	Lifespan (years)	Relationship to the Project
Wyemo Piggery	Yarranlea	The Wyemo Piggery is a large piggery with approval for 55,000 pig units.	Approved with conditions by Goondiwindi Regional Council	Ongoing	Around 10 km south of the Project rail alignment near Glenarbon. Potential for operational visual impacts.
Commodore Mine and Millmerran Power Station	Domville	The Commodore Mine is an open cut coal mine which provides coal for the 850 MW Millmerran Power Station (Mininglink, 2018). The Millmerran Power Station is a coal-fired power station that supplies enough electricity to power approximately 1.1 million homes (Power Technology, 2018)	Operational	Ongoing	Potential expansion areas of Commodore Mine to directly to the east of the Project rail alignment, south of Millmerran. Potential for operational visual impacts.
Doug Hall Poultry	Millmerran	A poultry farming operation with capacity of approximately 20,000 chickens. Operations include egg grading, a feed mill with output of 1,500 tonnes per week, piggery, cropping and solar farm.	Operational	Ongoing	Lot directly adjoins alignment east of Millmerran. Potential for operational visual impacts.
Yarranlea Solar	Yarranlea	Solar Farm Stage 1 will span over 250 ha area consisting of 360,000 solar panels. Projected to have a generation capacity of up to 100 megawatts (MW) once completed. Estimated to power 32,000 homes.	Under construction	Ongoing	The Project rail alignment runs between solar arrays. Potential for operational visual impacts.
Pittsworth Industrial Precinct Enabling Project	Pittsworth	Upgrades to the Precinct provided under the Queensland Government's 'Building our Regions' fund to provide new road and sewerage infrastructure at the Pittsworth Industrial Precinct to allow for industrial land for industries servicing agriculture and the wider region.	Under construction	Ongoing	Southern side of the Project rail alignment near Pittsworth Potential for operational visual impacts.
Toowoomba Wellcamp Airport	Wellcamp	The Toowoomba Wellcamp Airport is a new airport servicing Toowoomba, promoting interstate, intrastate and international connection for the Darling Downs, Granite Belt, Surat Basin and Southern Downs regions.	Operational – subject to continuing construction and expansion	Ongoing	Located to the east of the Project. Potential for operational visual impacts.

Project	Location	Description	Project status	Lifespan (years)	Relationship to the Project
Wellcamp Business Park	Wellcamp	The Wellcamp Business Park is a 500 ha industrial and commercial park that forms part of the Toowoomba Enterprise Hub. The Business Park is located in proximity to the Toowoomba Wellcamp Airport and other major transportation infrastructure.	Operational – subject to expansion	Ongoing	Located to the east of the Project. Potential for operational visual impacts.
Asterion Medicinal Cannabis Facility	Wellcamp	A high-tech medicinal cannabis cultivation, research and manufacturing facility. The project involves infrastructure construction spanning approximately 71 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.	Construction	Ongoing	Adjoins the Project footprint 1 km south of Toowoomba–Cecil Plains Road. Potential for combined, successive and sequential visual impacts during operation.
Witmack Industry Park and Charlton Logistics Park	Wellcamp Charlton	The Witmack Industry Park is a large industrial land development that offers large size industrial land parcels. Businesses situated within the Witmack Industrial Park include the Toowoomba Pulse Data Centre. The Charlton Logistics Park is part of the Toowoomba Enterprise Hub and provides fully serviced 2 ha sites and is well situated for potential transport and logistics operators due to its proximity to transport infrastructure.	Operational – subject to continuing construction and expansion	Ongoing	Around 4 km southeast of the Project rail alignment. Limited potential for operational visual impacts due to distance from Project and local topography.

Project	Location	Description	Project status	Lifespan (years)	Relationship to the Project
Toowoomba Bypass (formerly the Toowoomba Second Range Crossing)	The 41-km long bypass route extends from the Warrego Highway at Helidon Spa in the east to the Gore Highway at Athol in the west, via Charlton.	This bypass takes heavy vehicle through-traffic around the north of Toowoomba	Opened in September 2019	Ongoing	Approximately 1 km to south and east of the Project footprint near Gowrie. Potential for operational visual impacts.
Interlink SQ	13 km west of Toowoomba	200 ha of new transport, logistics and business hubs. Located on the narrow-gauge regional rail network and interstate network. Located at the junction of the Gore, Warrego and New England Highways.	Under construction	2017-2037	Located 8 km from Wellcamp International Airport and to the immediate south of the Project footprint. Ongoing development could require deconfliction of construction resources. There may also be an increase of heavy vehicles using the surrounding highways. Potential for operational visual impacts.
Australia Pacific LNG Project	Walloons gas fields (approximately 20 km west of Millmerran)	Integrated liquefied natural gas (LNG) project. The Walloons gas fields, located to the west of the Project, supplies Coal Seam Gas to support the LNG Facility on Curtis Island.	EIS evaluated subject to conditions in 2011	Started construction in 2011, with an expected project life of 30 years	Around 15 km at closest point to the Project rail alignment. Potential for operational visual impacts.
New Acland Coal Mine Stage 3	35 km northwest of Toowoomba	Expansion of the existing New Acland open-cut coal mine to up to 7.5 Mtpa.	EIS approved with conditions in 2014, Queensland Land Court recommends environmental conditions be reassessed	Sequential development of resource areas expected to extend coal production until 2042	18 km north of the Project footprint. Ongoing development could require deconfliction of construction resources. There may also be an increase of heavy vehicles using the surrounding highways. Limited potential for operational visual impacts due to distance from Project.

Project	Location	Description	Project status	Lifespan (years)	Relationship to the Project
Wetalla Water Pipeline	Toowoomba	A 45 km underground water pipeline to supply up to 5,500 megalitres of treated wastewater to the New Acland coal mine	Operational	Ongoing	From the Wetalla Wastewater Reclamation Facility in Toowoomba to the New Acland coal mine, 35 km northwest of the city. Adjacent to north of the Project footprint.
Southern Queensland Correctional Precinct – Stage two	Spring Creek	Stage 2 expansion of high-level security, men's prison. Expansion estimated to house 1,004 beds.	Construction	Ongoing	km north-east of Gatton, 46 km north-east of the Project. Limited potential for cumulative landscape and visual impacts due to distance from Project.
Wagners Intermodal terminal	Wellcamp Airport	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.	Construction	Ongoing	Located to the east of the Project footprint. Potential for operational visual impacts.
Regional quarantine facility	Wellcamp Airport	1000 bed quarantine facility at Wellcamp Airport. Estimated to have 500 beds operational by Q4 2021 and 500 more beds by Q1 2022.	Operational	Ongoing	Located to the east of the Project footprint, 15 km from Toowoomba centre. Potential for operational visual impacts.
Entertainment precinct	Wellcamp 15 km from Toowoomba centre	Planned to be Queensland's largest entertainment precinct, designed to withhold 40,000 people for major events and house 5,000 onsite accommodations.	Construction	Ongoing	Located to the east of the Project footprint. Potential for operational visual impacts.

Project	Location	Description	Project status	Lifespan (years)	Relationship to the Project
MacIntyre Windfarm	Karara	Wind Farm Precinct will span approximately 40,000 ha, predominantly built on sheep farming land. The MacIntyre Wind Farm is expected to generate 1,026 MW, using up to 120 turbines.	Construction	>30 years	Located 40 km east of the Project, 10 km south of Karara. Limited potential for cumulative landscape and visual impacts due to distance from Project.

For the purposes of landscape and visual amenity, projects that are within the area of influence and will have temporal overlap in construction or expansion activities are considered to have potential to result in cumulative impacts. Only 10 of the initial 29 projects identified meet these criteria. These projects are as follows:

- InterLinkSQ
- Commodore Mine and Millmerran Power Station
- North Star to NSW/QLD Border (Inland Rail)
- Gowrie to Helidon (Inland Rail)
- Helidon to Calvert (Inland Rail)
- Goondiwindi Abattoir
- New Acland Coal Mine Stage 3
- Australia Pacific LNG Project
- Asterion Medicinal Cannabis Facility
- Wagners Intermodal terminal.

The following projects were considered but determined to lie outside of the area of influence for LVIA and/or have been completed so are not considered further in the cumulative assessment:

- Calvert to Kagaru (Inland Rail) – 70 km from the Project, located close to Rosewood
- Cross River Rail – 120 km from the Project, within Brisbane CBD
- Wetalla Water Pipeline – A 45 km water pipeline that has already been constructed and is underground so would not result in cumulative visual impacts.

Based on this assessment, the Project is considered to have potential cumulative landscape and visual impacts.

10.3 Cumulative impact assessment

Cumulative impacts to the landscape and visual amenity of the Project will be largely the product of:

- Temporal construction impacts – presence of construction traffic, workforce and machinery operating on adjoining projects at the same time.
- Spatial operational impacts – the residual impact of the visibility of infrastructure of identified projects to sensitive receptors, including increases in the visibility of infrastructure as a result of the introduction of additional visual receptors (including residential receptors) into an area and with potential to view the Project.

In terms of temporal (construction) impact, it is likely that the other sections of Inland Rail (i.e. North Star to NSW/QLD Border, Gowrie to Helidon and Helidon to Calvert), the Goondiwindi abattoir and InterLinkSQ may have some overlap in construction periods. In addition, ongoing growth and expansion of Commodore Mine and Millmerran Power Station, Australia Pacific LNG, New Acland Coal Mine, Wagners Intermodal terminal and the Asterion Medicinal Cannabis Facility may result in some temporal overlap. Collectively, these projects have the potential to result in the perception of relatively high amounts of construction activity and views of the movement of heavy vehicles and plant within the area of influence.

The areas within the area of influence likely to be most affected by this cumulative activity are the Cunningham Highway, Millmerran-Inglewood Road, Gore Highway, Toowoomba Bypass and Warrego Highway with the greatest activity in the northeastern part of the LVIA Study Area to the west of Toowoomba. As large vehicles on the highway and main road would not be unexpected from a visual perspective and the construction impacts are temporary, the significance of this cumulative impact during construction in the area of influence is considered to be Low.

In terms of the spatial (operational) impacts of other linear transport infrastructure projects, the North Star to NSW/QLD Border and the Gowrie to Helidon sections of Inland Rail immediately adjoin the Project. Some receptors will experience views of both the Project and the North Star to NSW/QLD Border section of Inland Rail or both the Project and the Gowrie to Helidon section of Inland Rail. However, these developments will be viewed as part of the same integrated Inland Rail Program. This is considered to be an impact of Medium cumulative impact significance.

With regards to InterLinkSQ, there would be potential for the perception of development intensification in the northern part of the corridor with potential impacts of up to Medium cumulative impact significance. Similar effects of Medium significance are likely associated with views from the Toowoomba-Cecil Plains Road for the Asterion Medicinal Cannabis Facility and ongoing development of the Wagners Intermodal terminal which are part of the broader Charlton Wellcamp Enterprise Area that is to be developed on the western side of the Toowoomba Wellcamp Airport. Combined or successive impacts with Australia Pacific LNG and New Acland Mine are less likely due to the separation distances from the Project and is considered to be of Low cumulative impact significance.

The Goondiwindi abattoir is unlikely to result in meaningful operational cumulative impact on landscape or visual values. This is because it is a discrete rural development project that is in keeping with the rural and agricultural character of the landscape. Therefore, although combined, successive and/or sequential views may be obtained it is not considered that the Project will intensify this. This would have a Low significance. Similarly, Commodore Mine and Millmerran Power Station are existing facilities. In the context of the expansion of this development, the cumulative landscape and visual impact of the Project is considered to be generally very modest and is considered to be of Low cumulative impact significance. The significance of the contribution of Helidon to Calvert section of Inland Rail to cumulative impact is considered to be Low for both landscape and visual values due to the separation distance from the Project.

An assessment of cumulative impacts that may arise from these projects in combination with the Project is presented in Table 94.

Mitigation measures to address these identified cumulative impacts will generally be as described for the standalone project (Section 11.2).

Due to the low level of lighting proposed for the Project, there are not anticipated to be any significant cumulative lighting impacts.

Overall, the cumulative landscape and visual impact assessment in the region is likely to be up to **Medium**.

Table 94: Assessment of landscape and visual amenity cumulative impacts

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Medium (2)	7	Medium	Activities associated with the Project and InterLinkSQ have potential to combine to result in cumulative visual impacts for residents of Kingsthorpe and Gowrie Junction. Such impacts will be managed through: - Development and implementation of a Rehabilitation and Landscaping Management Plan, as a component of the Construction Environmental Management Plan (CEMP) for the Project that is compatible with InterLinkSQ's adjoining activities and addresses cumulative landscape and visual impacts. - Consultation with InterLinkSQ regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	9	Medium	Activities associated with the Project and InterLinkSQ have potential to combine to result in cumulative visual impacts for residents of Kingsthorpe and Gowrie Junction. Such impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to InterLinkSQ.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
		Sensitivity of the receiving environment	Nil			
Asterion Medicinal Cannabis Facility	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: - Development and implementation of a Rehabilitation and Landscaping Management Plan, as a component of the CEMP for the Project that is compatible with Asterion's adjoining activities and addresses cumulative landscape and visual impacts. - Consultation with Asterion regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	8	Medium	The Asterion Medicinal Cannabis Facility is the first facility as part of the broader Charlton Wellcamp Enterprise Area that is to be developed on the western side of the Toowoomba Wellcamp Airport, adjacent to the Project footprint. In combination with the Project, the Asterion Medicinal Cannabis Facility may result in cumulative impacts to views from Toowoomba-Cecil Plains Road. Potential impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to the Asterion Medicinal Cannabis Facility.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			
		Sensitivity of the receiving environment	Nil			
Commodore Mine and Millmerran Power Station	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: - Development and implementation of a Rehabilitation and Landscaping Management Plan, as a component of the CEMP for the Project that is compatible with Interger's adjoining activities and addresses cumulative landscape and visual impacts - Consultation with Interger regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to Commodore Mine and Millmerran Power Station.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
		Sensitivity of the receiving environment	Nil			
North Star to NSW/QLD Border (Inland Rail)	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	High (3)	7	Medium	The Project interfaces with the North Star to NSW/QLD Border project at the NSW/QLD border on the Macintyre River. Potential cumulative impacts will be managed through: - ARTC to ensure that Rehabilitation and Landscaping Management Plans (or equivalent) are prepared for both adjoining Inland Rail projects, and that these Plans are complimentary and are consistent with the Inland Rail Landscaping and Rehabilitation Strategy. - ARTC to ensure that construction contract documentation for adjoining projects have consistent clauses regarding landscape design and planting. This will extend to the development and implementation of Plans, and the monitoring and defect correction for revegetated and rehabilitated areas.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	9	Medium	Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC, across adjoining project of the Inland Rail Program.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
		Sensitivity of the receiving environment	Nil			
Gowrie to Helidon (Inland Rail)	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	High (3)	8	Medium	The Project interfaces with the Gowrie to Helidon project adjacent to the InterLinkSQ site, before Inland Rail connects into the QR West Moreton System. Potential cumulative impacts will be managed through: - ARTC to ensure that Rehabilitation and Landscaping Management Plans (or equivalent) are prepared for both adjoining Inland Rail projects, and that these Plans are complimentary and are consistent with the Inland Rail Landscaping and Rehabilitation Strategy. - ARTC to ensure that construction contract documentation for adjoining projects have consistent clauses regarding landscape design and planting. This will extend to the development and implementation of Plans and the monitoring and defect correction for revegetated and rehabilitated areas.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	9	Medium	Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC, across adjoining project of the Inland Rail Program.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
		Sensitivity of the receiving environment	Nil			
Helidon to Calvert (Inland Rail)	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 26 km to the east of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of Rehabilitation and Landscaping Management Plans (or equivalent) for both Inland Rail projects that are consistent with the Inland Rail Landscaping and Rehabilitation Strategy.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 26 km to the east of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC, across the Inland Rail Program.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			
		Sensitivity of the receiving environment	Nil			
Goondiwindi Abattoir		Probability of the impact	Medium (2)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Construction impacts associated with views of increases in:	Sensitivity of the receiving environment	Low (1)			The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP. By doing so, ARTC will have managed landscape and visual impacts within its control.
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance landscaping and rehabilitation treatments, that are the responsibility of ARTC. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			
		Sensitivity of the receiving environment	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
New Acland Coal Mine Stage 3 – New Acland Coal Pty Ltd	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 18 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 18 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance landscaping and rehabilitation treatments, that are the responsibility of ARTC. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			
		Sensitivity of the receiving environment	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Australia Pacific LNG Project	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km west of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km west of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance landscaping and rehabilitation treatments, that are the responsibility of ARTC. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			
		Sensitivity of the receiving environment	Nil			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Wagners Intermodal terminal	Construction impacts associated with views of increases in: - Construction traffic - Construction areas.	Probability of the impact	Medium (2)	6	Low	Activities associated with the Project and Wagners Intermodal terminal have potential to combine to result in cumulative visual impacts. Potential cumulative impacts will be managed through: - Development and implementation of a Rehabilitation and Landscaping Management Plan, as a component of the CEMP for the Project that is compatible with Wagner's adjoining activities and addresses cumulative landscape and visual impacts. - Consultation with Wagners regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	8	Medium	The Wagners Intermodal terminal is part of the broader Charlton Wellcamp Enterprise Area that is to be developed on the western side of the Toowoomba Wellcamp Airport, adjacent to the Project footprint. In combination with the Project, the Wagners Intermodal terminal may result in cumulative impacts to views from Toowoomba-Cecil Plains Road. Potential impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to the Wagners Intermodal terminal.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Impact	Aspect	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Impacts of night lighting	Probability of the impact	Nil	Nil	Nil	Nil
		Duration of the impact	Nil			
		Magnitude/intensity of the impact	Nil			
		Sensitivity of the receiving environment	Nil			

11 Mitigation and Residual Impact Assessment

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 11.1), as well as those measures that are proposed to be adopted for future stages of Project delivery (Section 11.2).

This section also presents an assessment of the residual significance of landscape, visual and lighting impacts as a consequence of the Project. In each instance, the assessment establishes a) the initial significance of impact with the application of mitigation measures (specified in Section 11.1); and b) the residual significance of impact, with the application of mitigation measures nominated for implementation through future Project stages (specified in Section 11.2).

The significance assessment methodology that has been adopted is introduced in EIS Chapter 4: Assessment Methodology and is discussed, in the context of this assessment, in Sections 4.8, 4.9 and 4.10.

11.1 Mitigation through the reference design stage

Development of the revised reference design for the Project has progressed in parallel with the impact assessment process and the revised reference design has been slightly amended for the revised draft EIS, to reflect outcomes of ongoing engagement with the community and key stakeholders. As a consequence, design solutions for avoiding, minimising or mitigating impacts have been incorporated into the reference design and revised draft EIS design as appropriate and where possible.

Mitigation measures and controls that have been factored into the design, or otherwise implemented during the revised reference design stage for the Project, are as follows:

- The Project has, where possible, avoided impacts on nationally or regionally protected landscape areas such as the Wondul Range National Park and has minimised impacts on State Forests such as Whetstone State Forest by following the edge of the protected area to the greatest extent possible
- The Project has been intentionally aligned along the eastern boundary of the Rainbow Reserve so as to minimise the extent of encroachment into this reserve
- The Project has avoided, where possible, direct impacts on areas noted as being of regional landscape significance defined using the regional scenic amenity methodology (ShapingSEQ)
- The Project has been aligned to be co-located with existing rail and road infrastructure where possible, minimising the need to develop land that has not previously been subject to disturbance for transport infrastructure purposes
- The alignment has been positioned to reduce the number of crossings and extent of impact on watercourses
- The Project footprint defined in the revised reference design has aimed to minimise vegetation clearing extents to that required to safely and efficiently construct, operate and maintain the works
- The alignment has avoided significant settlements to the greatest extent possible to assist in minimising visual impacts (e.g. Inglewood, Millmerran, Pittsworth) except where the alignment is within or adjacent to existing rail corridor (i.e. through Yelarbon, Pampas and Brookstead)
- The revised draft EIS alignment has changed to minimise impacts in the vicinity of Millmerran.

11.2 Proposed mitigation measures

In order to manage and mitigate potential impacts associated with the Project, several mitigation measures have been proposed for implementation in future stages of Project delivery. These proposed mitigation measures have been identified to address Project specific issues and opportunities including legislative requirements and accepted government plans, policy and practices.

Table 95 identifies the relevant Project stage, the aspect to be managed and the proposed mitigation measure. These mitigation measures include Project-wide considerations as well as location or issue specific measures in response to impacts identified in the LVIA.

The mitigations in Table 95 have been factored into the assessment of residual impact significance, as documented in Table 96.

Table 95: Additional mitigation measures relevant to landscape and visual amenity

Delivery stage	Aspect	Proposed mitigation measures
Detailed design	Landscape and visual impacts due to vegetation removal	- Clearing extents of visually significant vegetation are further limited, where feasible, to that required to safely construct, operate and maintain the Project. Locations include: - East of Rainbow Reserve (Viewpoint 1) (approximately Ch 32 km to Ch 34.6 km) - Yelarbon-Kurumbul Road (approximately Ch 0 – 15 km) - In the vicinity of the township of Yelarbon (approximately Ch 25 km to 27 km) - Whetstone State Forest and adjoining forested areas (approximately Ch 37.5 km to Ch 50 km) - Bringalily State Forest and adjoining forested areas (approximately Ch 50 km to Ch 96 km) - Through Brookstead, in particular with regards to the alignment of the proposed rail corridor adjacent Ware Street and the impact on the removal of existing vegetation that provides a key visual buffer for nearby residents (approximately Ch 151 km to Ch 155 km) - Associated with river and creek crossings (see below). - A Rehabilitation and Landscaping Management Plan will be developed for the Project, as a component of the CEMP. This Plan will be developed in consultation with local governments and affected communities, including Traditional Owners, and will be based on the <u>Inland Rail Landscape and Rehabilitation Strategy</u>, in addition to location and lot specific reinstatement commitments. The Plan will include and clearly identify: - Location-specific objectives for rehabilitation, reinstatement and/or stabilisation. Outside of the rail corridor, lot-specific and township-specific (e.g. Yelarbon, Pampas, Brookstead, Pittsworth) rehabilitation and landscaping requirements may apply and will be developed in collaboration with the relevant land owner, Regional Council or Road Authority Manager. Where the rail corridor passes through landscapes of importance to Traditional Owners consultation will be undertaken (including with the Bigambul Nation Traditional Aboriginal Corporation) to develop mitigation to 'care for country'. Within the rail corridor, maintaining operational safety and rail formation stability will be the driving factors. - Objectives and timeframes for rehabilitation and/or reinstatement/stabilisation works (including biodiversity, vegetation establishment and erosion and sediment control outcomes to be achieved) - Where appropriate, how the objectives align with relevant recovery plans, threat abatement plans, conservation advice or policy guidance for target species in areas identified for rehabilitation - Details of the actions and responsibilities to progressively rehabilitate, regenerate, and/or revegetate areas, whilst minimising the duration of exposure in disturbed areas include rehabilitation requirements such as: - Milling and removal of bitumen pavement - Removal of any decommissioned culverts - Tyning and ripping of base and sub-base material - Application of soil ameliorants - Topsoiling and/or compost blanket - Stabilisation and rehabilitation (e.g. planting and or seeding). - Native flora species endemic to the Darling Downs and Toowoomba regions or other suitable species appropriate to the landscape context and nursery/seed stock sources

Delivery stage	Aspect	Proposed mitigation measures
		○ Consideration for maintenance or performance issues of rehabilitation (e.g. use of groundcover that does not grow and obscure signals or impact the longevity of rail infrastructure) ○ Procedures, timeframes, measurable performance objectives and responsibilities for monitoring the success of rehabilitation and/or reinstatement/stabilisation areas ○ Corrective actions if the outcomes of rehabilitation and/or reinstatement/stabilisation are not achieved. ● Where temporary construction facilities are required, land will be returned to a stable condition that complies with the conditions of applicable landowner agreements and regulatory approvals (e.g. development approval and/or Environmental Authority).
	Landscape and visual impacts on watercourses	● Develop the detailed design to minimise impacts to waterways, riparian vegetation and in-stream flora and habitats. Particular locations include Macintyre River, Macintyre Brook, Pariagara Creek, Cattle Creek, Native Dog Creek, Bringalily Creek, Nicol Creek, Back Creek, Grasstree Creek, Condamine River and Dry Creek and their tributaries. ● Continue to adhere to a crossing structure hierarchy, with bridges preferred to culverts. ● Aim to avoid, then minimise the extent of waterway diversions or realignments.
	Visual impact of rail infrastructure	● Infrastructure (such as structures, embankments/cuttings and bridges) will be designed with regard to landscape character and views as identified in the LVIA, seeking to: ○ Legacy: Implement consistent treatments along the Project alignment to enhance the overall recognition and legacy of the Project and Inland Rail. ○ Bridges: Ensure that bridges are considerate of the local setting, connectivity requirements, crime prevention through environmental design and graffiti issues. In particular, assess urban design input to the following bridges (which have potential to be viewed by the greatest number of viewers) to enhance their visual amenity and potential to create a positive legacy: ○ Cunningham Highway road-over-rail bridge (near Yelarbon) (approximately Ch 25.6 km to Ch 26 km) ○ Gore Highway road-over-rail bridge (near Brookstead) (approximately Ch 153.2 km) ○ Millmerran-Inglewood Road rail-over-road bridge (approximately Ch 73 km) ○ Millmerran-Inglewood Road rail-over-road bridge (approximately Ch 115.5 km) ○ Oakey-Pittsworth Road rail-over-road bridge (approximately Ch 171 km) ○ Linthorpe Road road-over-rail bridge (near Southbrook) (approximately Ch 175.8 km) ○ Toowoomba-Cecil Plains Road rail-over-road bridge (approximately Ch 196.2 km) ○ Warrego Highway rail-over-road bridge (near Gowrie Mountain) (approximately Ch 203 km). ○ Embankments: At locations where embankments are near roads and/or adjoin bridge structures, minimise the extent to which embankments restrict views or affect views from nearby residences, including through selection of sensitive stabilisation techniques, revegetation or – where appropriate - screen planting. Particularly consider treatment opportunities for the new embankments along the northern edge of Pittsworth, between Ch 170 km and 173 km. ○ Cuttings: Assess opportunities to blend cut batters into their landscape setting (e.g. considering potential for revegetation, rock pitching, etc.). Particularly with consideration to the cut near Athol (approximately Ch 189 km to Ch 190 km).

Delivery stage	Aspect	Proposed mitigation measures
		○ Noise barriers: Where these are or may be required in the future, particularly in towns and urban areas, consultation with the local community will be undertaken during the detailed design phase to assess visual amenity and to ensure they are designed sympathetically to their surroundings and consider crime prevention through environmental design and graffiti issues. This will also include, where appropriate, consideration for the inclusion of landscaping, community artwork and urban design and/or transparent panelling. This strategy will be applied to any noise barriers identified as part of potential mitigation of noise impacts in the LVIA areas included in this assessment, including Yelarbon, Brookstead and Pittsworth as well as any other locations identified in the noise mitigation assessments (EIS Chapter 16: Noise and Vibration) in Kildonan, Pampas and the Gowrie area.
	Landscape design treatments	Develop a Project landscape design with landscaping treatments determined with reference to the key landscape characteristics and elements identified in the revised draft EIS, with particular emphasis on design that is appropriate to the setting as described below: • Rural and natural landscapes: The landscape design will respect and enhance the rural landscapes. This includes: ○ Provide earthworks and planting to screen the Project wherever practicable and appropriate to maintain local character and desirable views. This includes further opportunity for design of targeted planting adjacent to major earthworks where possible to the extent consistent with railway safety requirements and <i>ARTC Engineering (Track & Civil) Code of Practice Section 17 Right of Way</i> (ARTC, 2013). For example, planting strips could be introduced adjacent to significant embankments to reduce visual impact and assist in integrating the landform into the existing landscape setting, and in the following locations: ○ Selective planting adjacent to the Warrego Highway Bridge to screen the alignment and bridge abutments as viewed from Gowrie Mountain (approximately Ch 203 km). ○ Adjacent to the alignment and adjacent to the bridge near Brookstead (approximately Ch 153.2 km) to assist to integrate the Project into its landscape context. ○ Adjacent to the alignment and adjacent to the bridge near Oakey-Pittsworth Road and Pittsworth (approximately Ch 169 km to Ch 176 km) to assist to integrate the Project into its landscape context. • Ecologically sensitive areas: The landscape design will provide opportunities for ecological gain to benefit biodiversity. This includes: ○ Development and use of planting and seed mixes to maximise and connect native habitat types for ecological gain. ○ Enhancement of landscape corridors and ecological links by, where possible, joining or re-joining fragmented areas of habitat (where identified in EIS Appendix P: Fauna Connectivity Strategy). • Culturally sensitive landscapes: The landscape design will provide opportunities to reflect Traditional Owner Values. This includes: ○ Consultation with affected Traditional Owners (including with the Bigambul Nation Traditional Aboriginal Corporation) to develop appropriate landscape design treatments (particularly through areas identified in EIS Chapter 19: Cultural Heritage) such as in the vicinity of Rainbow Reserve. • Townships: The landscape design will enhance or complement the local context. For example, the appearance and integration of new structures, fencing and noise barriers will be assessed for all Project components located in an urban area.

Delivery stage	Aspect	Proposed mitigation measures
		Visual impact assessment to be updated during detailed design stage to address design refinements.
	Impacts on the setting of heritage landscapes	- Refine the Project footprint and develop the construction methodology during the detailed design stage to avoid impacts, where possible, to items of Aboriginal, historic or natural heritage significance, such as the old Brookstead railway station, Pampas Memorial Hall, Yelarbon Silos and the Yelarbon and District Soldiers Memorial Hall. - Assess the feasibility of implementing an interpretation strategy and wayfinding to assist in the interpretation of visual elements of heritage significance such as old rail lines, bridges, buildings or other items of visual value.
	Visual impacts of lighting	- Detailed design to incorporate lighting to the minimal level required to meet operational road and rail safety requirements for the Project. - Attenuation measures to minimise light spillage will be assessed and incorporated into the detailed design, such as selection of appropriate light fittings/shields and/or at-receptor treatments. - Limit the potential for vertical illuminance, by selecting luminaries that direct light downwards below the horizontal to avoid lateral glare. - Lighting impact assessment to be updated during the detailed design stage to address design refinements
	Impacts to fauna	Detailed design stage to undertake a wildlife lighting assessment in accordance with the <i>National Light Pollution Guidelines for Wildlife</i> (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2023) with findings used to inform the preparation of a Wildlife Lighting Management Plan , refer Chapter 11: Flora and Fauna..
Pre-Construction Activities and Early Works	Impacts to landscape and visual values	- Implement the Rehabilitation and Landscaping Management Plan to minimise disturbance to landscape and visual amenity values during the site establishment. - Construction areas including stockpile areas, fuel storage areas and staff parking areas to be located outside the tree protection zone as defined in AS4970-2009: Protection of trees on development sites (Standards Australia, 2009).
Construction Works and Commissioning	Landscape and visual impacts due to vegetation removal	Establish vegetation protection zones and Project clearing extents prior to commencement of works to avoid impacts on adjoining vegetation and habitats as far as practicable. In particular seek to retain key mature trees and vegetation corridors within proposed non-resident workforce accommodation facilities to provide amenity for residents and enable ease of rehabilitation.
	Impacts to landscape and visual values	- Minimise height of all stockpiles to the greatest extent possible to reduce their visual impact. - Temporary treatments (such as hoardings and screens) to site compounds and non-resident workforce accommodation facilities will be considered to assist in reducing visual impacts of temporary infrastructure and sun glare within close proximity of sensitive receptors (particularly townships including Yelarbon, Brookstead, Pampas and Pittsworth and road networks). These include opportunities to utilise features on temporary fencing/hoarding. This will include art-based treatments to assist with screening the works from the public and using information boards (or similar) to educate the public about the construction works.
	Visual impacts of lighting	- Avoid night works to the greatest extent possible close to residences - Where night works are unavoidable, consider light attenuation measures in discussion with potentially affected landowners. - Minimise light spill from the proposed non-resident workforce accommodation facilities at Yelarbon, Inglewood and Millmerran by orientating and/or shielding light sources so as not to impact on neighbouring sensitive receptors.
	Reinstatement and rehabilitation	Implement the Rehabilitation and Landscaping Management Plan following the completion of works within each area of the Project footprint, until performance criteria are satisfactorily achieved.

Delivery stage	Aspect	Proposed mitigation measures
Operations	Visual impacts of lighting	In response to any legitimate complaints, consider additional control measures, such as screening of sensitive receptors.

11.3 Residual impact assessment

Potential impacts to landscape and visual values associated with the Project in the construction works and operations stages are outlined in Section 7, Section 8 and Section 9. These impacts have been subjected to an impact assessment as per the methodology detailed in Section 4.

The initial impact assessment is undertaken on the assumption that the design considerations (or initial mitigations) factored into the revised reference design stage (Section 11.1) have been implemented.

Proposed mitigation and management measures, including those listed in relevant Plans and described in Table 95, were then applied as appropriate to the stage of the Project to reduce the level of potential impact. These are documented under the heading proposed additional mitigations.

The residual significance of the potential impacts on landscape and visual values was then reassessed after mitigation and management measures were applied. The pre-mitigated significance levels were compared to the residual significance levels in order to assess the effectiveness of the mitigation and management measures.

In conclusion, the Project is assessed to have the following impacts, shown in Table 96 on landscape and visual values.

Table 96: Impact Assessment summary

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
Landscape impacts	Construction works/operations	LCT A: Vegetated Watercourses – Rivers	Moderate	Moderate	Moderate	Low	Low
		LCT B: Vegetated Watercourses – Creeks and Channels	Low	Moderate	Low	Moderate	Low
		LCT C: Irrigated Croplands	Low	Low	Negligible	Low	Negligible
		LCT D: Dry Croplands and Pastures	Low	High	Moderate	High	Moderate
		LCT E: Vegetated Grazing	No Impact	No Impact	No Impact	No Impact	No Impact
		LCT F: Rural Settlement	Moderate	High	High	Moderate	Moderate
		LCT G: Rural Living	Moderate	Moderate	Moderate	Moderate	Moderate
		LCT H: Forested Uplands	High	No Impact	No impact	No Impact	No impact
		LCT I: Settled Hills	Moderate	High	High	High	High
		LCT J: Suburban Living	Moderate	Low	Low	Low	Low
		LCT K: Salinity Scald	Low	Low	Negligible	Low	Negligible
		LCT L: Transitional Landscapes	No Impact	No Impact	No Impact	No Impact	No Impact
Visual impacts	Construction works/operations	Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Moderate	Low	Low	Low	Low
		Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation facility	Low	Moderate	Low	Low	Negligible
		Viewpoint 3: Yelarbon Rest Area	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 4: Yelarbon silo artwork viewing area	Moderate	Low	Low	Low	Low
		Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Low	Negligible	Negligible	Negligible	Negligible
		Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Low	Moderate	Low	Moderate	Low

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation site	Low	Moderate	Low	Low	Negligible
		Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Low	Low	Negligible	Low	Negligible
		Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Low	Moderate	Low	Moderate	Low
		Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Moderate	Low	Low	Low	Low
		Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Low	Moderate	Low	Moderate	Low
		Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	Low	Moderate	Low	Moderate	Low
		Viewpoint 14: Nardoo Street edge of Millmerran	Moderate	Negligible	Low	Negligible	Low
		Viewpoint 15: Turallin Road towards the proposed Turallin facility	Low	Moderate	Low	Low	Negligible
		Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Low	Moderate	Low	Moderate	Low
		Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Low	Low	Negligible	Low	Negligible
		Viewpoint 18: Gore Highway near service station, Pampas	Moderate	Moderate	Moderate	Moderate	Moderate

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Low	Moderate	Low	Moderate	Low
		Viewpoint 20: Near Brookstead State School	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Low	Moderate	Low	Moderate	Low
		Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 23: Stanley Street near local park, Pittsworth	Moderate	Low	Low	Moderate	Low
		Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 25: Gore Highway near Southbrook	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 26: View from Athol School Road	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Low	Moderate	Low	Moderate	Low
		Viewpoint 28: Linora Drive, Gowrie Mountain	Moderate	Low	Low	Low	Low
		Viewpoint 29: Mount Kingsthorpe summit scenic lookout	High	Low	Moderate	Low	Moderate
Visual impacts	Operations	Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation facility	Low	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)
		Viewpoint 3: Yelarbon Rest Area	Moderate	High	High	High	High
				High (noise barriers)	High (noise barriers)	High (noise barriers)	High (noise barriers)

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 4: Yelarbon silo artwork viewing area	Moderate	Moderate	Moderate	Moderate	Moderate
				High (noise barriers)	High (noise barriers)		High (noise barriers)
		Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Low	Low	Negligible	Low	Negligible
		Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Low	High	Moderate	High	Moderate
		Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation site	Low	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)
		Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Low	Moderate	Low	Moderate	Low
		Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Low	High	Moderate	High	Moderate
		Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Moderate	Low	Low	Low	Low
		Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Low	Moderate	Low	Moderate	Low
		Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Moderate	Low	Low	Low	Low
		Viewpoint 13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	Low	High	Moderate	High	Moderate
		Viewpoint 14: Nardoo Street edge of Millmerran	Moderate	Negligible	Low	Negligible	Low
		Viewpoint 15: Turallin Road towards the proposed Turallin facility	Low	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Low	Moderate	Low	Moderate	Low
		Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Low	Moderate	Low	Moderate	Low
		Viewpoint 18: Gore Highway near service station, Pampas	Moderate	Moderate	Moderate	Moderate	Moderate
		Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Low	Moderate	Low	Moderate	Low
		Viewpoint 20: Near Brookstead State School	Moderate	High	High	Moderate	Moderate
				High (noise barriers)	High (noise barriers)	High (noise barriers)	High (noise barriers)
		Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Low	Moderate	Low	Moderate	Low
		Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Moderate	High	High	High	High
				High (noise barriers)	High (noise barriers)	High (noise barriers)	High (noise barriers)
		Viewpoint 23: Stanley Street near local park, Pittsworth	Moderate	Moderate	Moderate	Low	Low
				High (noise barriers)	High (noise barriers)	Moderate (noise barriers)	Moderate (noise barriers)
		Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Moderate	High	High	High	High
				High (noise barriers)	High (noise barriers)	High (noise barriers)	High (noise barriers)
		Viewpoint 25: Gore Highway near Southbrook	Moderate	High	High	Moderate	Moderate
		Viewpoint 26: View from Athol School Road	Moderate	High	High	High	High
		Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Low	High	Moderate	High	Moderate

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 28: Linora Drive, Gowrie Mountain	Moderate	Moderate (construction and operation)	Moderate (construction and operation)	Moderate (construction and operation)	Moderate (construction and operation)
		Viewpoint 29: Mount Kingsthorpe summit scenic lookout	High	Moderate (construction and operation)	High (construction and operation)	Moderate (construction and operation)	High (construction and operation)
Lighting impacts	Construction works/operations	Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Moderate	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)
		Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation site	Low	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)
						No Impact (decommissioned)	No Impact (decommissioned)
		Viewpoint 3: Yelarbon Rest Area	Moderate	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)
		Viewpoint 4: Yelarbon silo artwork viewing area	Moderate	Low (construction and operation)	Low (construction and operation)	Low (construction and operation)	Low (construction and operation)
		Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Low	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)
		Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Low	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)
		Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation site	Low	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)
						No Impact (decommissioned)	No Impact (decommissioned)

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Low	No impact (construction)	No impact (construction)	No impact (construction)	No impact (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Low	Low (construction)	Negligible (construction)	Low (construction)	Negligible (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Low	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)
		Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Low	No Impact (construction)	No Impact (construction)	No Impact (construction)	No Impact (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Low	No Impact (construction)	No Impact (construction)	No Impact (construction)	No Impact (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	Low	Low (construction)	Negligible (construction)	Low (construction)	Negligible (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 14: Nardoo Street edge of Millmerran	Moderate	No impact (construction)	No impact (construction)	No impact (construction)	No impact (construction)
				Negligible (operation)	Low (operation)	Negligible (operation)	Low (operation)
		Viewpoint 15: Turallin Road towards the proposed Turallin facility	Low	Low (construction)	Negligible (construction)	Low (construction)	Negligible (construction and operation)
				No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)	No Impact (decommissioned)

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Low	No Impact (construction)	No Impact (construction)	No Impact (construction)	No Impact (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Low	Negligible (construction)	Negligible (construction and operation)	Negligible (construction)	Negligible (construction and operation)
		Viewpoint 18: Gore Highway near service station, Pampas	Moderate	No Impact (construction)	No Impact (construction)	No Impact (construction)	No Impact (construction)
				Low (operation)	Low (operation)	Low (operation)	Low (operation)
		Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Low	Low (construction)	Negligible (construction)	Low (construction)	Negligible (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 20: Near Brookstead State School	Moderate	Negligible (construction)	Low (construction)	Negligible (construction)	Low (construction)
				Low (operation)	Low (operation)	Low (operation)	Low (operation)
		Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Low	No impact (construction)	No impact (construction)	No impact (construction)	No impact (construction)
				Negligible (operation)	Negligible (operation)	Negligible (operation)	Negligible (operation)
		Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Moderate	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)
		Viewpoint 23: Stanley Street near local park, Pittsworth	Moderate	No Impact (construction)	No Impact (construction)	No Impact (construction)	No Impact (construction)
				Negligible (operation)	Low (operation)	Negligible (operation)	Low (operation)
		Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Moderate	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)

Aspect	Stage	Landscape Character Type/Viewpoint	Sensitivity	Initial Significance ^{#1}		Residual Significance ^{#2}	
				Magnitude	Potential Effect	Magnitude	Potential Effect
		Viewpoint 25: Gore Highway near Southbrook	Moderate	No impact (construction)	No impact (construction)	No impact (construction)	No impact (construction)
				Negligible (operation)	Low (operation)	Negligible (operation)	Low (operation)
		Viewpoint 26: View from Athol School Road	Moderate	Low (construction)	Low (construction)	Low (construction)	Low (construction)
				Negligible (operation)	Low (operation)	Negligible (operation)	Low (operation)
		Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Low	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)
		Viewpoint 28: Linora Drive, Gowrie Mountain	Moderate	Negligible (construction and operation)	Low (construction and operation)	Negligible (construction and operation)	Low (construction and operation)
		Viewpoint 29: Mount Kingsthorpe summit scenic lookout	Negligible	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)	Negligible (construction and operation)

Table notes:

^{#1} Includes implementation of initial mitigations specified in **Table 94**

^{#2} Includes implementation of additional mitigations and controls (such as provision of vegetation buffers) as identified in **Table 95**

12 Conclusions

12.1 Summary of landscape impacts

Twelve LCTs with associated LCAs were identified through the landscape assessment process. A summary of the overall likely landscape impact anticipated during the construction works and operations stages of the Project for each LCT is presented in Table 97.

Table 97: Summary landscape assessment (construction and operation)

Landscape character type	Landscape sensitivity	Magnitude of change	Potential effect/significance
LCT A: Vegetated Watercourses – Rivers	Moderate	Moderate ¹	Moderate ¹
		Low ²	Low ²
LCT B: Vegetated Watercourses – Creeks and Channels	Low	Moderate ^{1, 2}	Low ^{1, 2}
LCT C: Irrigated Croplands	Low	Low ^{1, 2}	Negligible ^{1, 2}
LCT D: Dry Croplands and Pastures	Low	High ^{1, 2}	Moderate ^{1, 2}
LCT E: Vegetated Grazing	No Impact	No Impact ^{1, 2}	No Impact ^{1, 2}
LCT F: Rural Settlement	Moderate	High	High ¹
		Moderate ²	Moderate ²
LCT G: Rural Living	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
LCT H: Forested Uplands	High	No Impact ^{1, 2}	No impact ^{1, 2}
LCT I: Settled Hills	Moderate	High ^{1, 2}	High ^{1, 2}
LCT J: Forested Hills and Plains	Moderate	Low ^{1, 2}	Low ^{1, 2}
LCT K: Salinity Scald	Low	Low ^{1, 2}	Negligible ^{1, 2}
LCT L: Transitional Landscapes	No Impact	No Impact ^{1, 2}	No Impact ^{1, 2}

Table notes:

1. Application of mitigation measures specified in Section 11.1
2. Application of mitigation measures specified in Section 11.2.

This shows that the Project is considered likely to result in impacts of up to a high level of effect on landscape character and amenity of two LCTs during construction or operation prior to the application of mitigation: LCT – LCT I: Settled Hills and LCT F: Rural Settlement. Impacts on LCT I principally relates to the impacts associated with clearance of vegetation and the construction of extensive cuts and embankments through landscapes of high local scenic value. Impacts on LCT F relate to the introduction of large embankments and bridges within the vicinity of the settled areas (of Yelarbon, Brookstead and Pittsworth).

12.2 Summary of visual impacts

Based on digital mapping (VAM) and the field survey, 29 representative viewpoints were selected for detailed assessment. A summary of the baseline analysis and overall likely visual impact anticipated during the construction of the Project (as described in 8.2: Viewpoint assessment) is summarised for each viewpoint in Table 98.

Table 98: Summary preliminary visual assessment (Construction)

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation facility	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 3: Yelarbon Rest Area	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 4: Yelarbon silo artwork viewing area	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Low	Negligible ^{1, 2}	Negligible ^{1, 2}
Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation facility	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Low	Low ^{1, 2}	Negligible ^{1, 2}
Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 14: Nardoo Street edge of Millmerran	Moderate	Negligible ^{1, 2}	Low ^{1, 2}
Viewpoint 15: Turallin Road towards the proposed Turallin facility	Low	Moderate	Low ^{1, 2}
Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Low	Moderate	Low ^{1, 2}
Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Low	Low ^{1, 2}	Negligible ^{1, 2}
Viewpoint 18: Gore Highway near service station, Pampas	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 20: Near Brookstead State School	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 23: Stanley Street near local park, Pittsworth	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 25: Gore Highway near Southbrook	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 26: View from Athol School Road	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Low	Moderate ^{1, 2}	Low ^{1, 2}

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 28: Linora Drive, Gowrie Mountain	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 29: Mount Kingsthorpe summit scenic lookout	High	Low ^{1, 2}	Moderate ^{1, 2}

Table notes:

1. Application of mitigation measures specified in Section 11.1
2. Application of mitigation measures specified in Section 11.2

This shows that, while construction impacts of up to a moderate magnitude of change are anticipated, the Project is considered likely to result in impacts up to a moderate level of effect during construction.

A summary of the overall likely visual impact on the same representative viewpoints during the operation of the Project is summarised in Table 99.

Table 99: Summary preliminary visual assessment (Operation)

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation facility	Low	No Impact ³ (decommissioned)	No Impact ³ (decommissioned)
Viewpoint 3: Yelarbon Rest Area and silo artwork viewing platform	Moderate	High ^{1, 2} (noise barriers)	High ^{1, 2} (noise barriers)
Viewpoint 4: Yelarbon silo artwork viewing area	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
		High ^{1, 2} (noise barriers)	High ^{1, 2} (noise barriers)
Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Low	Low ^{1, 2}	Negligible ^{1, 2}
Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road active level crossing	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation facility	Low	No Impact ³ (decommissioned)	No Impact ³ (decommissioned)
Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Low	High ^{1, 2}	Moderate ^{1, 2}
Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Moderate	Low ^{1, 2}	Low ^{1, 2}
Viewpoint 13: Millmerran-Inglewood Road near lot	Low	High ^{1, 2}	Moderate ^{1, 2}
Viewpoint 14: Nardoo Street edge of Millmerran	Moderate	Negligible ^{1, 2}	Low ^{1, 2}
Viewpoint 15: Turallin Road towards the proposed Turallin facility	Low	No Impact ³ (decommissioned)	No Impact ³ (decommissioned)
Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 18: Gore Highway near service station, Pampas	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 20: Near Brookstead State School	Moderate	High ¹	High ¹
		Moderate ² (noise barriers)	Moderate ² (noise barriers)
Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Low	Moderate ^{1, 2}	Low ^{1, 2}
Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Moderate	High ^{1, 2}	High ^{1, 2}
Viewpoint 23: Stanley Street near local park, Pittsworth	Moderate	Moderate ¹	Moderate ^{1, 2} (noise barriers)
		Low ² (noise barriers)	Low ²
Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Moderate	High ^{1, 2}	High ^{1, 2}
Viewpoint 25: Gore Highway near Southbrook	Moderate	High ¹	High ¹
		Moderate ²	Moderate ²
Viewpoint 26: View from Athol School Road	Moderate	High ^{1, 2}	High ^{1, 2}
Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Low	High ^{1, 2}	Moderate ^{1, 2}
Viewpoint 28: Linora Drive, Gowrie Mountain	Moderate	Moderate ^{1, 2}	Moderate ^{1, 2}
Viewpoint 29: Mount Kingsthorpe summit scenic lookout	High	Moderate ^{1, 2}	High ^{1, 2}

Table notes:

1. Application of mitigation measures specified in Section 11.1
2. Application of mitigation measures specified in Section 11.2
3. No Impact results if the non-resident workforce accommodation site/Turallin facility is decommissioned

This shows that the Project is considered likely to result in impacts of high level of effect on seven representative views, relating to impacts on Viewpoint 3: Yelarbon Rest Area, Viewpoint 20: Near Brookstead State School, Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn, Viewpoint 24: Pittsworth-Felton Road, Viewpoint 25: Gore Highway near Southbrook, Viewpoint 26: View from Athol School Road and Viewpoint 29: Mount Kingsthorpe summit scenic lookout. These will be managed in accordance with the principles outlined in Section 11.

An additional six representative viewpoints (Viewpoint 3: Yelarbon Rest Area, Viewpoint 4: Yelarbon silo artwork viewing platform, Viewpoint 20: Near Brookstead State School, Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn, Viewpoint 23: Stanley Street near local park, Pittsworth and Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth) have the potential for the significance of impact during operation to increase, should noise barriers be included at the detailed design stage. However, with the exception of Viewpoint 4: Yelarbon silo artwork viewing platform (where the potential effect would increase from Moderate to High), as these viewpoints are already considered to experience a magnitude of change of high, this would not change the potential effect/significance (as 'high' is the highest magnitude of change possible).

12.3 Summary of lighting impacts

In summary, the qualitative desktop assessment concludes that the proposed alignment and associated infrastructure are unlikely to create any important effects associated with obtrusive lighting on the external environment as a result of the likely construction activities or permanent Project lighting.

As there is limited permanent Project lighting proposed beyond that required for operational safety, many of the viewpoints are not anticipated to be affected by night lighting. Table 100 presents a summary of the baseline analysis and overall likely visual impact anticipated during operations stage of the Project for each viewpoint. The greatest effect during the construction works and operations stages is up to a Low level of effect.

Additional information on potential obtrusive lighting impacts, based on quantitative analysis is provided in Appendix 3: Obtrusive lighting assessment. This has identified up to 60 potential non-compliances with AS/NZS 4282:2019 and three locations being directly in the path of the track alignment and/or proposed associated road works that require specific mitigation measures to address the identified impact.

Table 100: Summary lighting assessment (Construction and Operation)

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul	Moderate	Negligible	Low (construction and operation) ^{1, 2}
Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation facility	Low	Low (construction)	Negligible (construction) ^{1, 2}
		No Impact (decommissioned) ³	No Impact (decommissioned) ³
Viewpoint 3: Yelarbon Rest Area	Moderate	Negligible	Low (construction and operation) ^{1, 2}
Viewpoint 4: Yelarbon silo artwork viewing area	Moderate	Low	Low (construction and operation) ^{1, 2}
Viewpoint 5: Cunningham Highway Near Whetstone Rest Area	Low	Negligible	Negligible (construction and operation) ^{1, 2}
Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road level crossing	Low	Negligible	Negligible (construction and operation) ^{1, 2}
Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation facility	Low	Low (construction)	Negligible (construction) ^{1, 2}
		No Impact (decommissioned) ³	No Impact (decommissioned) ³
Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road	Low	No Impact (construction)	No Impact (construction) ^{1, 2}
		Negligible (operation)	Negligible (operation) ^{1, 2}
Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2	Low	Low (construction)	Negligible (construction and operation) ^{1, 2}
		Negligible (operation)	
Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran	Low	Negligible	Negligible (construction and operation) ^{1, 2}
Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road	Low	No Impact (construction)	No Impact (construction) ^{1, 2}
		Negligible (operation)	Negligible (operation) ^{1, 2}
Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station	Low	No Impact (construction)	No Impact (construction) ^{1, 2}
		Negligible (operation)	Negligible (operation) ^{1, 2}

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3	Low	Low (construction) Negligible (operation)	Negligible (operation and operations) ^{1, 2}
Viewpoint 14: Nardoo Street edge of Millmerran	Moderate	No Impact Negligible	No Impact (construction) ^{1, 2} Low (operation) ^{1, 2}
Viewpoint 15: Turallin Road towards the proposed Turallin facility	Low	Low (construction) No Impact (decommissioned) ³	Negligible (construction) ^{1, 2} No Impact (decommissioned) ³
Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and floodplain	Low	No Impact (construction) Negligible (operation)	No Impact (construction) ^{1, 2} Negligible (operation) ^{1, 2}
Viewpoint 17: Gore Highway towards Condamine River crossing and floodplain	Low	Negligible	Negligible (construction and operation) ^{1, 2}
Viewpoint 18: Gore Highway near service station, Pampas	Moderate	No Impact (construction) Low (operation)	No Impact (construction) ^{1, 2} Low (operation) ^{1, 2}
Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing	Low	Low (construction) Negligible (operation)	Negligible (construction and operation) ^{1, 2}
Viewpoint 20: Near Brookstead State School	Moderate	Negligible (construction) Low (operation)	Low (construction and operation) ^{1, 2}
Viewpoint 21: Glen Devon Road looking south from elevated private residential lots	Low	No Impact (construction) Negligible (operation)	No Impact (construction) ^{1, 2} Negligible (operation) ^{1, 2}
Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn	Moderate	Negligible	Low (construction and operation) ^{1, 2}
Viewpoint 23: Stanley Street near local park, Pittsworth	Moderate	No Impact (construction) Negligible (operation)	No Impact (construction) ^{1, 2} Low (operation) ^{1, 2}
Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth	Moderate	Negligible	Low (construction and operation) ^{1, 2}
Viewpoint 25: Gore Highway near Southbrook	Moderate	No Impact (construction) Negligible (operation)	No Impact (construction) ^{1, 2} Low (operation) ^{1, 2}
Viewpoint 26: View from Athol School Road	Moderate	Low (construction) Negligible (operation)	Low (construction and operation) ^{1, 2}
Viewpoint 27: Toowoomba-Cecil Plains Road, near private lot 'Burton'	Low	Negligible	Negligible (construction and operation) ^{1, 2}
Viewpoint 28: Linora Drive, Gowrie Mountain	Moderate	Negligible	Low (construction and operation) ^{1, 2}

Viewpoint name	Viewpoint sensitivity	Magnitude of change	Potential effect/significance
Viewpoint 29: Mount Kingsthorpe summit scenic lookout	Low	Negligible	Negligible (construction and operation) ^{1, 2}

Table notes:

1. Application of mitigation measures specified in Section 11.1
2. Application of mitigation measures specified in Section 11.2
3. No Impact results if the non-resident workforce accommodation facility is decommissioned

12.4 Impact assessment summary

In conclusion, the Project is assessed to have the following impacts, shown in Table 101: Impact Assessment summary on landscape and visual values.

Table 101: Impact Assessment summary

Impact	Potential Effect/Significance
Landscape impacts during the construction works and operations stages	For landscape impacts during the construction works and operations stages, the greatest impact identified of up to High is on LCT I: Settled Hills.
Visual impacts during construction works	For visual impacts during construction, the greatest impact identified is up to Moderate for nine viewpoints (Viewpoint 3: Yelarbon Rest Area, Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station, Viewpoint 18: Gore Highway near service station, Pampas, Viewpoint 20: Near Brookstead State School, Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn, Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth, Viewpoint 25: Gore Highway near Southbrook, Viewpoint 26: View from Athol School Road and Viewpoint 29: Mount Kingsthorpe summit scenic lookout).
Visual impacts during operations	For visual impacts during operation, the greatest impact identified is up to High for seven viewpoints (Viewpoint 3: Yelarbon Rest Area, Viewpoint 20: Near Brookstead State School, Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn, Viewpoint 24: Pittsworth-Felton Road, Viewpoint 25: Gore Highway near Southbrook, Viewpoint 26: View from Athol School Road and Viewpoint 29: Mount Kingsthorpe summit scenic lookout). An additional six representative viewpoints (Viewpoint 3: Yelarbon Rest Area, Viewpoint 4: Yelarbon silo artwork viewing platform, Viewpoint 20: Near Brookstead State School, Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn, Viewpoint 23: Stanley Street near local park, Pittsworth and Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth) have the potential for the significance of impact during operation to increase, should noise barriers be included at the detailed design stage. However, with the exception of Viewpoint 4: Yelarbon silo artwork viewing platform (where the potential effect would increase from Moderate to High), as these viewpoints are already considered to experience a magnitude of change of high, this would not change the potential effect/significance (as 'high' is the highest magnitude of change possible).

Impact	Potential Effect/Significance
Lighting impacts (qualitative)	For lighting impacts the greatest impact identified of up to Low relates to seven viewpoints during construction (Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul, Viewpoint 3: Yelarbon Rest Area, Viewpoint 4: Yelarbon silo artwork viewing area, Viewpoint 20: Near Brookstead State School, Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth, Viewpoint 26: View from Athol School Road and Viewpoint 28: Linora Drive, Gowrie Mountain) and eleven viewpoints during operation (Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul, Viewpoint 3: Yelarbon Rest Area, Viewpoint 4: Yelarbon silo artwork viewing area, Viewpoint 14: Nardoo Street edge of Millmerran, Viewpoint 18: Gore Highway near service station, Pampas, Viewpoint 20: Near Brookstead State School, Viewpoint 23: Stanley Street near local park, Viewpoint 24: Pittsworth and District Assembly of God, Viewpoint 25: Gore Highway near Southbrook, Viewpoint 26: View from Athol School Road and Viewpoint 28: Linora Drive, Gowrie Mountain).
Lighting impacts (quantitative)	Up to 60 potential non-compliances with AS/NZS 4282:2019 including three locations directly in the path of the track alignment and/or proposed associated road works (Appendix 3 for full details)
Cumulative impacts during construction works	Cumulative impacts during construction works are considered to be of up to Low (Section 10 for further details on cumulative impacts).
Cumulative impacts during operations	Cumulative impacts during operations are considered to be of up to Medium primarily associated with construction traffic on the Warrego Highway due to the simultaneous construction of G2H and C2K projects (Section 10 for further details on cumulative impacts).
Cumulative impacts of night lighting	There are no identified cumulative impacts associated with night lighting (Section 10 for further details on cumulative impacts). Nil

Table note:

Impact significance in the summary table above is given for the most significant impact identified for each attribute prior to any mitigation.

12.5 Conclusions

The landscape between Kurumbul near the NSW border and Gowrie Junction is typically a sparsely settled rural landscape characterised by generally flat irrigated and non-irrigated croplands and undulating pastures, interspersed by a network of vegetated watercourses associated with the Dumaresq, Macintyre and Condamine Rivers and set against a backdrop of forested low hills and isolated volcanic peaks. It is, for the most part, a highly modified landscape as a result of historical clearing practices for agriculture and grazing, the establishment of linear infrastructure (railways, highways and powerlines) and other development activity (e.g. Commodore Mine, Toowoomba Wellcamp Airport and surrounds). The northern extent of the Project is located within the Western Gateway Regional Economic Cluster (REC), as identified in ShapingSEQ as supporting significant agricultural and resource activities and priority sectors of manufacturing, transport and logistics, and health and knowledge. The REC is located to include the Toowoomba Wellcamp Airport, Toowoomba Bypass, Warrego, Gore and New England highways, InterLinkSQ and the city of Toowoomba.

Historically, freight rail has existed within the impact assessment area, and there is a legacy of modern and heritage rail infrastructure throughout the area.

The Project would introduce 217.48 km of new and upgraded rail into the landscape, two thirds of which would be greenfield development (149.48 km).

The key landscape and visual impacts of the Project relate to the introduction of rail infrastructure into relatively intact rural and natural settings, the removal of vegetation, along with the provision of new infrastructure elements including embankments, deep cuts, viaducts and new road and rail bridges.

Twelve LCTs have been identified within the impact assessment area that are assessed to have up to High sensitivity. Impacts on these LCTs of up to a **High** level of effect have been identified for two character areas prior to the application of mitigation:

- Landscape Type I: Settled Hills – which comprises landscapes of high local scenic value as identified in the Toowoomba Regional Council *Scenic Amenity Study* (Conics, 2009)
- LCT F: Rural Settlement – which includes the landscapes around the settlements of Yelarbon, Brookstead and Pittsworth.

No significant impacts have been identified on landscapes of high scenic amenity identified using the regional scenic amenity methodology or in the *Toowoomba Regional Council Scenic Amenity Study* (Conics, 2009). It is noted that the Project has the potential to impacts upon landscapes identified as having high scenic amenity value in *Toowoomba Region Scenic Amenity Study* (Lat27, 2021a) which was prepared as part of the Toowoomba Future's program and will inform future updates to the Toowoomba Regional Council's planning scheme. This includes potential direct landscape impacts on:

- Vegetated watercourses, particularly the Condamine River (LCA A01 and A02) and other tributaries traversed by the alignment
- Elevated and vegetated hills in the vicinity of Pittsworth (LCA I01).

The number of visual receptors varies greatly across the impact assessment area. Key areas with high numbers of receptors include the various population centres close to the alignment such as Kingsthorpe, Gowrie Mountain, Southbrook, Pittsworth, Brookstead, Pampas and Yelarbon, as well as numerous rural living areas where residents are present. Additionally, views can be obtained by travellers on roads throughout the area, including the Cunningham Highway, Gore Highway, Warrego Highway and tourist drives (including parts of the *Warrego Way* and *Adventure Way*, *Rural Getaway*, *Open Plains Country Drive* and *Border Rivers Tourist Drive* routes and other local routes).

Visual impacts are often contained by the presence of vegetation and landform. However, there are localised elevated areas affording views over a wider area, including three scenic lookouts at varying distances to the alignment, which are located at Mount Basalt Reserve, Commodore Peak picnic area and Mount Kingsthorpe summit.

Twenty-nine representative viewpoints have been assessed to represent impacts on these views. Of these, seven visual impacts of up to a **High** level of effect were identified for the operations stage of the Project prior to the application of mitigation. These comprise:

- The impact of the Cunningham Highway road bridge and introduction of additional rail infrastructure on Viewpoint 3: Yelarbon Rest Area
- The impact of the new road bridge and embankments north of Brookstead and additional rail infrastructure at Viewpoint 20: Near Brookstead State School
- The impact of bridges and large embankments on the northern edge of Pittsworth at Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn
- The impact of the large cuts and embankments close to rural residential lots at Viewpoint 25: Gore Highway near Southbrook
- The impact of large embankments and new rail and bridge infrastructure at Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth
- The impact of embankments and a proposed controlled level crossing in proximity to existing rural residential lots at Viewpoint 26: View from Athol School Road; and
- The impact on views obtained from the summit of Mount Kingsthorpe at Viewpoint 29: Mount Kingsthorpe summit scenic lookout.

An additional six representative viewpoints (Viewpoint 3: Yelarbon Rest Area, Viewpoint 4: Yelarbon silo artwork viewing platform, Viewpoint 20: Near Brookstead State School, Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn, Viewpoint 23: Stanley Street near local park, Pittsworth and Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth) have the potential for the significance of impact during operation to increase, should noise barriers be included at the detailed design stage. However, with the exception of Viewpoint 4: Yelarbon silo artwork viewing platform (where the potential effect would increase from Moderate to High), as these viewpoints are already considered to experience a magnitude of change of high, this would not change the potential effect/significance (as 'high' is the highest magnitude of change possible).

Qualitative lighting impacts of up to **Low** level of effect were identified for the Construction or operations stage. Concern has been raised through stakeholder engagement regarding the potential for lighting from the construction works and operations stages of the Project to impact on the operations of the University of Southern Queensland's Mt Kent Observatory. The observatory is located approximately 21 km southeast from the Project (closest Project point is Southbrook), beyond the extent of the impact assessment area. The Project will not result in lighting impacts at the Mt Kent Observatory for the following reasons:

- The substantial distance between the Project and the observatory
- The limited lighting associated with the construction (flashing beacons and temporary spot lights in support of short-duration night works, if required) and operation (head lamp on rollingstock and safety lighting at road-rail interfaces) of the Project
- The presence of several more substantial light sources that are located closer, or equally distant to the observatory.

Lighting provision for realignment of existing roads will generally be in accordance with current arrangements unless additional lighting requirements are identified in consultation with asset owners.

Additional information on potential obtrusive lighting effects associated with the Project is provided in Appendix 3.

Cumulative impacts, particularly the effects in combination with the adjoining North Star to NSW/QLD Border and Gowrie to Helidon sections of Inland Rail, Warrego Highway and a range of other industrial and rural developments proposed in the area of influence of the Project (such as Interlink SQ, Wagners Intermodal terminal, Asterion Medicinal Cannabis Facility, Yarranlea Solar Farm and Yarranbrook Feedlot) have been considered. It is considered that the significance of these cumulative impacts may be Medium. Mitigation measures have been nominated to reduce the significance of such cumulative impacts.

The revised draft EIS design has incorporated some mitigation measures that are considered as initial mitigation measures, and which have been considered in the impact assessment. The LVIA has also identified a range of additional mitigation measures for implementation in future stages of Project delivery, including consultation with key stakeholders, protection of existing vegetation, rehabilitation of disturbed vegetation and opportunities for urban design of key structures. These opportunities, outside the operating rail corridor, have the potential to enhance the legacy of the Project and would reduce the residual impact of the Project on some landscapes and views, particularly including landscapes and views around several rural settlements, including Yelarbon, Brookstead and Pittsworth.

13 Glossary

13.1 Acronyms

AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AHD	Australian Height Datum
AILA	Australian Institute of Landscape Architects
ARTC	Australian Rail Track Corporation
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CPTED	Crime Prevention through Environmental Design
DES	Queensland Government Department of Environment and Science
EIS	Environmental Impact Statement
ERIN	(Australian Government) Environmental Resources Information Network
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GNLVA	Guidance Note for Landscape and Visual Assessment (AILA Queensland)
kV	Kilo Volts
LCA	Landscape Character Area
LCT	Landscape Character Type
LGA	Local Government Area
LVA	Landscape and Visual Assessment
LVIA	Landscape and Visual Impact Assessment
NSW	New South Wales
OQTA	Outback Queensland Tourism Association
QLD	Queensland
QR	Queensland Rail
DTMR	Department of Transport and Main Roads

13.2 Glossary of Assessment Terms

Amenity	The pleasantness of a place as conveyed by desirable attributes including visual, noise, odour etc. With regards to quantitative lighting impacts, amenity is considered to be the '<i>state of pleasantness of the night-time environment or a particular night-time view</i>'.
Artist's impression	An indicative visual representation illustrating the appearance of a project. Typically to communicate a concept when photomontages are not available and / or when accuracy cannot be assured.
Candela (Cd)	The International System (SI) unit of luminous intensity. One candela is the luminous intensity, in a given direction. Luminous intensity does not change with change in distance, and luminous intensity is direction specific. If distance is X or 2X etc the luminous intensity is the same, however, the angular size of the light source changes and that can change the perceived brightness.
Character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, and often conveys a distinctive sense of place. This term does not imply a level of value or importance.
Curve inflection point	Loop tracks involve a track curvature away from the main line followed by a track curvature back towards the main line connecting with a track parallel to the main track. The point at which the curvatures swap direction is the curve inflection point.
Effect	The landscape or visual outcome of a proposed change. It may be the combined result of sensitivity together with the magnitude of the change.
Illuminance (E)	Quantity of light received at a surface, measured in lux. Illuminance is dependent on distance from the light source (inversely proportional to the square of the distance). If the distance to the light source is doubled that means the illuminance drops to 0.25 times the original value. At distance X if the illuminance is 10 lux and the distance is doubled to 2X, the illuminance is 2.5 lux.
Impact	The categorisation of effects. Legislative context is considered in defining impacts and their significance.
Landscape	Landscape is an all-encompassing term that refers to areas of the earth's surface at various scales. It includes those landscapes that are: urban, rural, and natural; combining bio-physical elements with the cultural overlay of human use and values.

Landscape Character Type (LCT)	Distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern
Landscape Character Area (LCA)	Single unique areas and are the discrete geographical areas of a particular Landscape Character Type.
Light Spill	Any light that goes beyond the area of the defined task. For this application that is the rail corridor of the Project.
Lumen (lm)	basic unit of light. the International System (SI) unit of luminous flux, equal to the amount of light emitted per second in a unit solid angle of one steradian from a uniform source of one candela.
Luminous flux (f)	a measure of the perceived power of light which considers the varying sensitivity of the human eye to different wavelengths of light.
Lux	International System (SI) unit for lumens received per square metre. Lux is both singular and plural (similar to sheep being both singular and plural).
Maintenance factor (MF)	All lighting installations reduce in light output over time. Maintenance factors are a provision for future decay in the amount of light provided over a given number of years, due to lumen depreciation, dirt, and failures etc. A maintained illuminance of 100 lux using a maintenance factor of 0.8 means $100 \text{ lux} / 0.8 = 125 \text{ lux}$ initially ($125 \times 0.8 = 100$).
Magnitude of change	The extent of change that will be experienced by receptors. This change can be adverse or beneficial. Factors that could be considered in assessing magnitude are: the proportion of the view / landscape affected; extent of the area over which the change occurs; the size and scale of the change; the rate and duration of the change; the level of contrast and compatibility.
Mitigation	Measures to avoid, reduce and manage identified potential adverse impacts.
Impact assessment area	Impact assessment area; comprising land within the potential viewshed of and forming the wider landscape context of the Project
Peak Intensity	The direction of the highest luminous intensity (Cd). For headlights and visibility lights that is assumed to be perpendicular to the face of the light source.
Project	The Inland Rail Border to Gowrie Project
Rail alignment	The exact positioning of the track, accurately defined both horizontally and vertically, along which the rail vehicles operate.

Rail corridor	The corridor within which the rail tracks and associated infrastructure are located.
Route	A primary description of the path which a railway will follow.
Receptor	A place, route, viewer audience or interest group which may require assessment.
Sensitivity	Capacity of a landscape or receptor to change without losing valued attributes.
Steradian (sr)	The unit solid angle (steradian) is used in three-dimensional geometry. There are 4π steradians in a sphere. A steradian is approximately a cone with an apex angle 57.3 degrees.
Values	Any aspect of landscape or views people consider to be important. Landscape and visual values may be reflected in local, State or federal planning regulations, other published documents or be established through community consultation and engagement, or as professionally assessed.
View	Any sight, prospect or field of vision as seen from a place, and may be wide or narrow, partial or full, pleasant or unattractive, distinctive or nondescript, and may include background, mid ground and/or foreground elements or features.
Viewpoint	The specific location of a view, typically used for assessment purposes.
Viewshed	Areas visible from a particular location (may be modelled or field-validated).
Visual catchment	Areas visible from a combination of locations within a defined setting (may be modelled or field-validated).
Visual audience	Groups of visual receptors with common attributes and sensitivities to changes in views (e.g. residents, golfers, road travellers, walkers, shoppers, beach goers, farmers, recreational users).
Visual absorption capacity	Potential for a landscape or scene to absorb a particular change without a noticeable loss of valued attributes.
Visual amenity	The attractiveness of a scene or view.
Photomontages/ Visualisations	A visual representation of a project from a particular receptor viewpoint, on a photographic base. The methodology for the preparation of any photomontage and its accuracy should be defined.
Scenic amenity	A measure of the relative contribution of each place in the landscape to the collective appreciation of open space as viewed from places that are important to the public. (Department of Natural Resources, 2001).

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APPENDIX K

Landscape and Visual Impact Assessment

Appendix 1 Plans

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX 1: PLANS

The following plans prepared by FFJV have been used to inform and illustrate this assessment:

Figure 1: Regional context

Figure 2: Landscape and visual impact assessment area

Figure 3: Regional scenic amenity and planning designations

Figure 4: Landform and hydrological context

Figure 5: Land use context

Figure 6: Interim Biogeographic Regionalisation Australia

Figure 7: Landscape character assessment

Figure 8: Tourist drives and sensitive

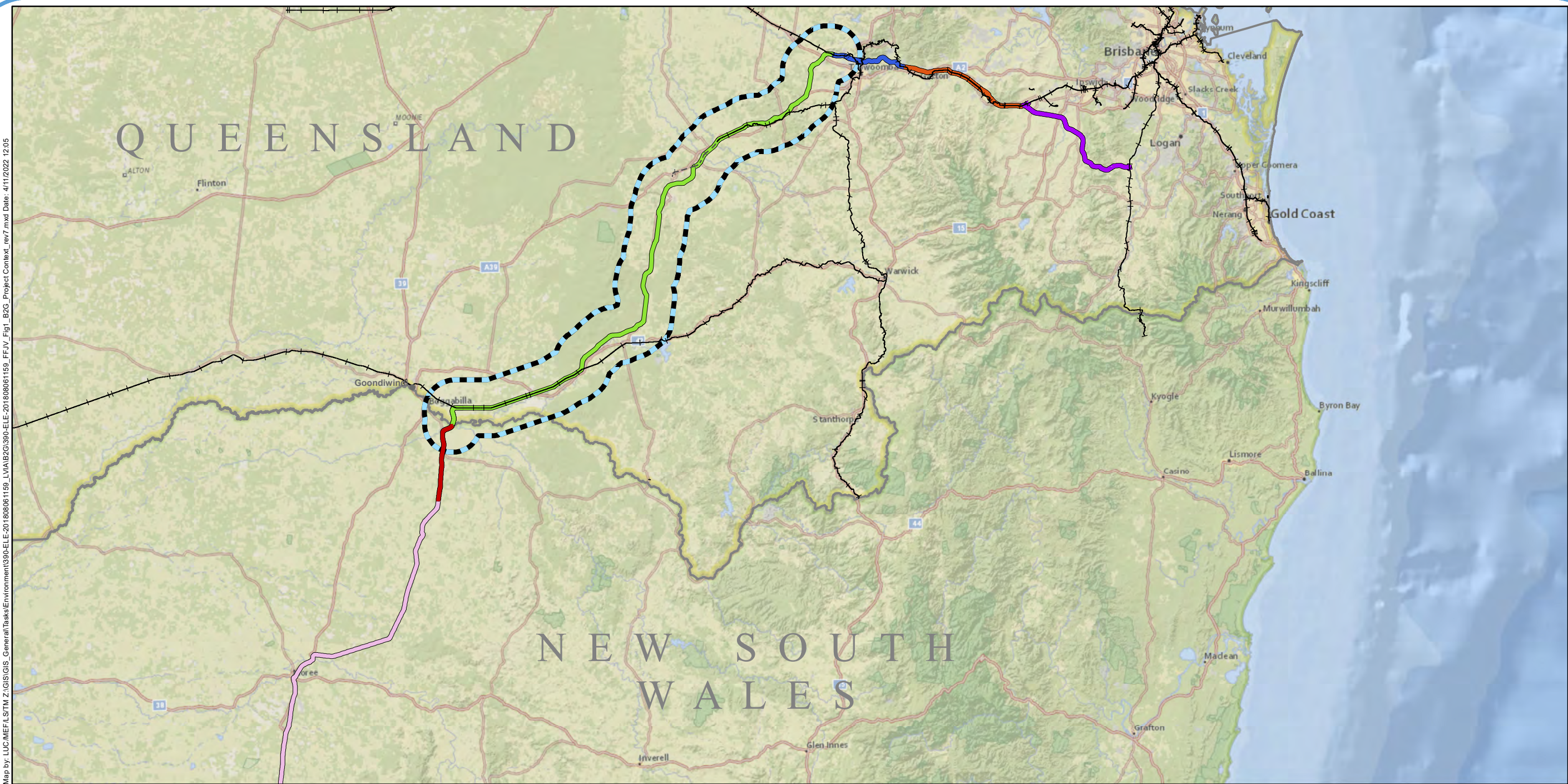
Figure 9: Key visual receptors and location of representative

Figure 10: Visual analysis map – infrastructure

Figure 11: Visual analysis map – rolling stock

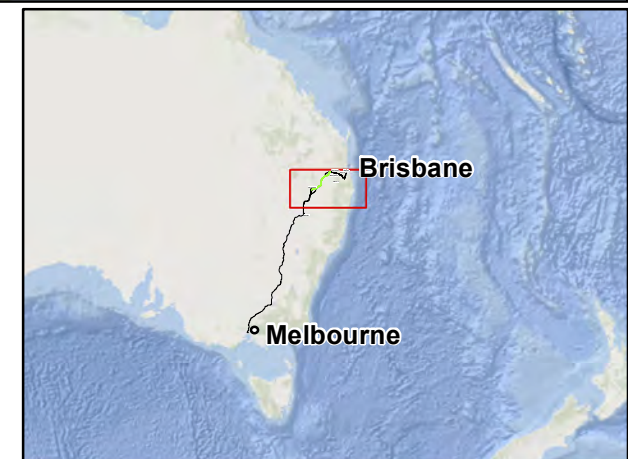
Figure 12: Visual analysis map – difference

Map by: LUC/MEF/ALSTM Z:\GIS\GIS_GeneralTasks\Environment\390-ELE-201808061159_FFJV_Fig1_B2G_ProjectContext_rev7.mxd Date: 4/11/2022 12:05



Legend

- | | |
|--|---|
| Narrabri to North Star alignment | Existing rail (operational) |
| North Star to NSW/QLD border alignment | Existing rail (non-operational) |
| Border to Gowrie alignment | LVIA study area (10 km from rail alignment) |
| Gowrie to Helidon alignment | NSW/Queensland border |
| Helidon to Calvert alignment | |
| Calvert to Kagaru alignment | |



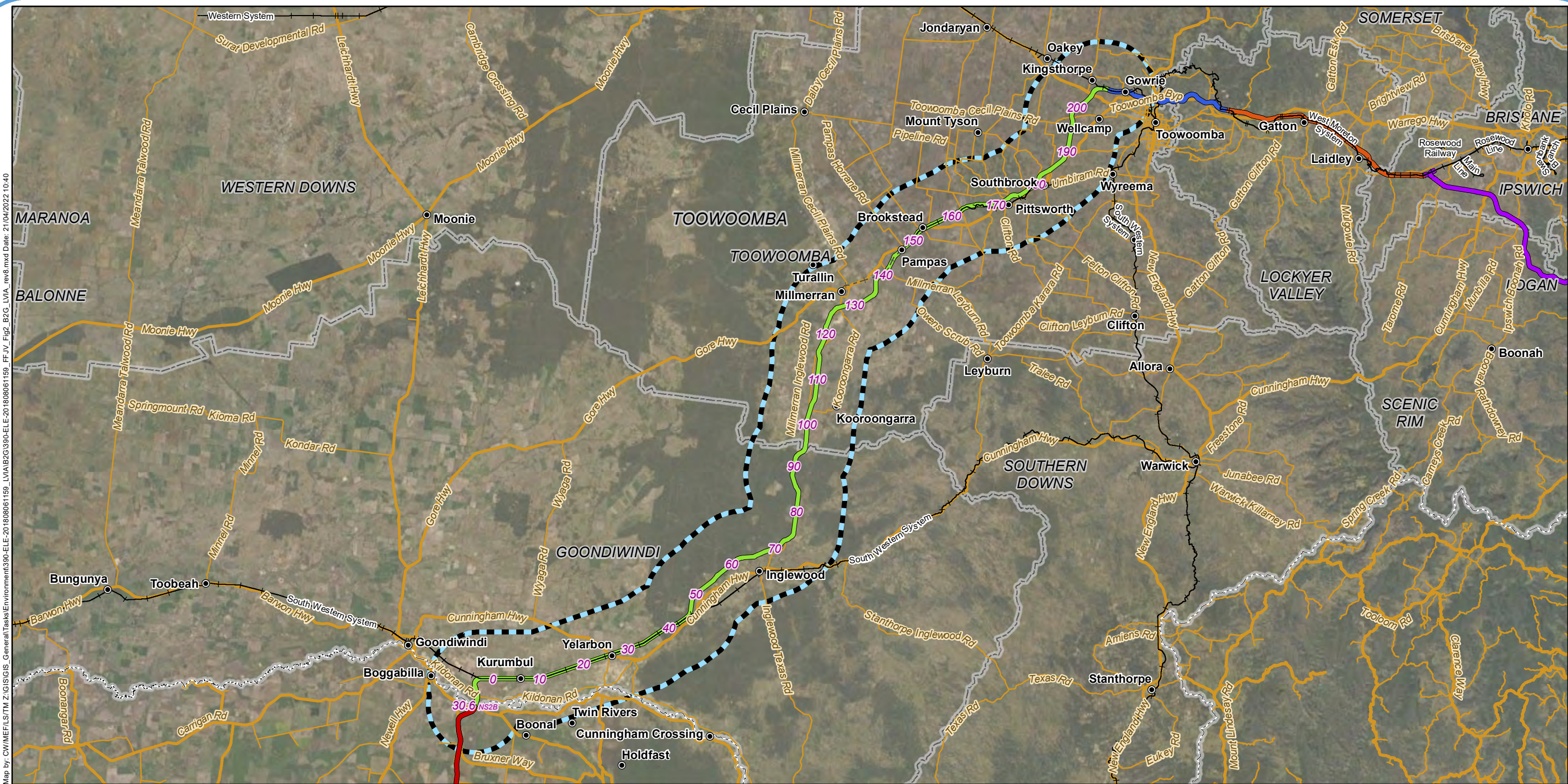
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0 10 20 30 40 50 km



Future Freight
Integrating Community, Environment and Engineering

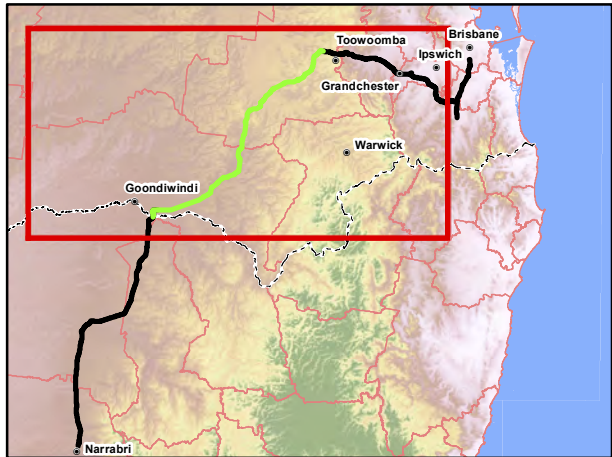
Issue date: 4/11/2022 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 1: Inland Rail regional context

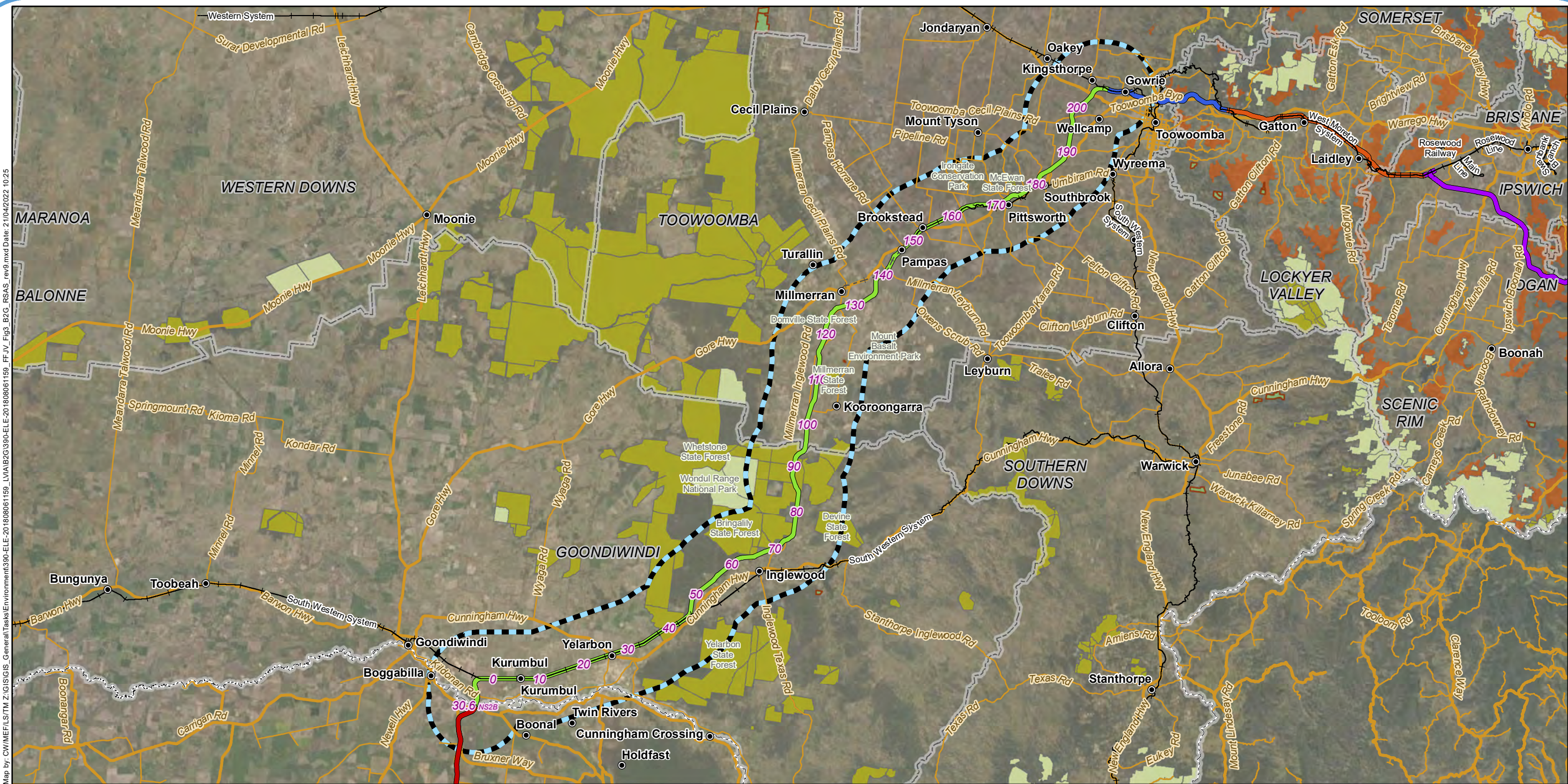


Legend

- 5 Chainage (km)
- Chainage label points
- 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
- ▨ LVIA study area (10 km from rail alignment)
- ▭ Local Government Areas

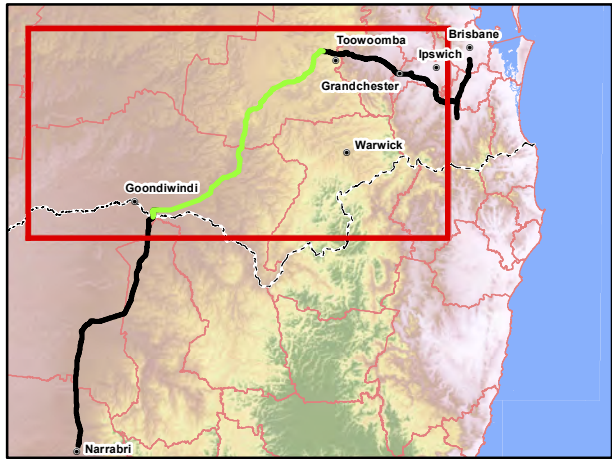


Border to Gowrie
Figure 2: Landscape and visual impact assessment study area



Legend

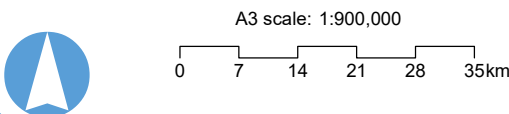
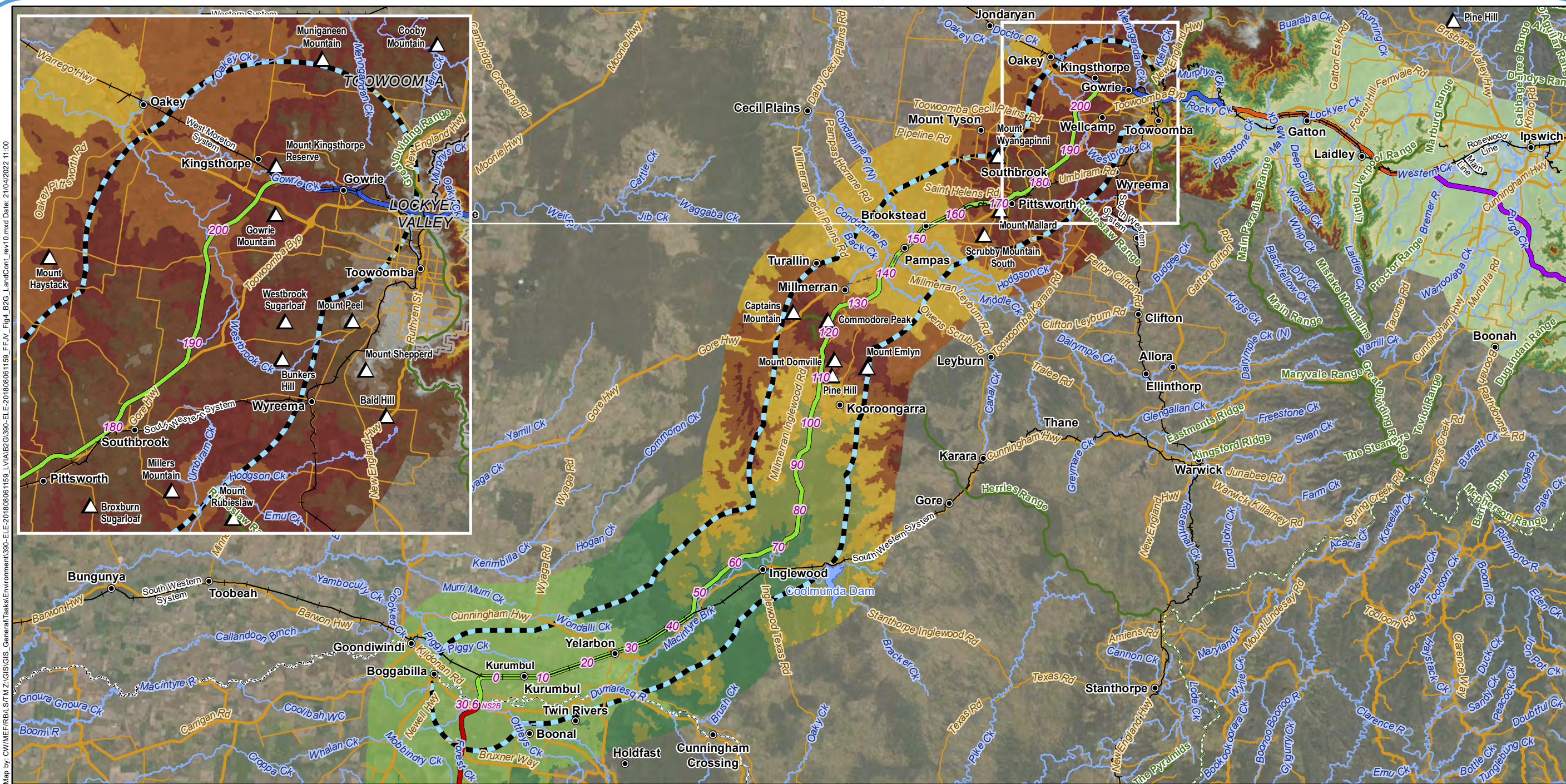
- | | | |
|--|---|--|
| 5 Chainage (km) | Existing rail (operational) | Regionally significant scenic amenity (ShapingSEQ) |
| Localities | Existing rail (non-operational) | Conservation Parks and Estates |
| North Star to NSW/QLD border alignment | Major roads | Forest Reserve |
| Border to Gowrie alignment | Minor roads | National Park |
| Gowrie to Helidon alignment | NSW/QLD border | State Forest |
| Helidon to Calvert alignment | LVIA study area (10 km from rail alignment) | |
| Calvert to Kagaru alignment | Local Government Areas | |

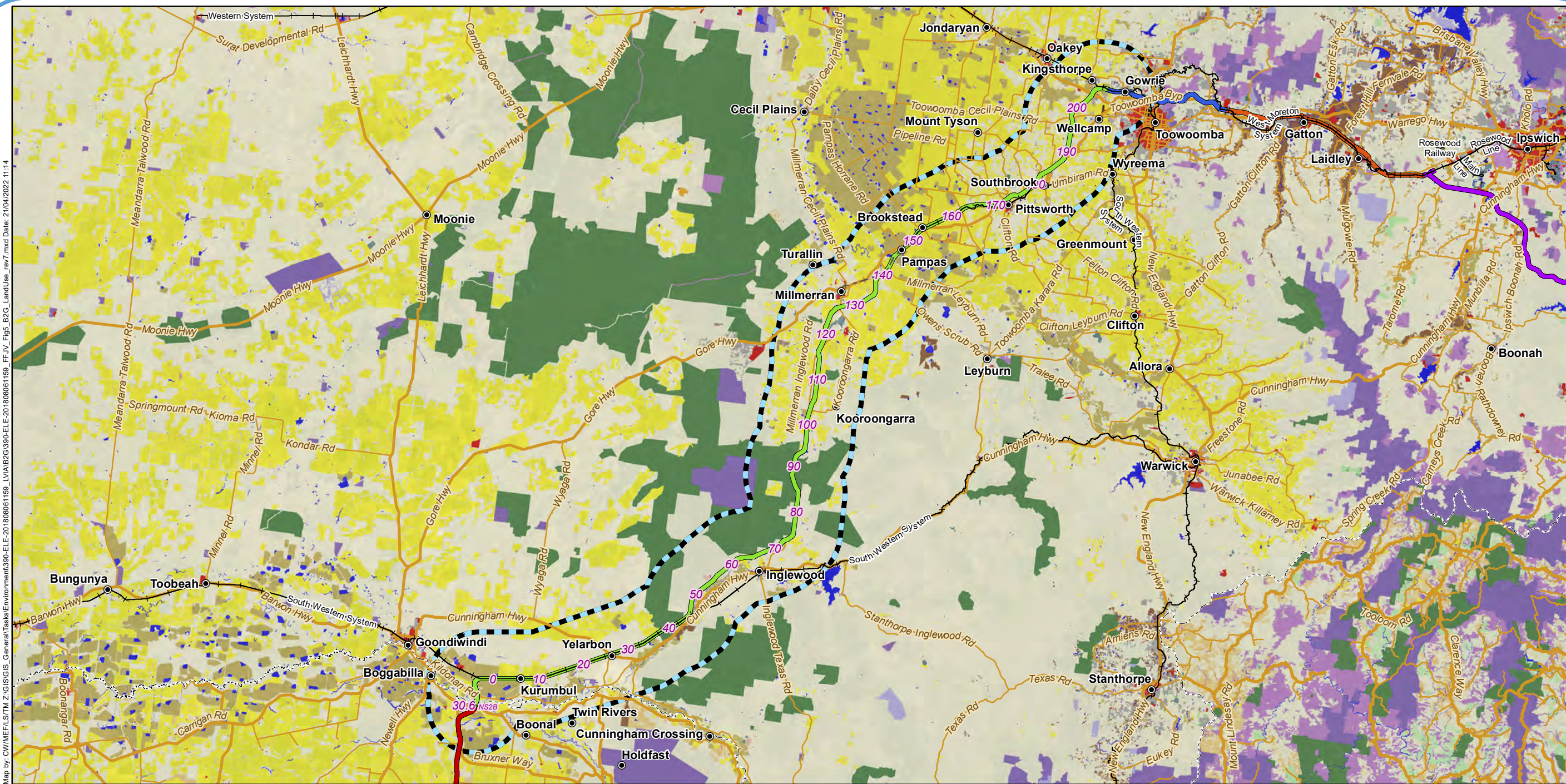


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0 7 14 21 28 35km

Border to Gowrie
Figure 3: Regional scenic amenity & planning designations





Legend

- 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)

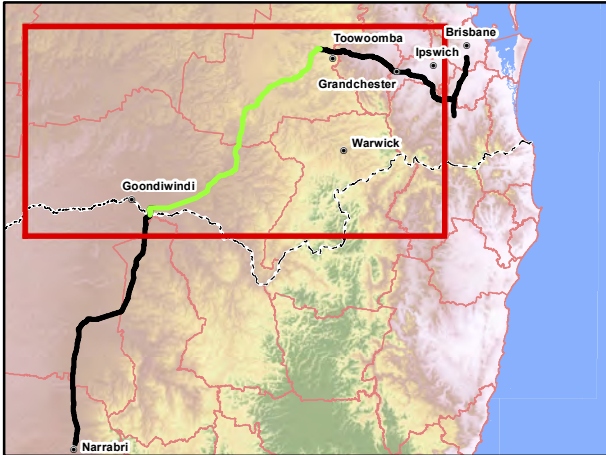
Land Use

- Nature conservation
- Other protected areas
- Minimal use

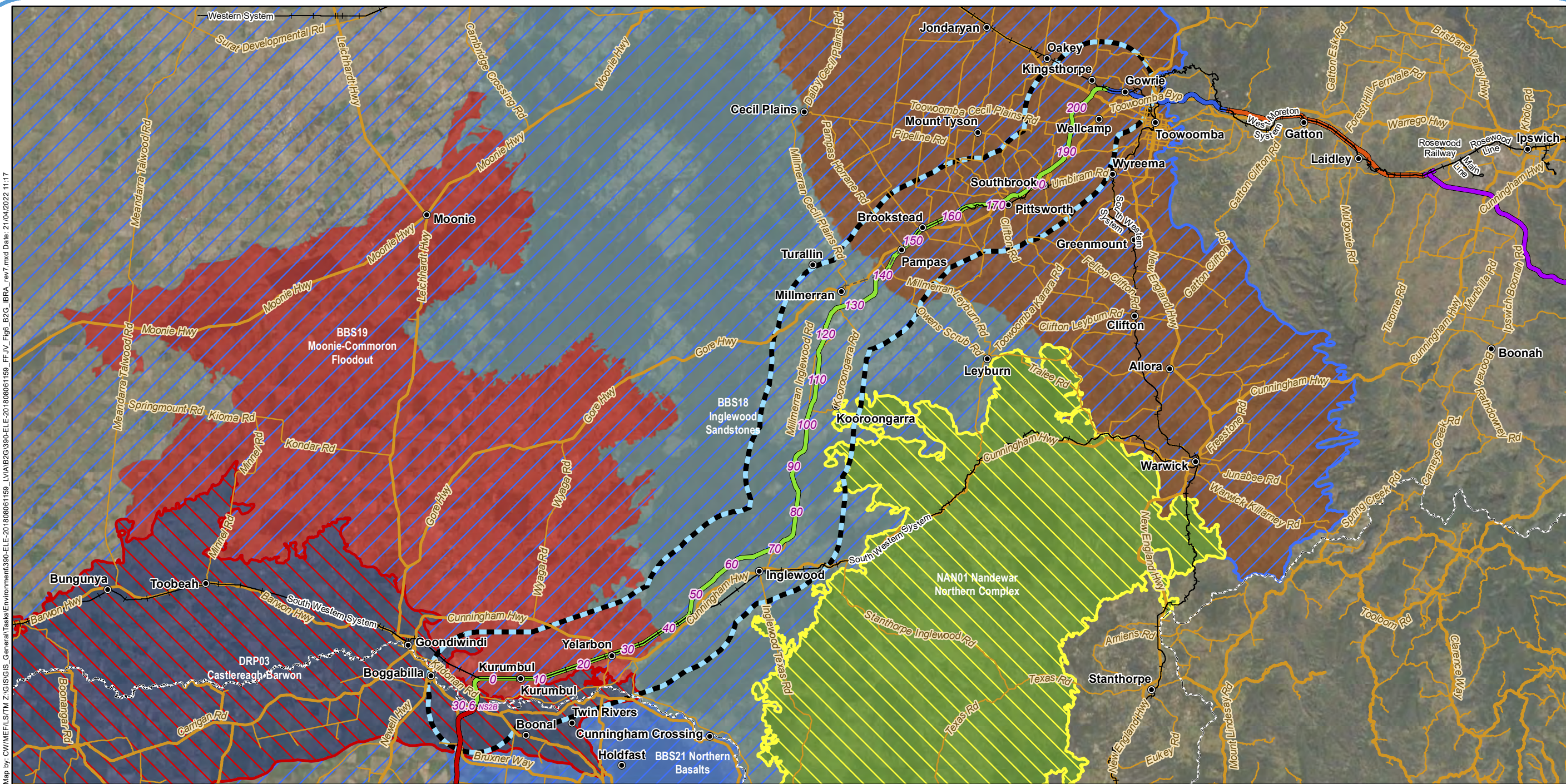
- Major roads
- Minor roads
- NSW/QLD border
- LVIA study area (10 km from rail alignment)

- Grazing native vegetation
- Production forestry
- Grazing modified pastures
- Plantation forestry
- Dryland cropping
- Dryland horticulture
- Land in transition
- Irrigated pastures

- Irrigated cropping
- Irrigated horticulture
- Urban intensive uses
- Intensive animal and plant production
- Rural residential and farm infrastructure
- Mining and waste
- Water



A3 scale: 1:900,000
0 7 14 21 28 35km



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)

IBRA Regions

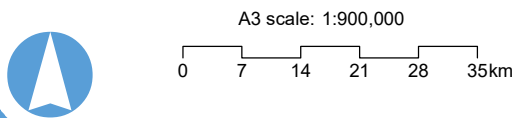
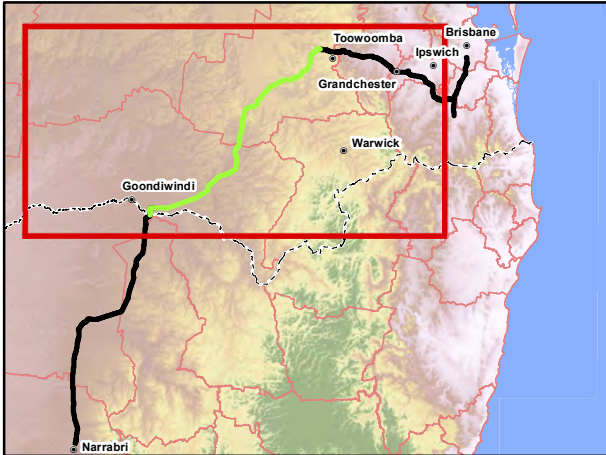
- Brigalow Belt South
- Darling Riverine Plains
- Nandewar

IBRA Subregions

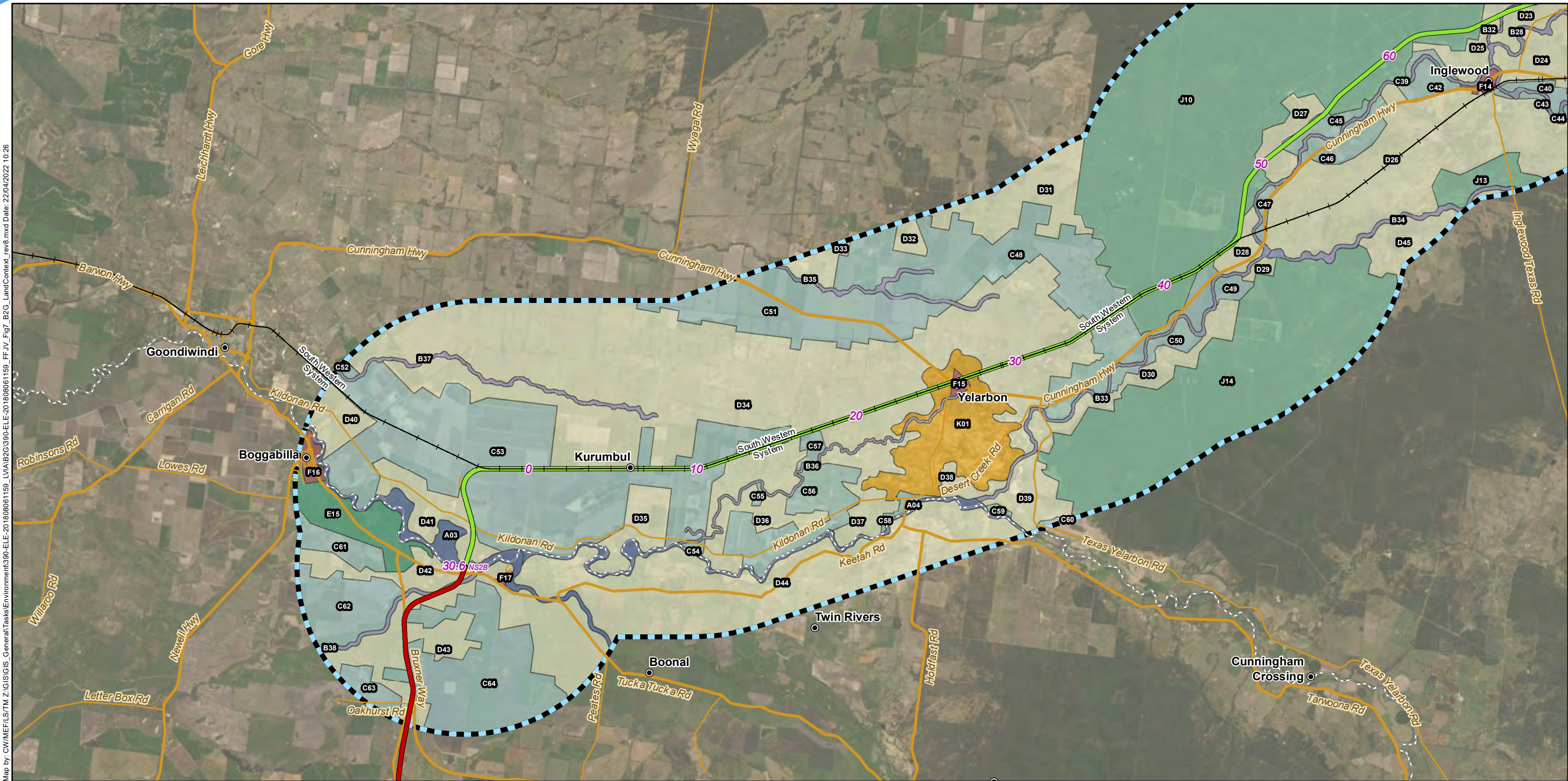
- DRP03 Castlereagh-Barwon
- BBS17 Eastern Darling Downs
- BBS18 Inglewood Sandstones
- BBS19 Moonie-Commonon Floodout
- NAN01 Nandewar Northern Complex
- BBS21 Northern Basalts

Map Features

- Major roads
- Minor roads
- NSW/QLD border
- LVIA study area (10 km from rail alignment)



Border to Gowrie
Figure 6: Interim biogeographic regionalisation Australia

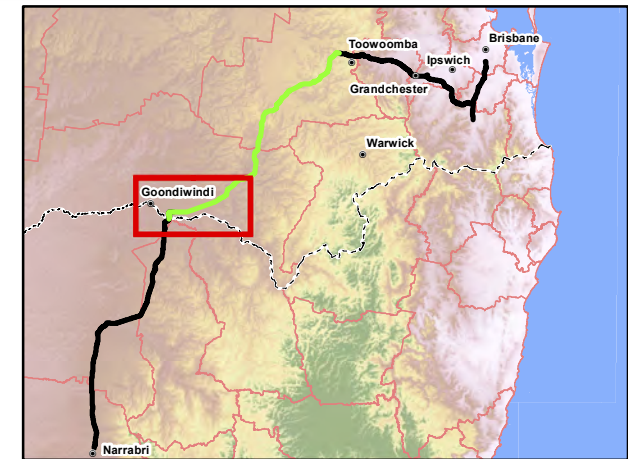


Legend

- 5 Chainage (km)
- Localities
- North Star to NSW/QLD border alignment
- Border to Gowrie alignment
- Existing rail (operational)
- Major roads
- Minor roads
- NSW/QLD border
- LVIA study area (10 km from rail alignment)

Landscape character type

- LCT A: Vegetated Watercourses - Rivers
- LCT B: Vegetated Watercourses - Creeks and Channels
- LCT C: Irrigated Croplands
- LCT D: Dry Croplands and Pastures
- LCT E: Vegetated Grazing
- LCT F: Rural Settlement
- LCT G: Rural Living
- LCT H: Forested Uplands
- LCT I: Settled Hills
- LCT J: Forested Hills and Plains
- LCT K: Salinity Scald
- LCT L: Transitional Landscapes

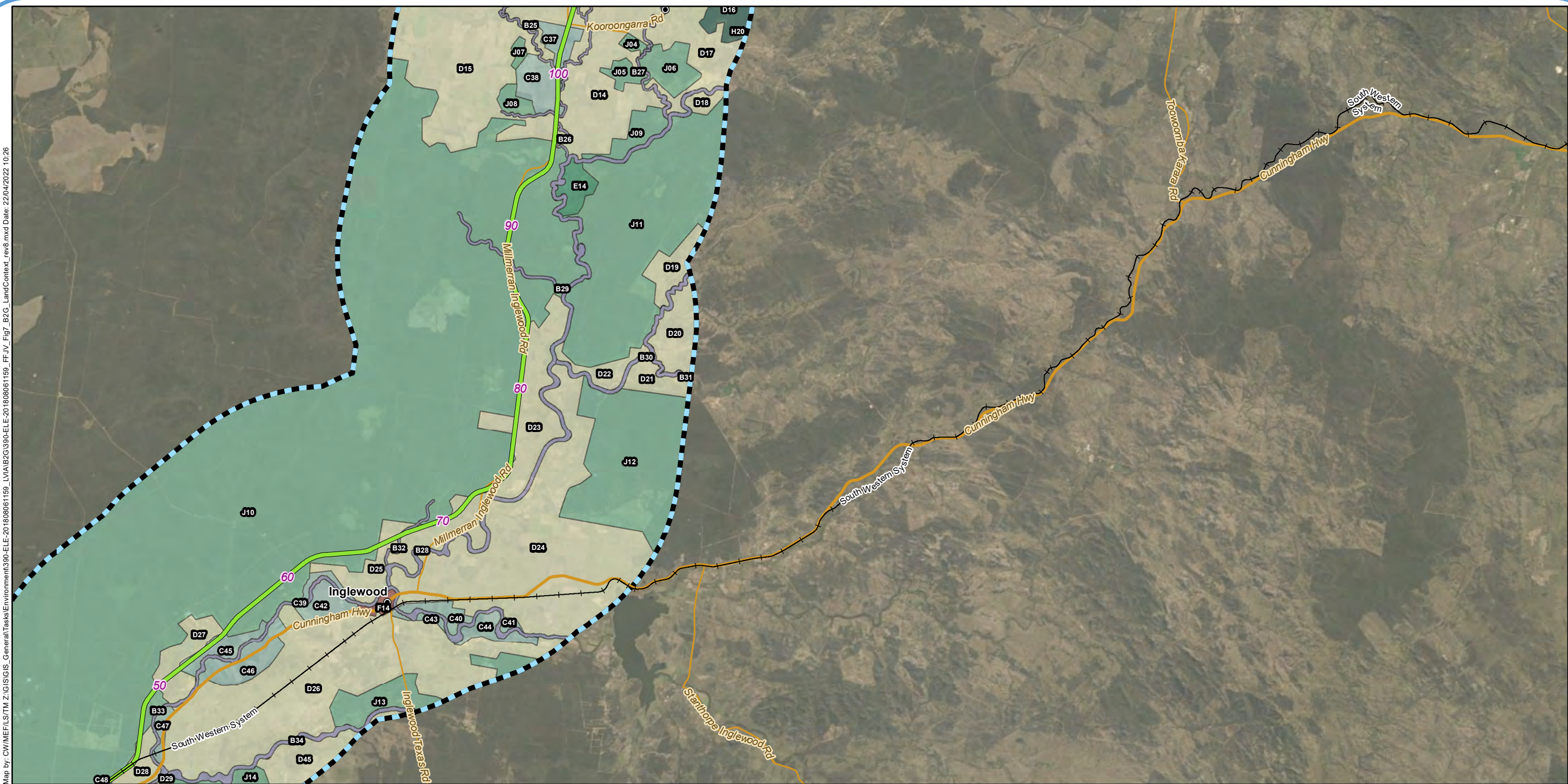


A3 scale: 1:250,000
0 1.5 3 4.5 6 7.5km



Issue date: 22/04/2022 Version: 8
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 7a: Landscape character assessment



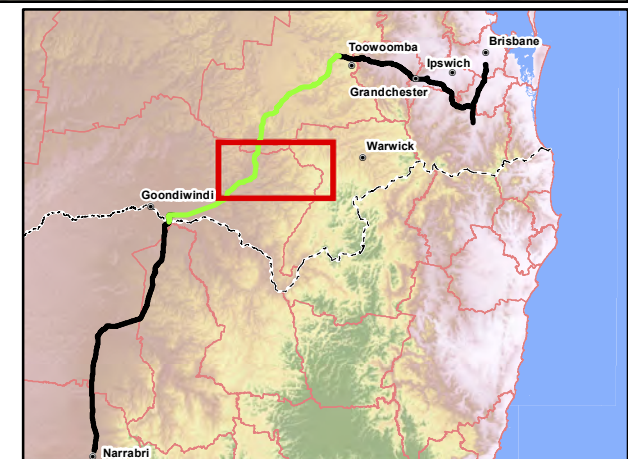
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Legend

- 5 Chainage (km)
- Localities
- Border to Gowrie alignment
- Existing rail (operational)
- Major roads
- Minor roads
- LVIA study area (10 km from rail alignment)

Landscape character type

- LCT A: Vegetated Watercourses - Rivers
- LCT B: Vegetated Watercourses - Creeks and Channels
- LCT C: Irrigated Croplands
- LCT D: Dry Croplands and Pastures
- LCT E: Vegetated Grazing
- LCT F: Rural Settlement
- LCT G: Rural Living
- LCT H: Forested Uplands
- LCT I: Settled Hills
- LCT J: Forested Hills and Plains
- LCT K: Salinity Scald
- LCT L: Transitional Landscapes

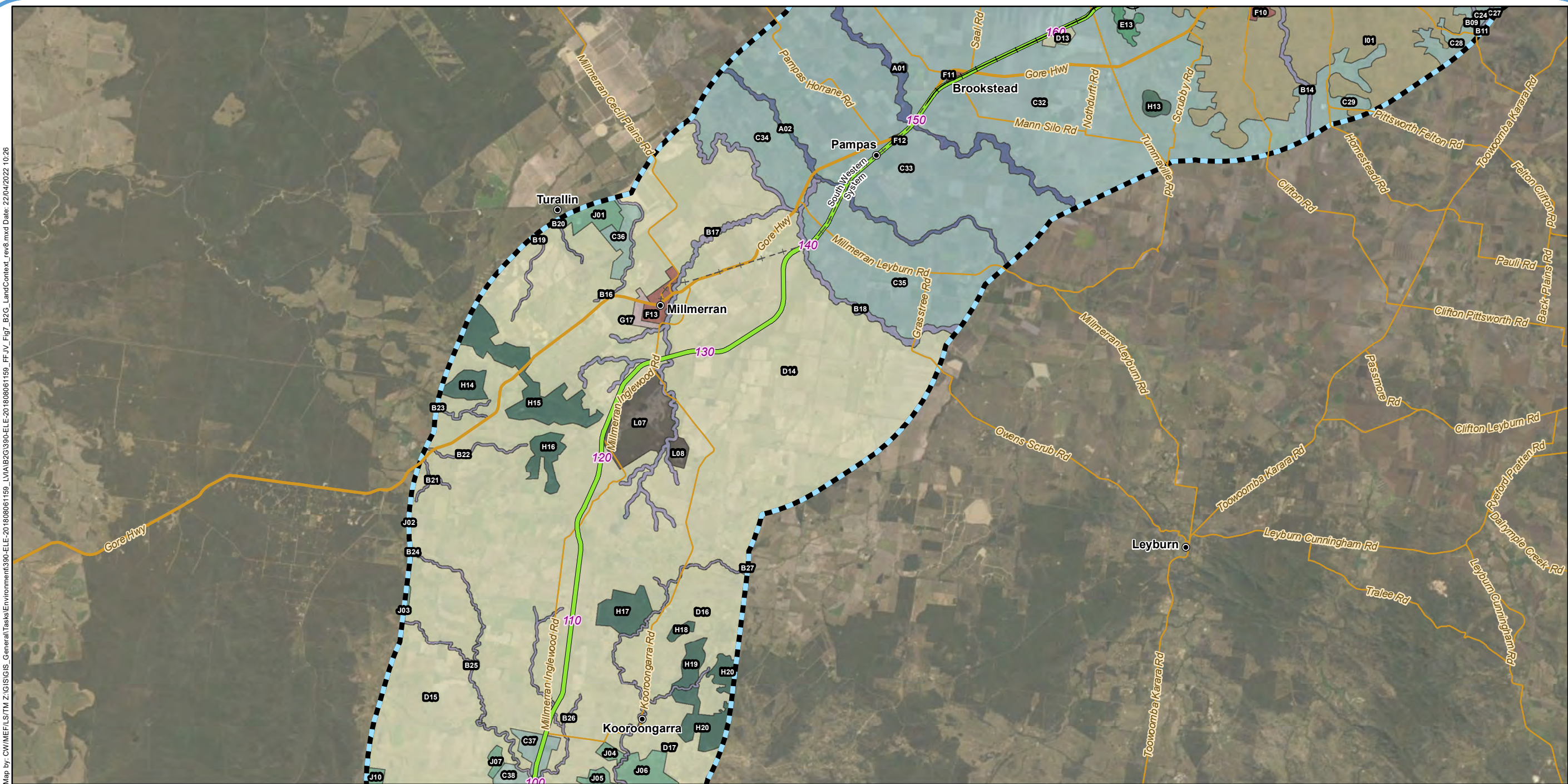


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Issue date: 22/04/2022 Version: 8
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 7b: Landscape character assessment



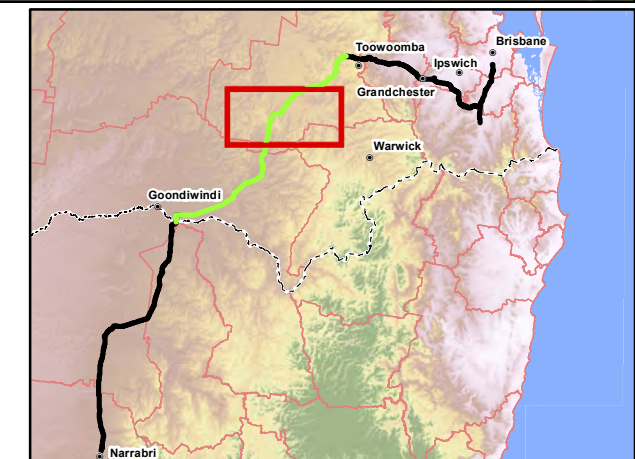
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Legend

- 5 Chainage (km)
- Localities
- Border to Gowrie alignment
- Existing rail (operational)
- Existing rail (non-operational)
- Major roads
- Minor roads
- L VIA study area (10 km from rail alignment)

Landscape character type

- LCT A: Vegetated Watercourses - Rivers
- LCT B: Vegetated Watercourses - Creeks and Channels
- LCT C: Irrigated Croplands
- LCT D: Dry Croplands and Pastures
- LCT E: Vegetated Grazing
- LCT F: Rural Settlement
- LCT G: Rural Living
- LCT H: Forested Uplands
- LCT I: Settled Hills
- LCT J: Forested Hills and Plains
- LCT K: Salinity Scald
- LCT L: Transitional Landscapes



A3 scale: 1:250,000
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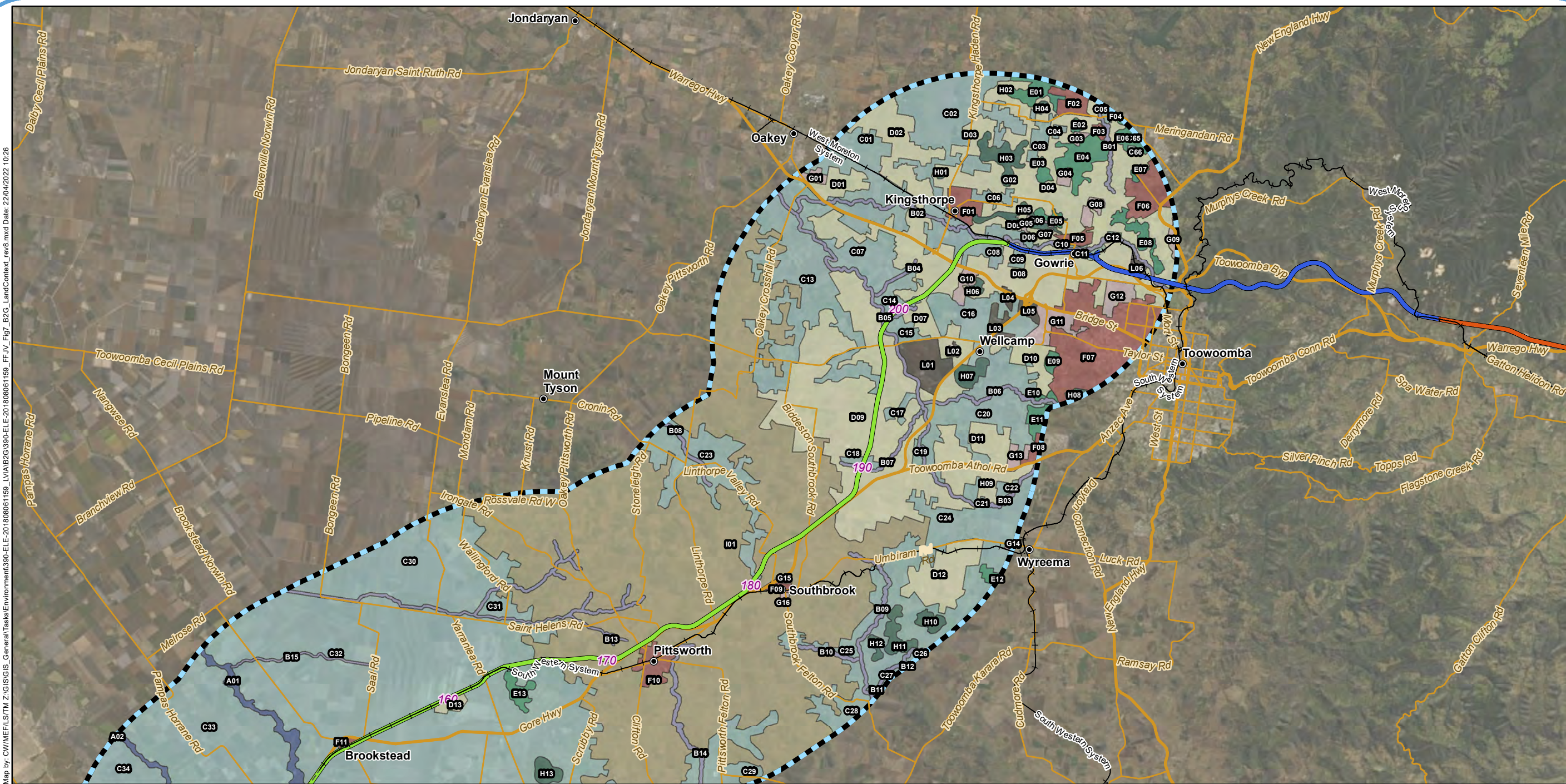


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure 7c: Landscape character assessment



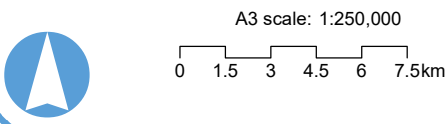
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Legend

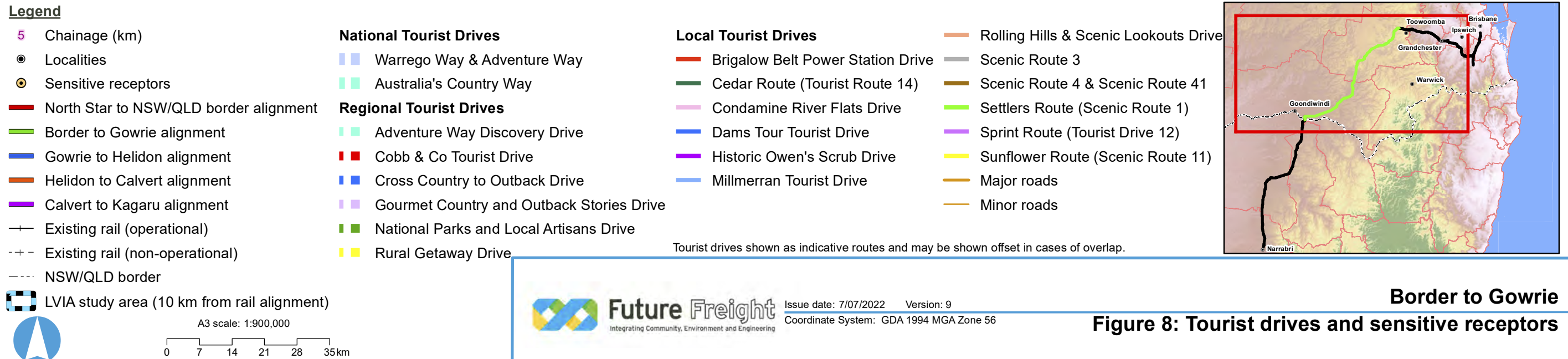
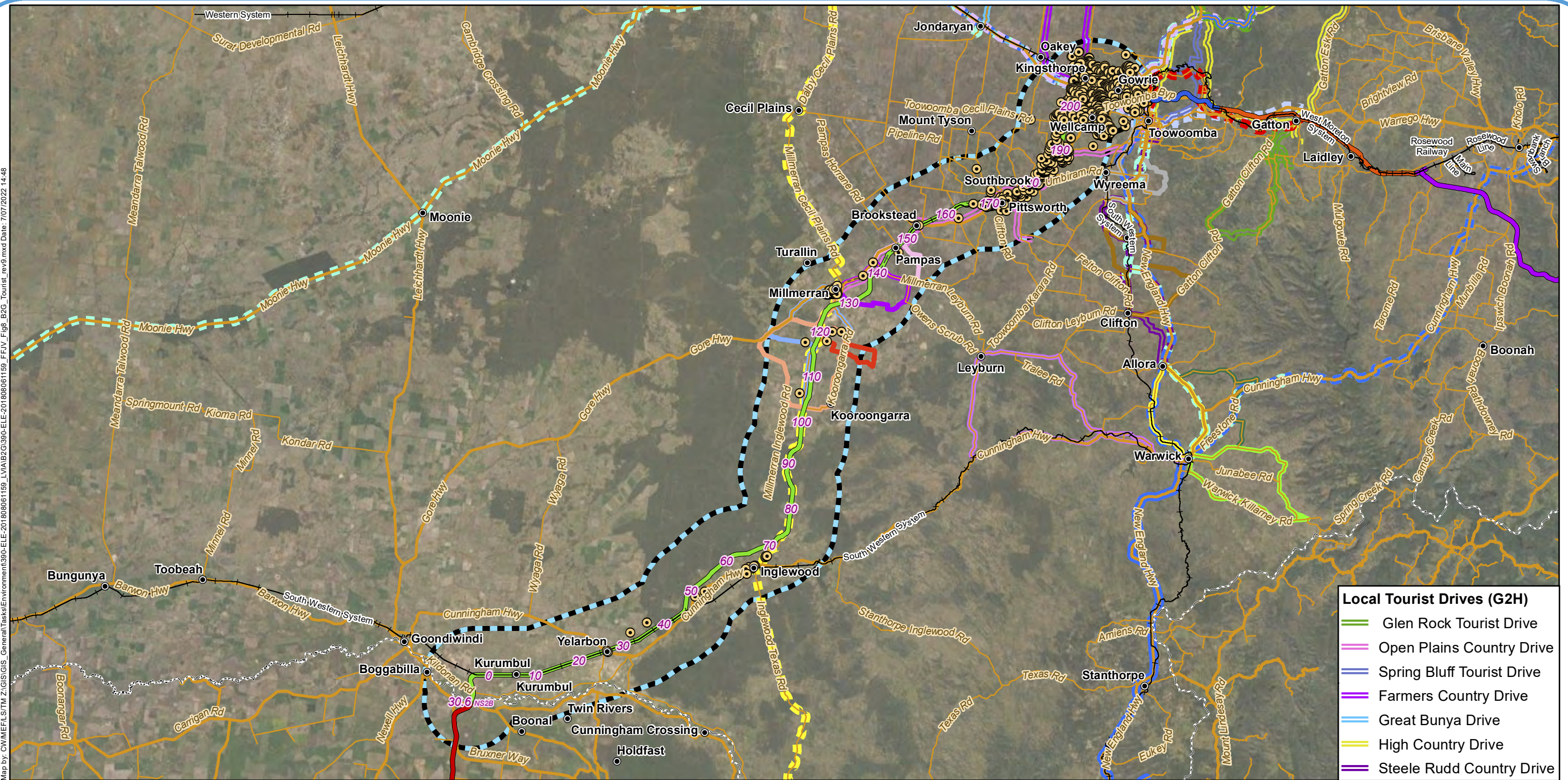
- 5 Chainage (km)
- Localities
- Border to Gowrie alignment
- Gowrie to Helidon alignment
- Helidon to Calvert alignment
- Existing rail (operational)
- Existing rail (non-operational)
- Major roads
- Minor roads
- LVIA study area (10 km from rail alignment)

Landscape character type

LCT A: Vegetated Watercourses - Rivers	LCT G: Rural Living
LCT B: Vegetated Watercourses - Creeks and Channels	LCT H: Forested Uplands
LCT C: Irrigated Croplands	LCT I: Settled Hills
LCT D: Dry Croplands and Pastures	LCT J: Forested Hills and Plains
LCT E: Vegetated Grazing	LCT K: Salinity Scald
LCT F: Rural Settlement	LCT L: Transitional Landscapes



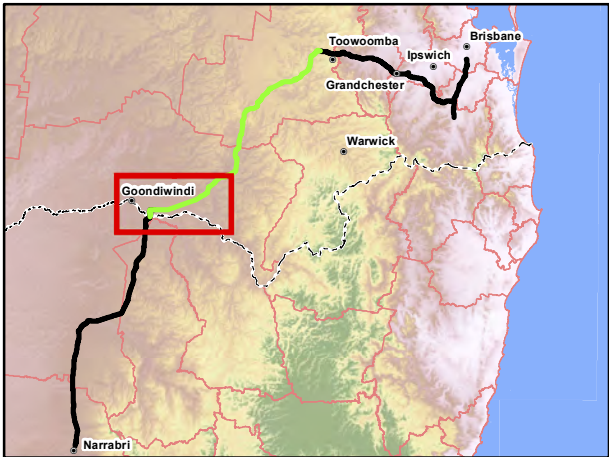
Border to Gowrie
Figure 7d: Landscape character assessment





Legend

- Viewpoints
- Chainage (km)
- Localities
- North Star to NSW/QLD border alignment
- Border to Gowrie alignment
- Existing rail (operational)
- Major roads
- Minor roads
- NSW/QLD border
- LVIA study area (10 km from rail alignment)



A3 scale: 1:250,000

0 2 4 6 8 10km

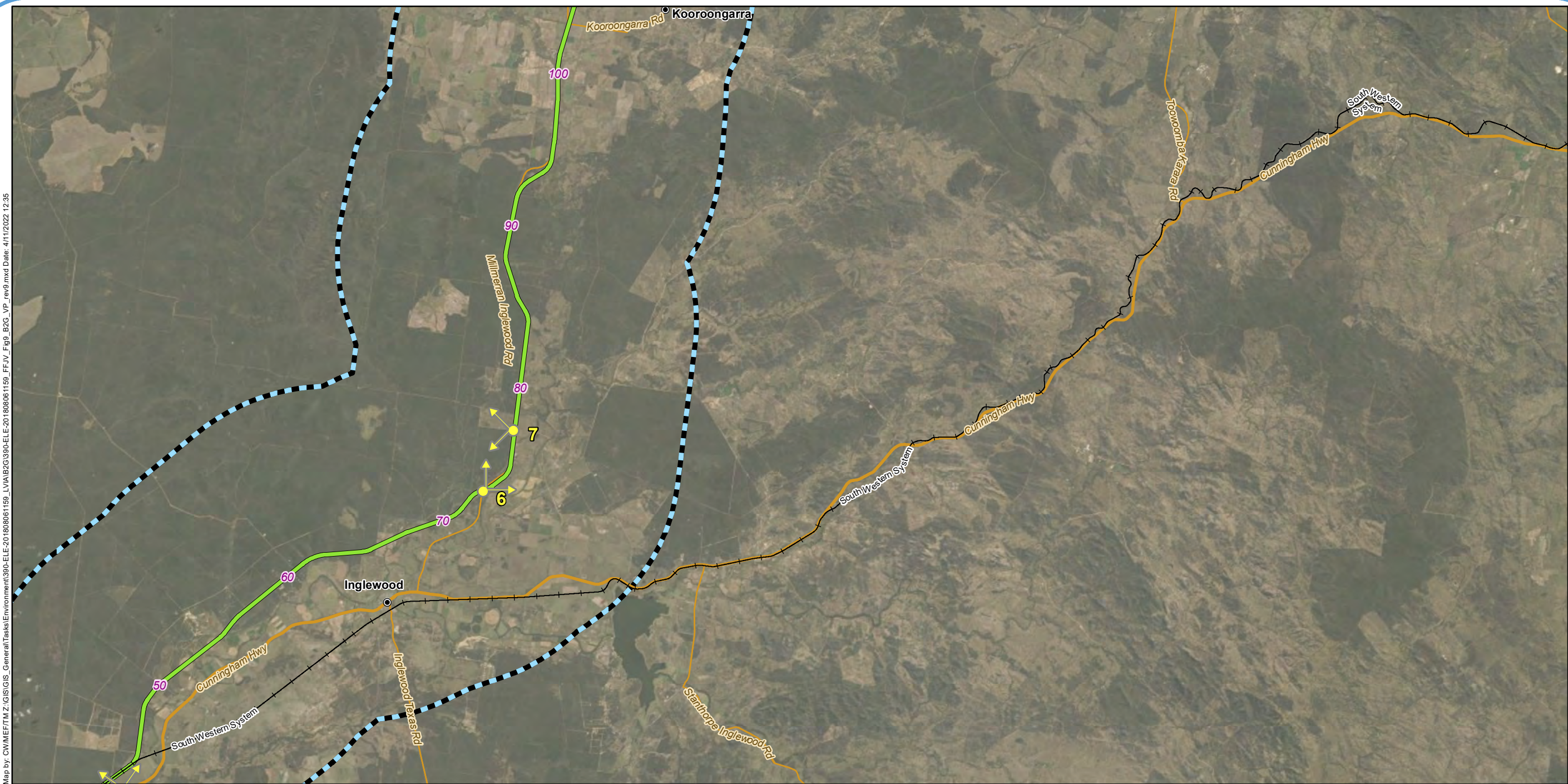


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

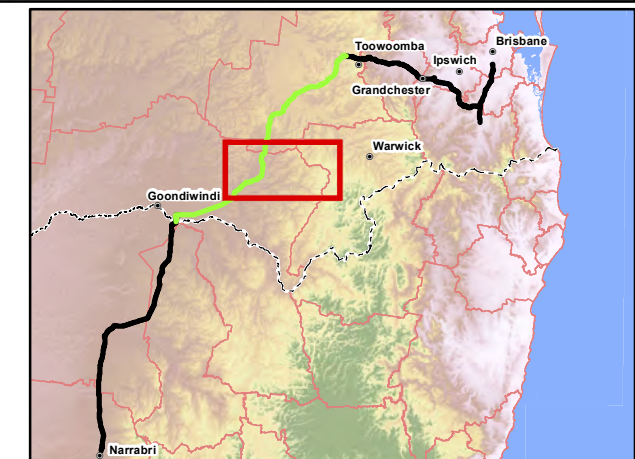
Figure 9a: Key visual receptors and location of representative viewpoints



Map by: C:\MEE\TM 2\GIS\GIS_General\Task\Environment\390-ELE-201808061159_LVIA\B2G\390-ELE-201808061159_FF\IV_Fig9_B2G_VP_rev9.mxd Date: 4/11/2022 12:35

Legend

- | | |
|----------------------------|---|
| Viewpoints | Existing rail (operational) |
| Chainage (km) | Major roads |
| Localities | Minor roads |
| Border to Gowrie alignment | LVIA study area (10 km from rail alignment) |



A3 scale: 1:250,000
0 2 4 6 8 10km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 4/11/2022 Version: 9
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

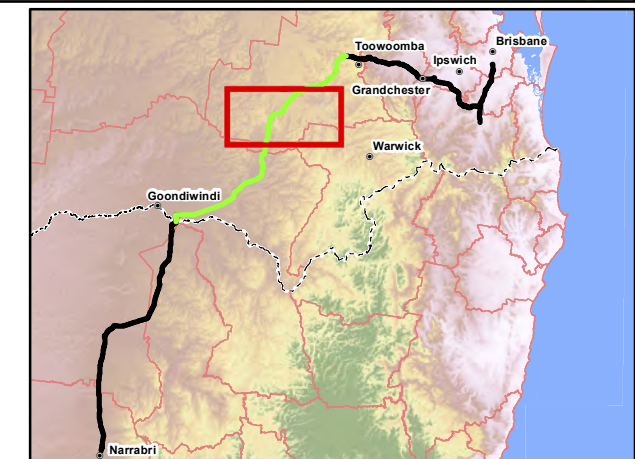
Figure 9b: Key visual receptors and location of representative viewpoints



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Legend

- Viewpoints
- Chainage (km)
- Localities
- Border to Gowrie alignment
- Existing rail (operational)
- Existing rail (non-operational)
- Major roads
- Minor roads
- LVIA study area (10 km from rail alignment)



A3 scale: 1:250,000
0 2 4 6 8 10km

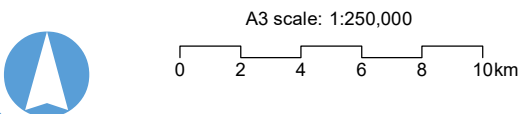
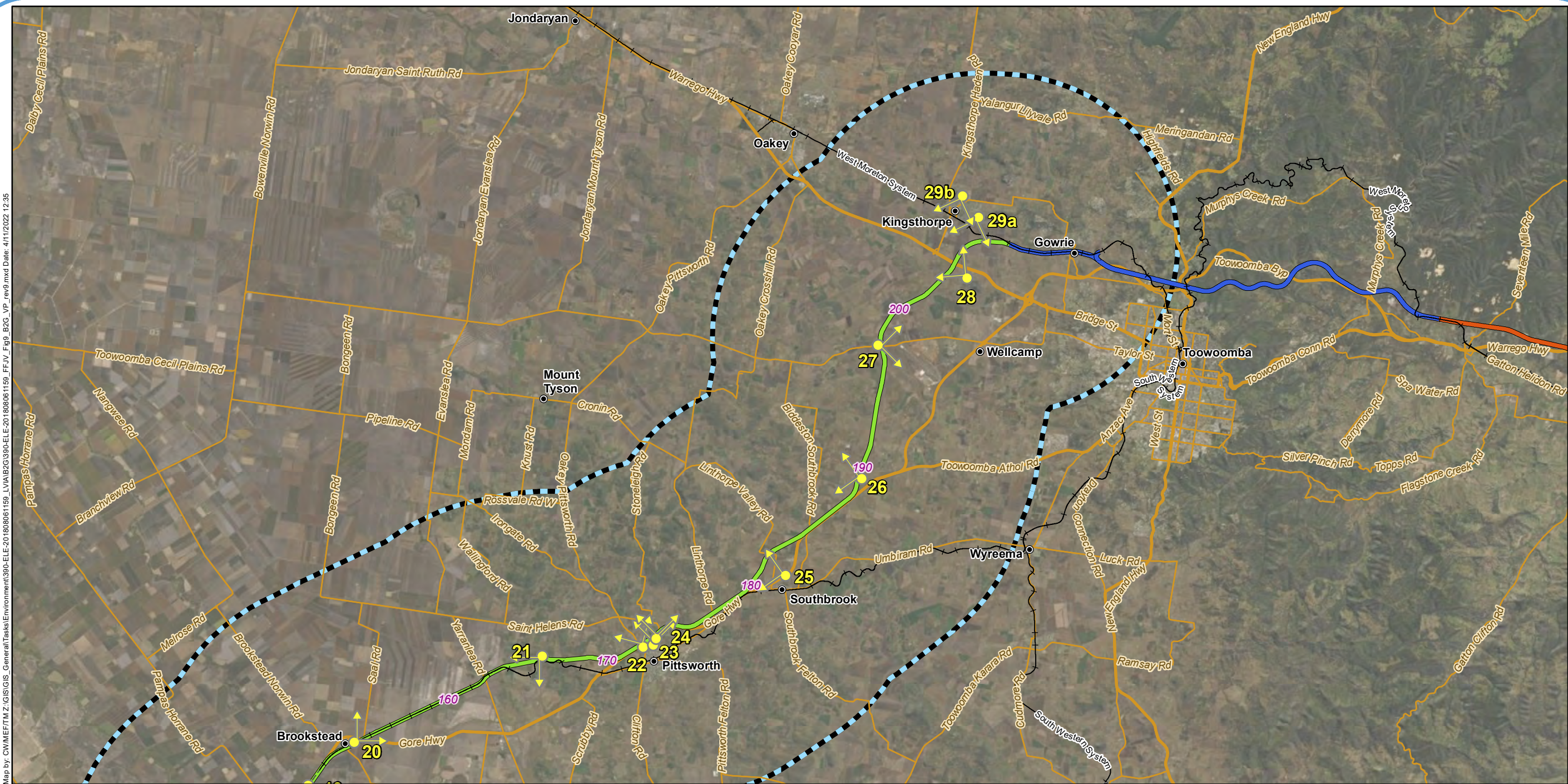


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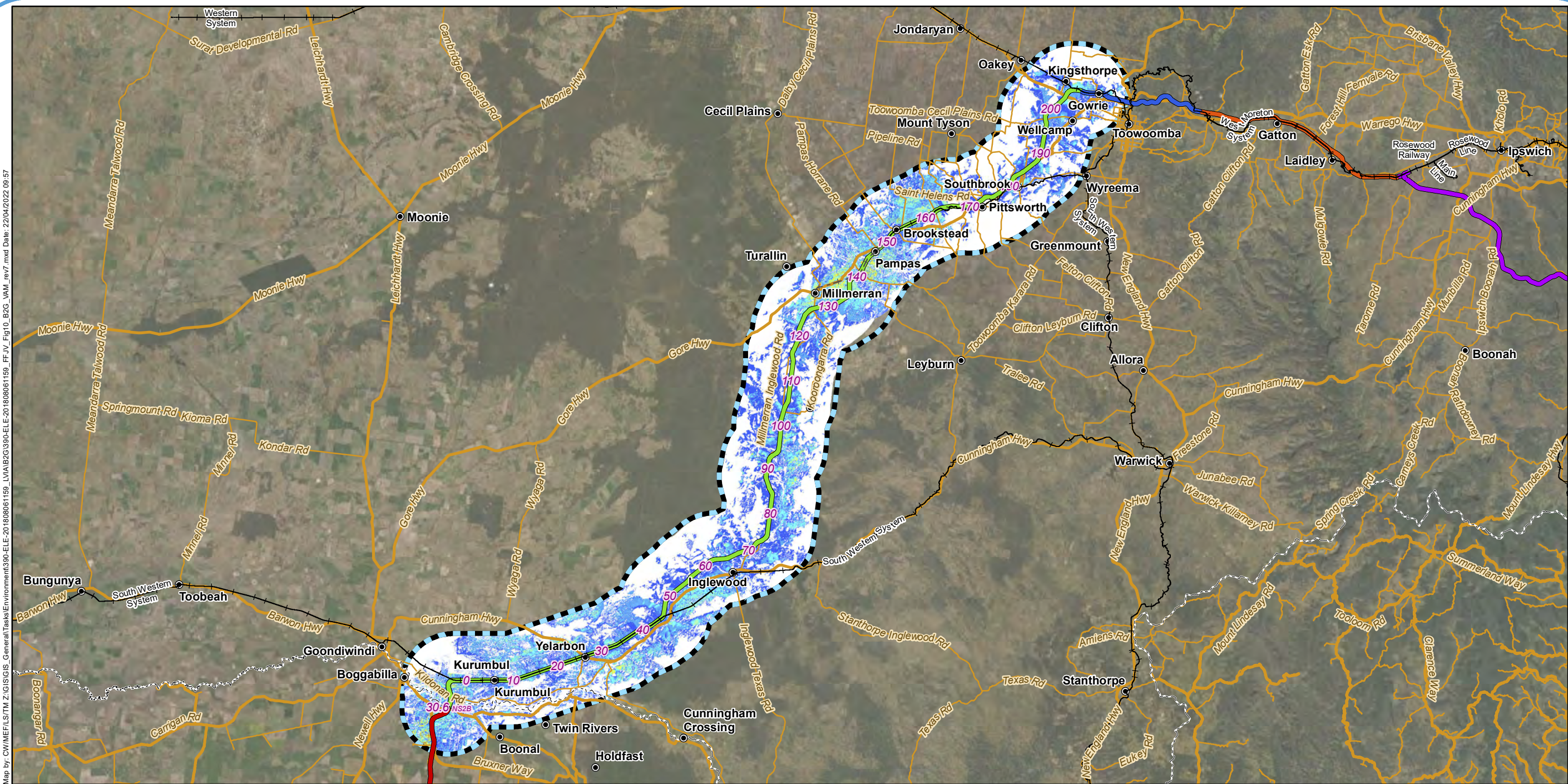
Issue date: 4/11/2022 Version: 9
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure 9c: Key visual receptors and location of representative viewpoints



Border to Gowrie
Figure 9d: Key visual receptors and location of representative viewpoints

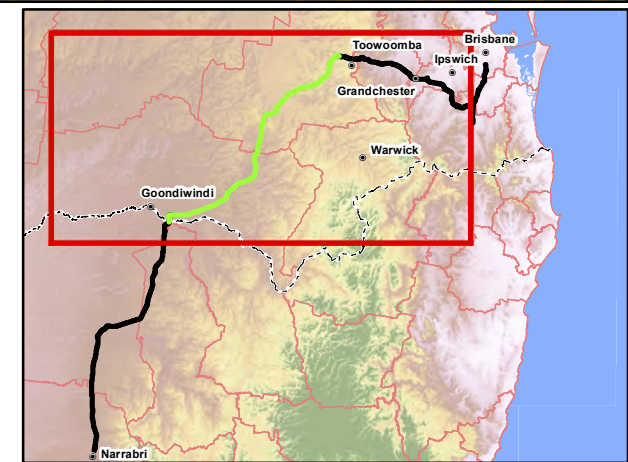


Legend

- 5 Chainage (km)
- Localities
- North Star to NSW/QLD border alignment
- Border to Gowrie alignment
- Gowrie to Helidon alignment
- Existing rail (operational)
- Existing rail (non-operational)
- Major roads
- Minor roads
- NSW/QLD border
- LVIA study area (10 km from rail alignment)

Observation points theoretically visible

- | | |
|---------|---------|
| 0 | 21 - 25 |
| 1 - 5 | 26 - 30 |
| 6 - 10 | 31 - 35 |
| 11 - 15 | 36 - 40 |
| 16 - 20 | <41 |



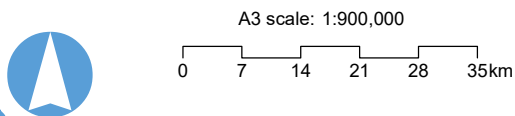
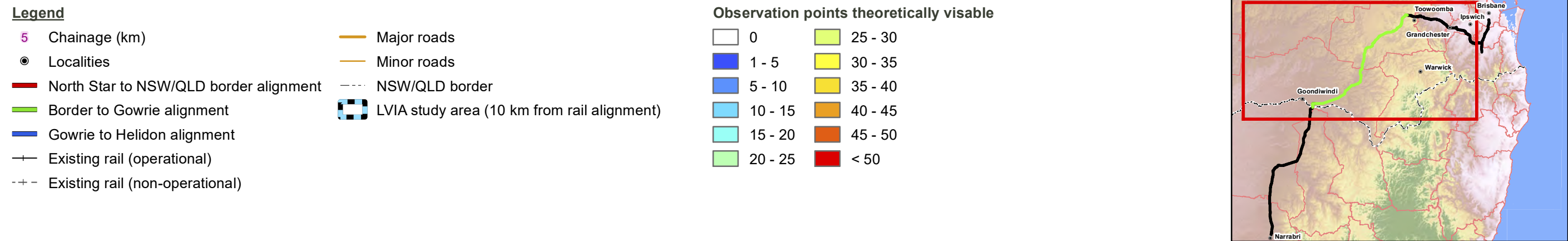
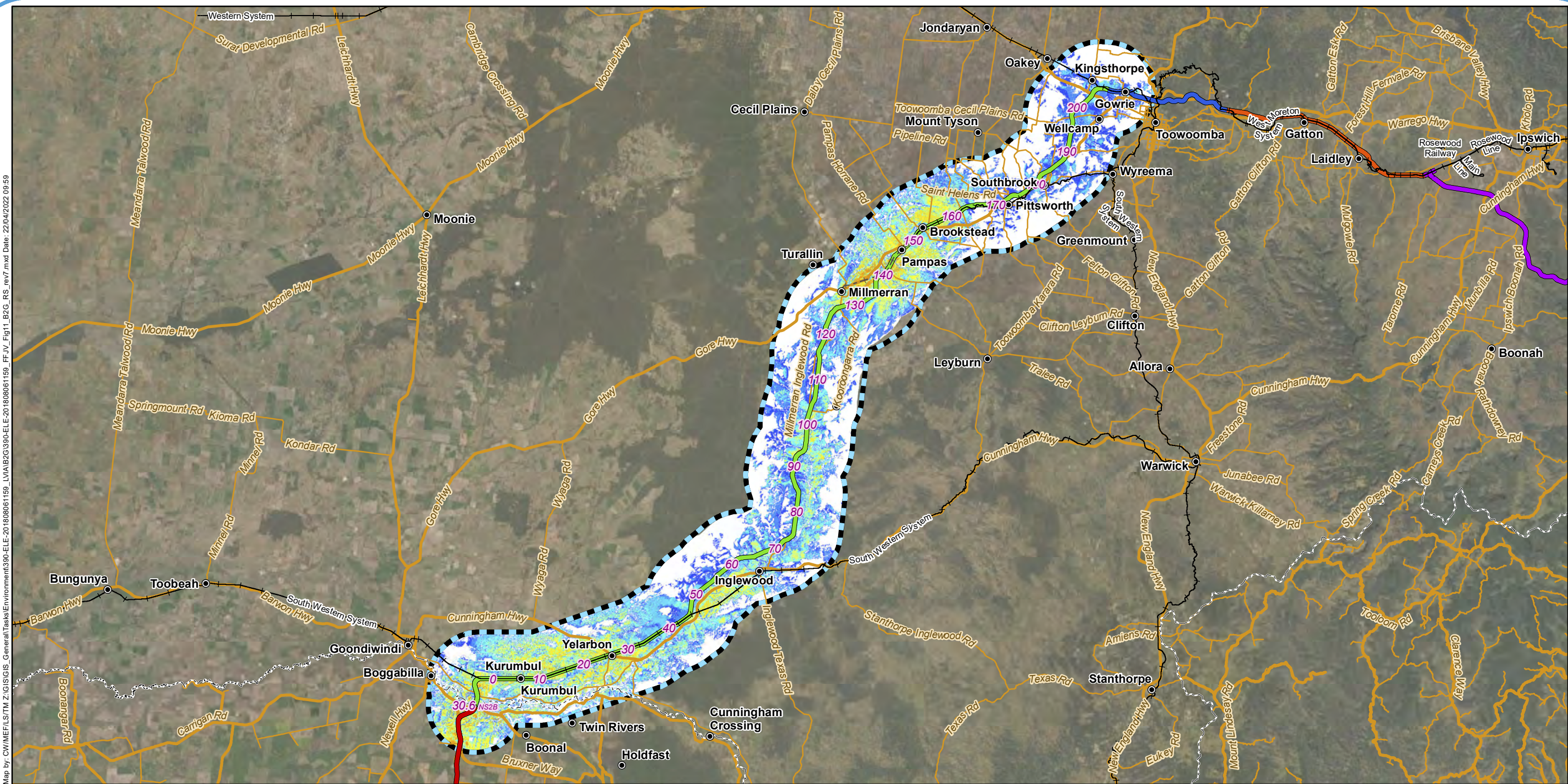
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0 6.5 13 19.5 26 32.5km



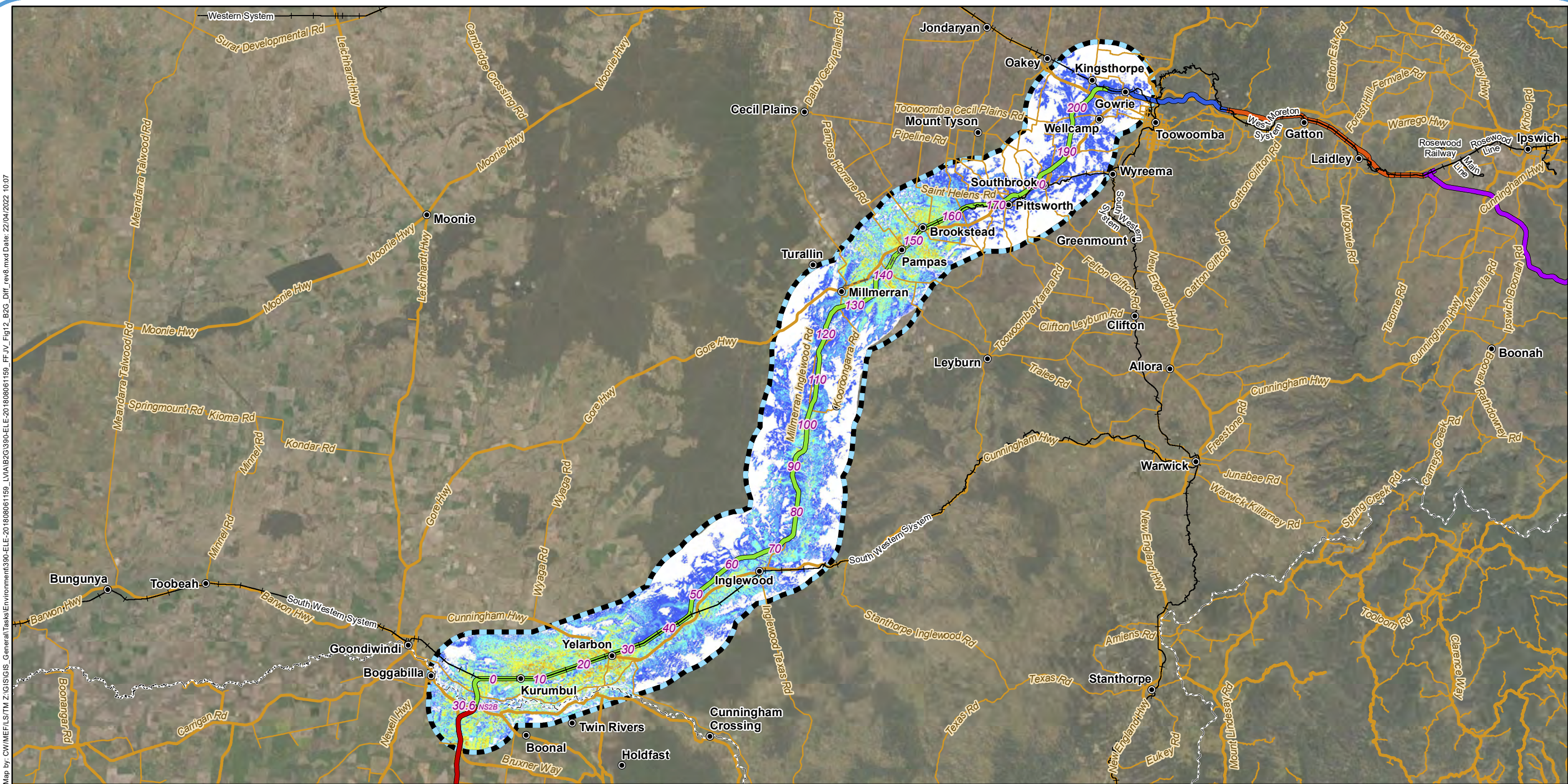
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Integrating Community, Environment and Engineering

Issue date: 22/04/2022 Version: 7
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 10: Visual analysis map
permanent infrastructure



Border to Gowrie
Figure 11: Visual analysis map
rolling stock



Map by: C:\MINEFILES\TM 2\GIS\GIS - General\Task\Environment\390-ELE-201806061159_LVIA\B2G\390-ELE-201806061159_FF_IV_Fig12_Diff_rev8.mxd Date: 22/04/2022 10:07

Legend

- 5 Chainage (km)
- Localities
- North Star to NSW/QLD border alignment
- Border to Gowrie alignment
- Gowrie to Helidon alignment
- Existing rail (operational)
- Existing rail (non-operational)
- Major roads
- Minor roads
- NSW/QLD border
- LVIA study area (10 km from rail alignment)

Observation points theoretically visible

0	21 - 25
1 - 5	26 - 30
6 - 10	31 - 35
11 - 15	36 - 40
16 - 20	<41



A3 scale: 1:900,000
0 7 14 21 28 35km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure 12: Visual analysis map
difference analysis

APPENDIX K

Landscape and Visual Impact Assessment

Appendix 2 Viewpoints

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX 2: VIEWPOINTS

The following viewpoints have been used to inform and illustrate this assessment:

Figure 22: Viewpoint 1

Figure 23: Viewpoint 2

Figure 24: Viewpoint 3 and visualisation

Figure 25: Viewpoint 3 and visualisation (noise wall option)

Figure 26: Viewpoint 4 and visualisation

Figure 27: Viewpoint 4 and visualisation (noise wall option)

Figure 28: Viewpoint 5

Figure 29: Viewpoint 6

Figure 30: Viewpoint 7

Figure 31: Viewpoint 8

Figure 32: Viewpoint 9

Figure 33: Viewpoint 10

Figure 34: Viewpoint 11

Figure 35: Viewpoint 12

Figure 36: Viewpoint 13

Figure 37: Viewpoint 14

Figure 38: Viewpoint 15

Figure 39: Viewpoint 16 and visualisation

Figure 40: Viewpoint 17 and visualisation

Figure 41: Viewpoint 18

Figure 42: Viewpoint 19

Figure 43: Viewpoint 20 and visualisation

Figure 44: Viewpoint 20 and visualisation (noise wall option and post-mitigation)

Figure 45: Viewpoint 20 – aerial visualisation

Figure 46: Viewpoint 21

Figure 47: Viewpoint 22 and visualisation

Figure 48: Viewpoint 22 and visualisation (noise wall option and post-mitigation)

Figure 49: Viewpoint 23 and visualisation

Figure 50: Viewpoint 23 and visualisation (noise wall option and post-mitigation)

Figure 51: Viewpoint 24 and visualisation

Figure 52: Viewpoint 24 and visualisation (post-mitigation)

Figure 53: Viewpoint 25

Figure 54: Viewpoint 26

Figure 55: Viewpoint 27

Figure 56: Viewpoint 28 and visualisation

Figure 57: Viewpoint 29a

Figure 58: Viewpoint 29b

Figure 22: Viewpoint 1: Rainbow Reserve near Kildonan Road, Kurumbul



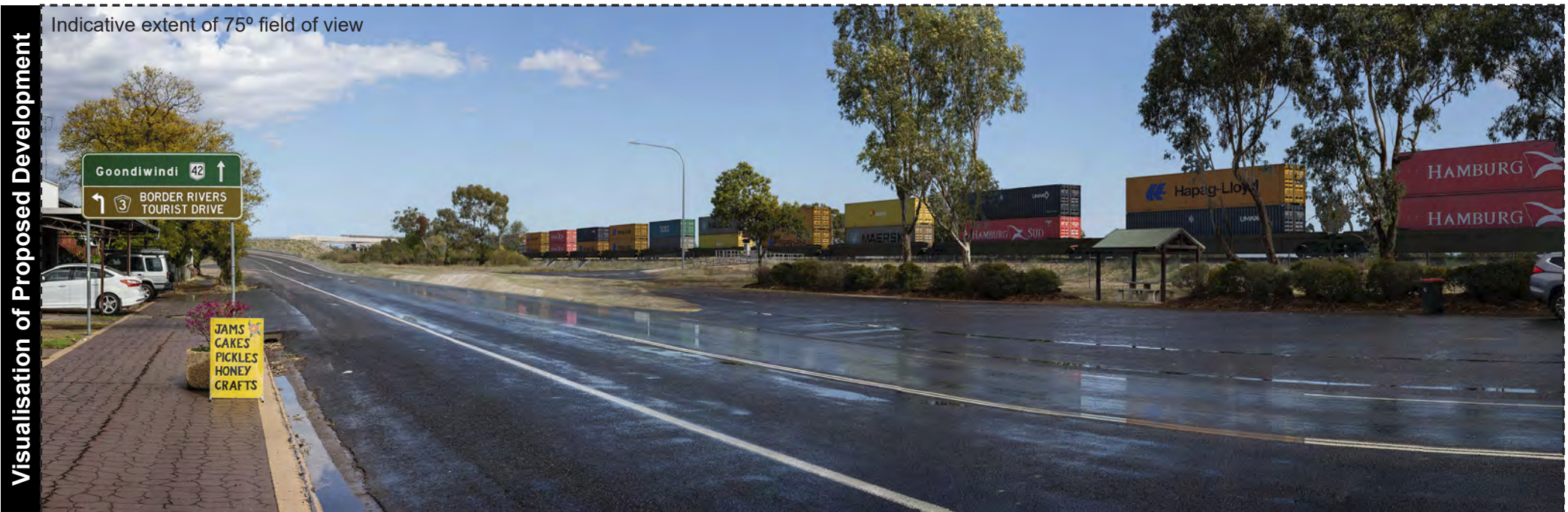
Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 23: Viewpoint 2: Cunningham Highway near Yelarbon towards proposed non-resident workforce accommodation site



Note: Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 24: Viewpoint 3: Yelarbon rest area



Note: Visualisation of level crossing is indicative only, showing a schematic option for the provision of a pedestrian crossing in this location. Design and extent of crossing subject to development at detailed design stage.

Figure 25: Viewpoint 3: Yelarbon rest area - noise wall option

Note: Visualisation of noise wall option is indicative only, showing a schematic option for the provision of noise walls in this location. Design and extent of noise walls subject to development at detailed design stage.



Figure 26: Viewpoint 4: Yelarbon silo artwork viewing area

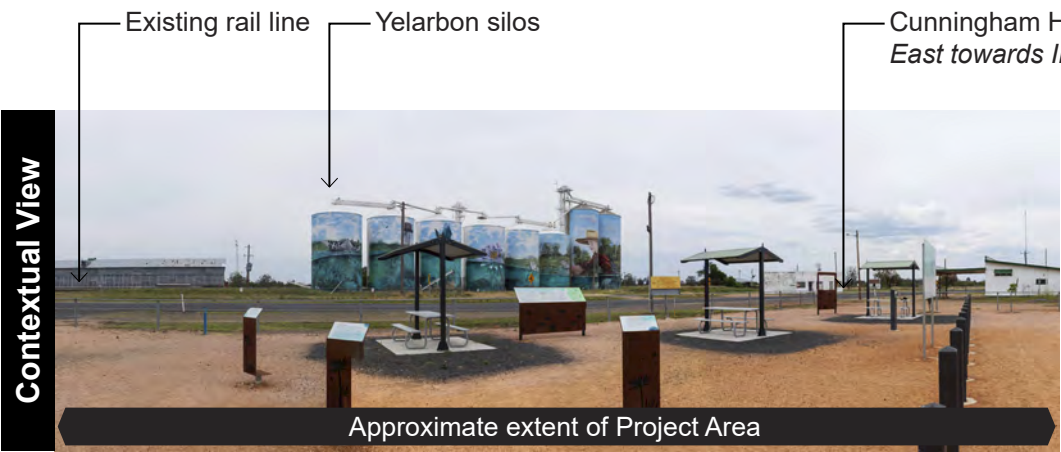
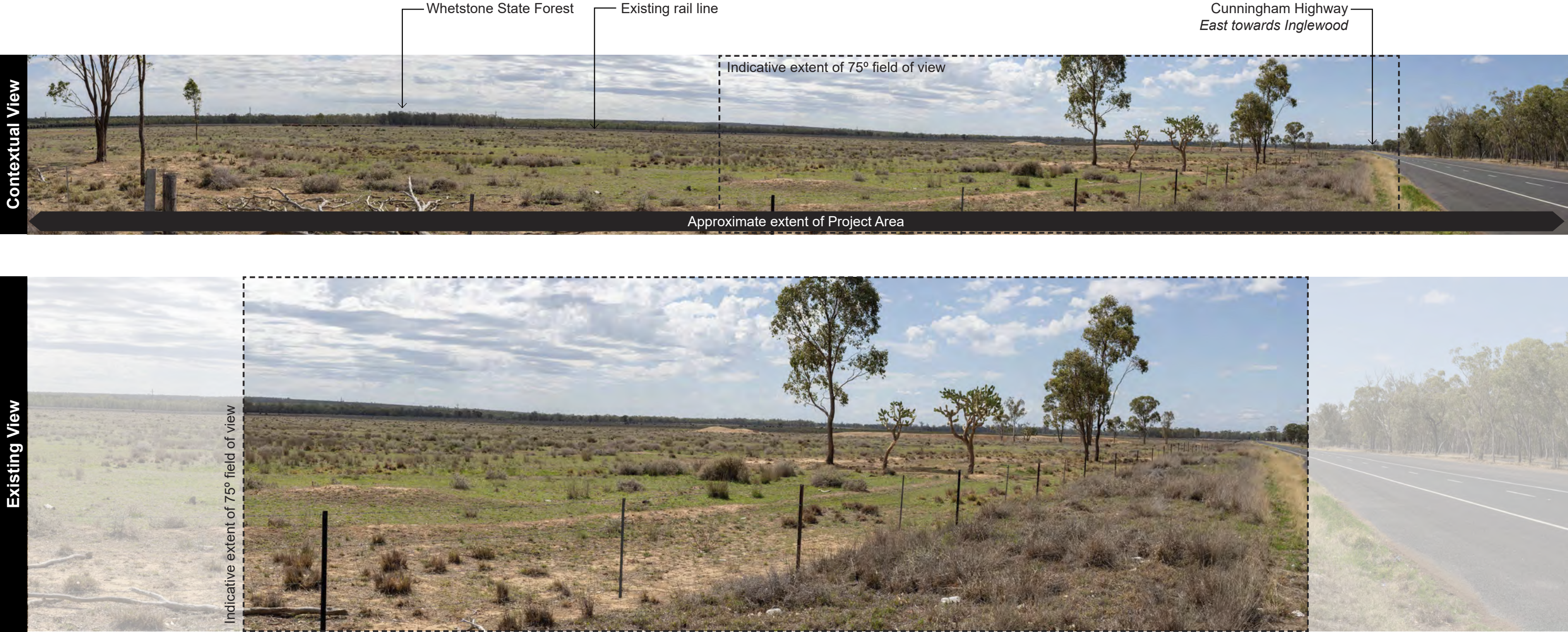


Figure 27: Viewpoint 4: Yelarbon silo artwork viewing area - noise wall option

Note: Visualisation of noise wall option is indicative only, showing a schematic option for the provision of noise walls in this location. Design and extent of noise walls subject to development at detailed design stage.



Figure 28: Viewpoint 5: Cunningham Highway Near Whetstone Rest Area



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 29: Viewpoint 6: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #1



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 30: Viewpoint 7: Millmerran-Inglewood Road towards proposed non-resident workforce accommodation site



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 31: Viewpoint 8: Millmerran-Inglewood Road near Nicol Creek Road



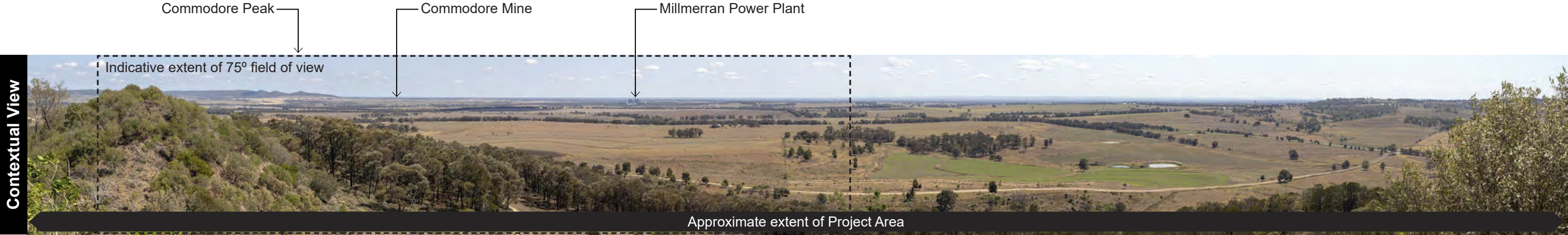
Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 32: Viewpoint 9: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #2



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 33: Viewpoint 10: Mount Basalt Reserve, looking towards Millmerran



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 34: Viewpoint 11: Blackwell Road looking towards Millmerran-Inglewood Road



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 35: Viewpoint 12: Commodore Peak picnic area looking towards Millmerran Power Station



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 36: Viewpoint 13: Millmerran-Inglewood Road towards Millmerran-Inglewood Road Rail Bridge #3



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 37: Viewpoint 14: Nardoo Street edge of Millmerran



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 38: Viewpoint 15: Turallin Road towards proposed non-resident workforce accommodation site



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 39: Viewpoint 16: Millmerran-Leyburn Road towards Condamine River crossing and loodplain



Figure 40: Viewpoint 17: Millmerran-Leyburn Road towards Condamine River crossing and floodplain

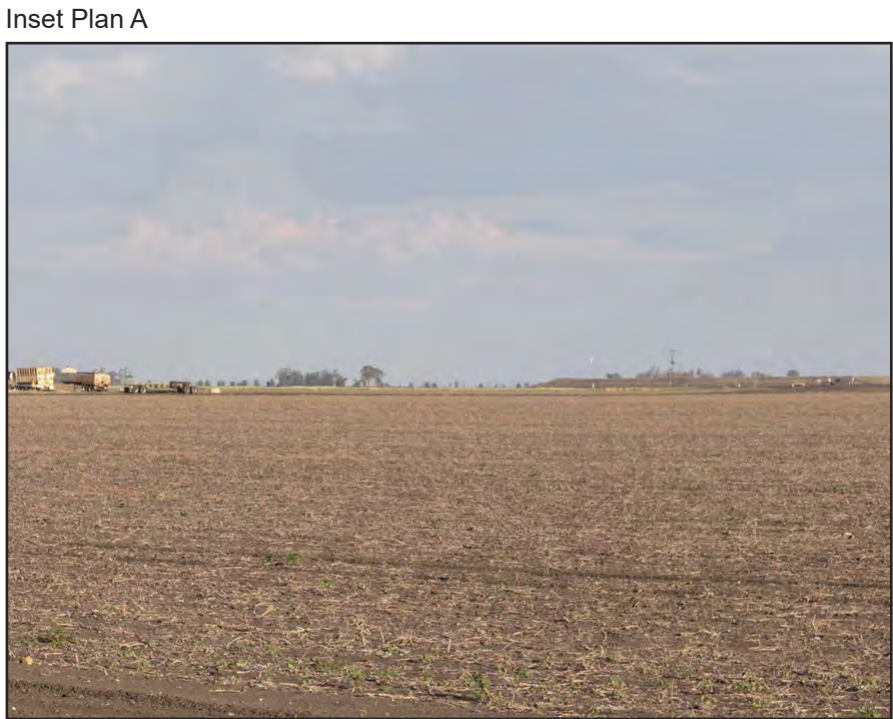
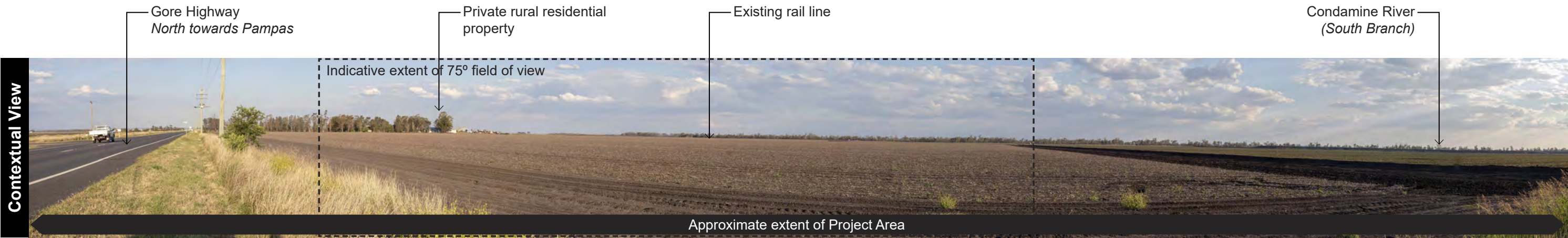


Figure 41: Viewpoint 18: Gore Highway near Caltex, Pampas



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 42: Viewpoint 19: Gore Highway towards Condamine River (north branch) crossing



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 43: Viewpoint 20: Near Brookstead State School



Figure 44: Viewpoint 20: Near Brookstead State School - noise wall otion and post-mitigation

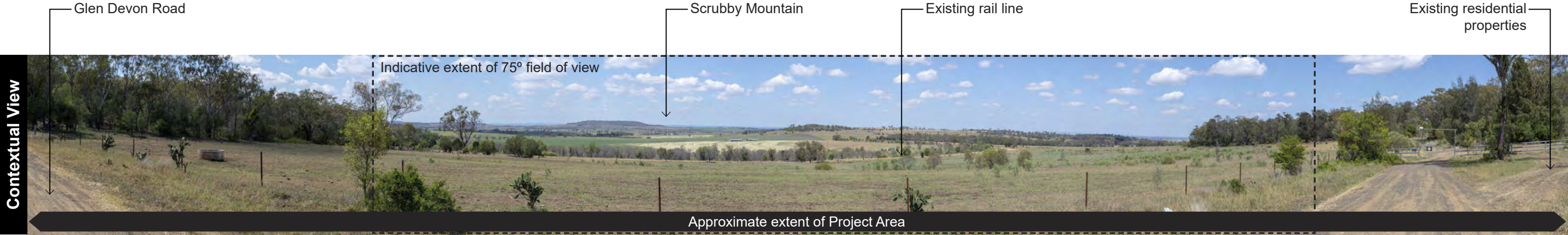


Figure 45: Viewpoint 20: Aerial View over the Gore Highway, Brookstead



Aerial View of Brookstead - Preliminary EIS design (indicative only)

Figure 46: Viewpoint 21: Glen Devon Road looking south from elevated private residential properties



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 47: Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn

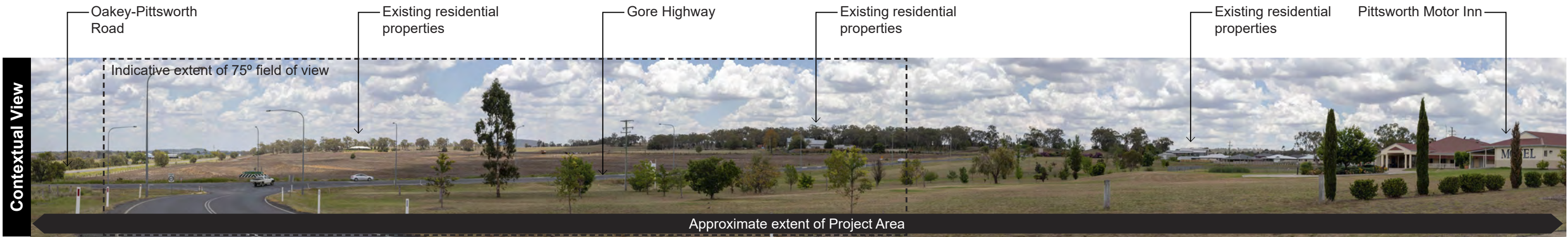


Figure 48: Viewpoint 22: Pittsworth-Felton Road near Pittsworth Motor Inn - noise wall option and post-mitigation



Figure 49: Viewpoint 23: Stanley Street near local park, Pittsworth



Figure 50: Viewpoint 23: Stanley Street near local park, Pittsworth - noise wall option and post-mitigation



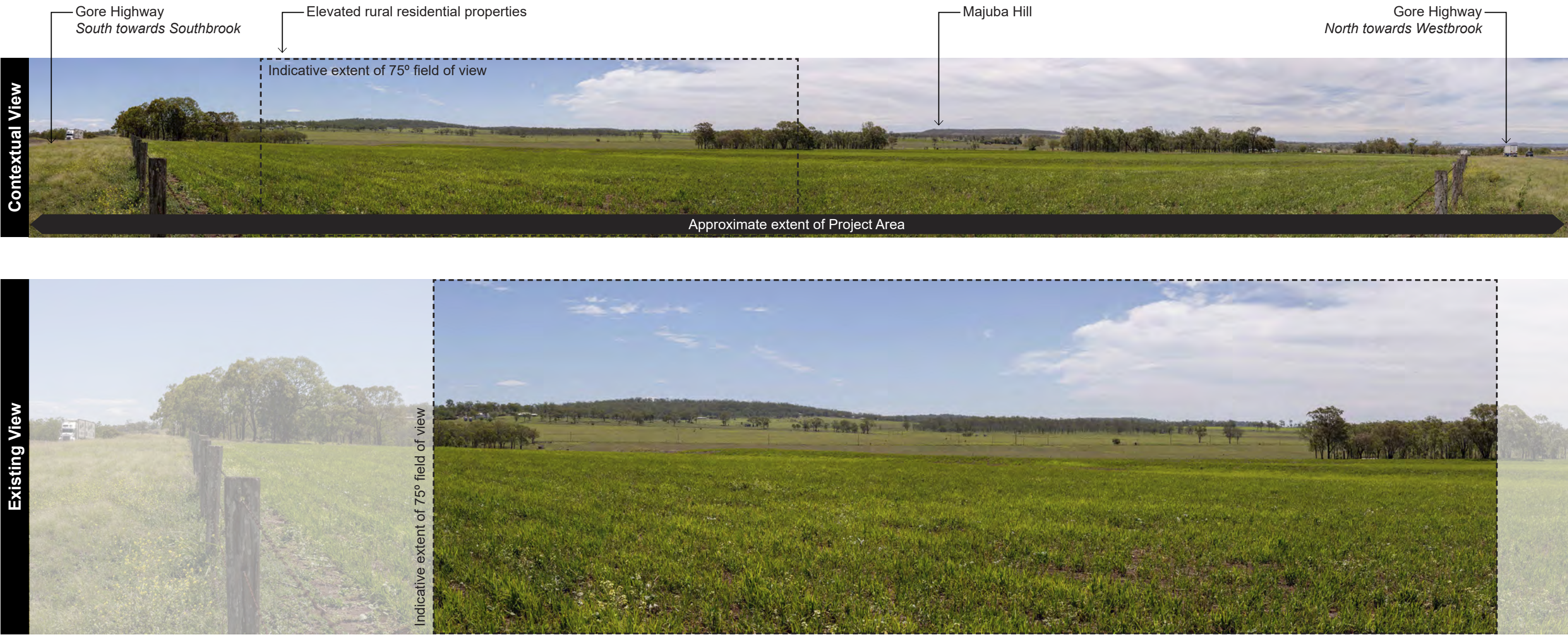
Figure 51: Viewpoint 24: Pittsworth and District Assembly of God, Pittsworth



Figure 52: Viewpoint 24:Assembly of God, Pittsworth - post-mitigation



Figure 53: Viewpoint 25: Gore Highway near Southbrook



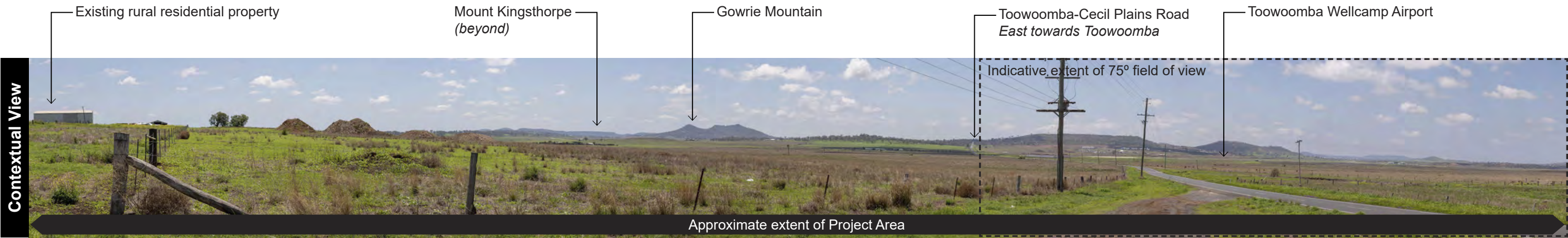
Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 54: Viewpoint 26: View from Athol School Road



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 55: Viewpoint 27: Toowoomba-Cecil Plains Road, near private property ‘Burton’



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 56: Viewpoint 28: Linora Drive, Gowrie Mountain



Figure 57: Viewpoint 29a: Mount Kingsthorpe summit scenic lookout



Note: Please note that no visualisation has been provided for this viewpoint, as dicussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

Figure 58: Viewpoint 29b: Mount Kingsthorpe summit scenic lookout
Note: This view has been provided to represent similar (more distant) views obtained from nearby residential areas as from Mount Kingsthorpe (refer Viewpoint 29a)



Note: Please note that no visualisation has been provided for this viewpoint, as discussed in Section 4.9: Visual Impact Assessment of the Landscape and Visual Impact Assessment Technical Report.

APPENDIX K

Landscape and Visual Impact Assessment

Appendix 3 Obtrusive lighting assessment

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Appendices

Appendix A

60553814 Lighting Analysis B2G Properties

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Figure 2.2	Creating a luminous intensity distribution from Figure 2.1
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Figure 4.2	+VE Peak intensity rotation
Figure 4.3	-VE peak intensity rotation
Figure 4.4	Loop track entry and exit potential light spill

Tables

Table 3.1	Summary of effective distances of headlight and visibility lights with respect to environmental zone classifications
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Abbreviations

Abbreviation	Explanation
ARTC	Australian Rail Track Corporation Ltd
B2G	NSW/QLD Border to Gowrie
C2K	Calvert to Kagaru
CBD	Central Business District
G2H	Gowrie to Helidon
GDP	Gross domestic product
H2C	Helidon to Calvert
Inland Rail	Melbourne to Brisbane Inland Rail
km	Kilometres
m	metre
cd	Candela
NSW	New South Wales
SFRC	Southern Freight Rail Corridor
the proponent	Australian Rail Track Corporation Ltd

1 Introduction

There are no known references defining acceptable visual ‘amenity’ at night. In this context, ‘amenity’ is taken to be *‘the state of pleasantness of the night-time environment or a particular night-time view’* and loss of amenity to mean *‘change to the existing view or environment’*. The human visual system perceives visual brightness relative to the state of adaptation to ambient conditions and includes the relative health and well-being of that observer. A specific quantity of light (illuminance or luminance) to a young healthy observer may be perceived to be excessive in a dark environment yet the same lighting in a different environment, such as in a suburban area, may be perceived to be far more acceptable.

Australian New Zealand Standard, AS/NZS4282:2019 Control of Obtrusive Effects of Outdoor Lighting classifies various ambient lighting environments from very dark (A0) to much brighter, such as suburban and city CBD area (A4). In the absence of any other known information, AS/NZS 4282:2019 criteria is applied to this project analysis; however, it should be noted that transient lighting, such as motor vehicle headlights and train headlights, are not included in any part of the AS/NZS4282:2019 standard. AS/NZS4282:2019 is focussed on lighting installations, not transient effects created by lighting associated with passing bicycles, boats, motor vehicles, trains, or aeroplanes. Also, any systems associated with transport infrastructure where lighting is provided to facilitate public safety and security, public safety and security is paramount which includes applications such as railway crossings.

AS/NZS4282:2019 separates two lighting periods, namely, before curfew and during curfew, with curfew taken as 23:00 hours through to dawn the following day unless stated differently by a controlling authority. Light technical values permissible are much more restrictive during curfew compared to prior to curfew.

Environmental zone A0 (Intrinsically Dark) is for UNESCO Starlight Reserves, International Dark Sky Association (IDA) Dark Sky Parks and areas in the vicinity of major optical observatories and has a requirement of 0 lux at any time; residences should not use outdoor lighting and definitely nothing strictly shielded, and windows fitted with blackout curtains or blinds. Use of vehicle headlights is usually not mentioned in such areas. The proposed B2G track does not intersect with any A0 areas and the use of the term ‘intrinsically dark’ should be used with caution. The relevant categories become A1 through to A4. A natural reference is moonlight: full moon on a clear sky night provides approximately 0.3 lux.

- **A1:** a dark environmental zone, relatively uninhabited rural areas with no road lighting. Curfew maximum limit 0.1 lux
- **A2:** has low district brightness, sparsely inhabited rural and semi-rural areas. Curfew maximum limit 1 lux
- **A3:** has medium district brightness, suburban areas in towns and cities. Curfew maximum limit 2 lux
- **A4:** has high district brightness, town and city centres and other commercial areas and includes residential areas abutting commercial areas. Curfew maximum limit 5 lux.

This brief report reviews the potential distribution of light and light spill from train headlights and visibility lights. Firstly, the intensity distribution of the luminaires is determined based on Australian Standard® AS 7531 Lighting and Visibility RISSB Rolling Stock Standard. Secondly, those distributions are interpreted relating to the potential effective distances applicable to each of the environmental zones A1 through to A4 and those distances applied along the B2G proposed track alignment to determine if various properties may be impacted during curfew.

Separate practical measurements were made of warning lights at a railway crossing in New South Wales to provide an indication of potential lighting impacts at a lit railway crossing. This is not unique to New South Wales but simply used as an example of the lighting impact that could be expected. However, as noted above, any systems associated with transport infrastructure where lighting is provided to facilitate public safety and security, public safety and security is paramount.

Further, practical lighting installation principles are provided to reduce any potential light spill from temporary construction camps or production facilities.

Consultation with Siding Spring Observatory in New South Wales and Mt Kent Observatory in Queensland reveals that, unlike New South Wales, there is no equivalent legislation in Queensland protecting the night-time environment associated with Mt Kent, although Toowoomba Regional Council is keen to protect Mt Kent Observatory. Mt Kent Observatory (University of Southern Queensland) has been directed to the draft EIS that is currently available on the Coordinator-General's website and the Inland Rail Community Consultation hotline. Consultation is on-going.

2 Train headlight light spill assessment

Luminous intensities required as per Australian Standard® AS 7531 Lighting and Visibility RISSB Rolling Stock Standard. As no maintenance factor has been stated in the Australian Standard, except that some allowance should be provided, an assumed maintenance factor of 0.7 means that 200,000 candela (cd) would be $200,000/0.7=285,714$ cd initial.

All lights have very specific performance and that is usually provided in a photometric file produced by the lighting manufacturer. A photometric file is a very detailed matrix of numbers specifying the luminous intensities in different angular directions. There are potentially many different locomotives with different headlight and visibility lighting performances and both the existing potential stock and future potential stock would need to be known. As there are no actual headlight lamp details, the limiting requirements noted in the Standard is used to create a luminous intensity distribution profile which can then be used to generate the distances that the various ASANZ 4282: 2019 Obtrusive Lighting light spill categories extend from the rail alignment.



Figure 2.1 Australian standard requirements for headlights

Creation of a likely luminous intensity distribution requires halving the angle between known angles and assuming the luminous intensity may also be half the difference between those two points. For example:

Known

3,000 cd at 7.5 degree offset

200,000 at nil offset (ie at peak intensity)

Therefore at 3.75 (7.5/2) degrees offset the luminous intensity will be

$3,000 + (200,000 - 3,000)/2 = 3,000 + 197,000/2 = 101,500$ cd at 3.75 degrees offset.

As the greatest sensitivity is likely to be closest to the peak intensity, halving the angle again to 1.875 degrees offset and following the same process

$101,500 + (200,000 - 101,500)/2 = 101,500 + 49,250 = 150,750$ cd at 1.875 degrees offset.

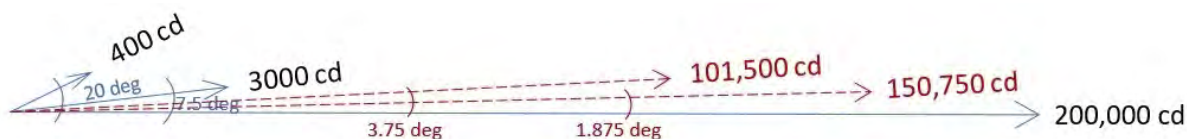


Figure 2.2 Creating a luminous intensity distribution from Figure 2.1

Determining the initial illuminance at 240 m in the vertical perpendicular to the peak intensity using the relationship $E=I/d^2$

Where:

E = illuminance (lux)

I = Luminous intensity (cd)

d = distance (m)

$mf=0.7$

$$E = (200,000/0.7)/240^2$$

$$E = 4.96 \text{ lux (say 5 lux).}$$

The relationship $E=I/d^2$ can also be utilised to determine distance that a given illuminance is achieved as the luminous intensities at different angles are known.

The most restrictive illuminance limits are during curfew hours. As an example, Category A4 (ASANZ 4282: 2019) has a maximum limit of 5 lux during curfew, curfew being 11:00 pm through to sunrise unless stated otherwise. Taking 5 lux initial as the maximum limit and at 1.875 degree offset the luminous intensity is 150,750 cd:

$$d = \sqrt{(I/E)}$$

$$d = \sqrt{(150,750/0.7)}/5$$

$$d = 207.5\text{m}$$

and offset in distance (x) from the peak intensity direction will be

$$\sin 1.875 = x/207.5$$

$$x = 6.79\text{ m}$$

Similarly at 3.75 degrees:

$$d = \sqrt{(101,500/0.7)}/5$$

$$d = 170.3\text{ m}$$

and offset in distance (x) from the peak intensity direction will be

$$\sin 3.75 = x/170.3$$

$$x = 11.14\text{ m}$$

At 7.5 degrees:

$$d = \sqrt{(3,000/0.7)}/5$$

$$d = 29.3\text{ m}$$

and offset in distance (x) from the peak intensity direction will be

$$\sin 7.5 = x/29.3$$

$$x = 3.82\text{ m}$$

At 20 degrees:

$$d = \sqrt{(400/0.7)}/5$$

$$d = 10.7\text{ m}$$

and offset in distance (x) from the peak intensity direction will be

$$\sin 20 = x/10.7$$

$$x = 3.66\text{m}$$

The maximum offset distance when focused straight ahead on a straight line occurs at luminous intensities where the angle of offset is 3.75 degrees from the peak intensity.

2.1 A1 Environmental Zone 0.1 Lux During Curfew

Peak intensity

$$d = \sqrt{(200,000/0.7)}/0.1$$

$$d = 1,690.3\text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(150,750/0.7)}/0.1$$

$$d = 1,467.5\text{ m}$$

Offset x is $\sin 3.75 = x/1467.5$

X = 95.98 m, that is, it is the distance from the centre line of the track beyond which the curfew limit from the headlight component will not be exceeded for this environmental zone when the locomotive is travelling in a straight line.

If the headlight is dimmed to 80,000 cd peak intensity as per Australian Standard whilst facing an oncoming train, running parallel to a road or in a built-up area, then:

$$d = \sqrt{(80,000/0.7)}/0.1$$

$$d = 1,069 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(60,300/0.7)}/0.1$$

$$d = 928.1 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 3.75 = x/928.1$$

$$X = 60.7 \text{ m from centre line of track}$$

2.2 A2 Environmental Zone 1.0 Lux During Curfew

Peak intensity

$$d = \sqrt{(200,000/0.7)}/1$$

$$d = 534.5 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(150,750/0.7)}/1$$

$$d = 464.1 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 3.75 = x/464.1$$

X = 30.35 m, that is, it is the distance from the centre line of the track beyond which the curfew limit from the headlight component will not be exceeded for this environmental zone when the locomotive is travelling in a straight line.

If the headlight is dimmed to 80,000 cd peak intensity as per Australian Standard whilst facing an oncoming train, running parallel to a road or in a built-up area then:

$$d = \sqrt{(80,000/0.7)}/1$$

$$d = 338 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(60,300/0.7)}/1$$

$$d = 293.5 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 3.75 = x/293.5$$

$$X = 19.2 \text{ m from centre line of track}$$

2.3 A3 Environmental Zone 2.0 Lux During Curfew

Peak intensity

$$d = \sqrt{(200,000/0.7)}/2$$

$$d = 377.96 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(150,750/0.7)}/2$$

$$d = 328.1 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 3.75 = x/328.1$$

X = 21.46 m, that is, it is the distance from the centre line of the track beyond which the curfew limit from the headlight component will not be exceeded for this environmental zone when the locomotive is travelling in a straight line.

If the headlight is dimmed to 80,000 cd peak intensity as per Australian Standard whilst facing an oncoming train, running parallel to a road or in a built-up area then:

$$d = \sqrt{(80,000/0.7)}/2$$

$$d = 239.05 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(60,300/0.7)}/2$$

$$d = 207.54 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 3.75 = x/207.54$$

2.4 X = 13.6m from centre line of track A4 Environmental Zone 5.0 Lux During Curfew

5 lux calcs used in first example - peak intensity

$$d = 240 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = 170.3 \text{ m}$$

Offset x is 11.14 m, that is, it is the distance from the centre line of the track beyond which the curfew limit from the headlight component will not be exceeded for this environmental zone when the locomotive is travelling in a straight line.

If the headlight is dimmed to 80,000 cd peak intensity as per Australian Standard whilst facing an oncoming train, running parallel to a road or in a built-up area then:

$$d = \sqrt{(80,000/0.7)}/5$$

$$d = 151.2 \text{ m}$$

At 3.75 degrees offset from peak intensity

$$d = \sqrt{(60,300/0.7)}/5$$

$$d = 131.3 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 3.75 = x/131.3$$

X = 8.6 m from centre line of track

3 Visibility lighting

Visibility lighting can either be aimed parallel to the locomotive centre line similar to the headlight(s) or cross aimed by up to 15 degrees from the centre line as shown in Figure 3.1. The greatest potential impact will be if the lights are cross aimed 15 degrees and therefore visibility lights cross aimed 15 degree is the basis of assessment. Visibility lighting is to be mounted between 600 mm and 1,200 mm above top of rail and to be cross aimed as indicated in figure below (copied from Australian Standard® AS 7531 Lighting and Visibility RISSB Rolling Stock Standard).

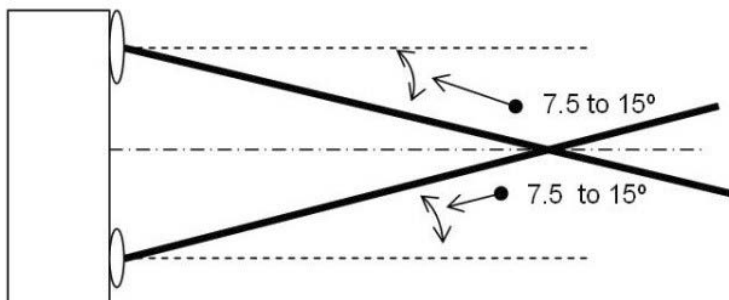


Figure 3.1 Visibility lighting figure copied from Australian standards

Taking the Standard information, the luminous intensity distribution profile is:



Figure 3.2 Australian standard requirements for visibility lighting

Visibility lights can be mounted 0.6 m to 1.2 m above top of track. If 1.2 m then, when aimed at 25 m ahead as required, the declination angle is $\tan^{-1} 1.2/25 = 2.75$ degrees. If 0.6 m then declination angle is 1.375 degrees.

The illuminance at 25 m at peak intensity is $E = I/d^2 = (20,000/0.7)/(25^2) = 32$ lux. The distance at which that diminishes to 5 lux:

$$d = \sqrt{((20,000)/0.7)/5}$$

$$d = 75.6\text{m}$$

However, as the peak is aimed at 25 m distance, there will be a reduction in the intensity for the angle that 75.6 m makes compared to say 1.2 m mounting height and 25 m distance. 2.75 degrees – 0.91 degrees is 1.84 degrees. Using the same principles of halving angles and applying the difference in luminous intensity would make that approximately the same as 1.875 degrees offset and the result is 14,400 cd.

$$d = \sqrt{((14,400)/0.7)/5}$$

$$d = 64.1\text{m}$$

$$\text{Offset } x \text{ is } \sin 15 = x/64.1$$

$$X = 16.6 \text{ m less offset from centre of locomotive (say } 0.75 \text{ m)} = 16.1 \text{ m}$$

Previously for headlights, the widest offset from centre line of the track appeared to be associated with luminous intensities at 3.75 degrees from the peak intensity. Checking that angle, $I = 8,800$ cd, therefore

$$d = \sqrt{((8,800)/0.7)/5}$$

$$d = 50.1 \text{ m}$$

However, as the lights are cross aimed, if the angle is 15 degrees cross aim plus the 3.75 degrees, the angle for calculating x is 18.75 degrees.



Figure 3.3 Visibility lighting maximum cross aiming

Offset x is $\sin 18.75 = x/50.1$

X = 16.1 m less offset from centre of locomotive (say 0.75 m) = 15.35 m

In addition, there will be a minor component from the second visibility light that is cross aimed in the other direction. The only consideration is the 20-degree luminous intensity which is 400 cd. The cross aim being 15 degrees (20 – 15 = 5 degrees to the same side as the first visibility light), therefore the total luminous intensity is 8,800 plus 400 cd.

$$d = \sqrt{((8,800 + 400)/0.7)/5}$$

$$d = 51.3 \text{ m}$$

Offset x is $\sin 18.75 = x/51.3$

X = 16.49 m, that is, it is the distance from the centre line of the track beyond which the curfew limit from the visibility lights component will not be exceeded for this environmental zone when the locomotive is travelling in a straight line. If this value exceeds the headlight value for curfew 5 lux limit zone (A4), then this becomes the required distance. In this instance, the maximum offset for the headlight component is 11.3 m, therefore it is the visibility lights that dominate and therefore the 5 lux limit should be shown as at least 16.5 m from the centre of the track when the locomotive is travelling in a straight line unless some physical barrier blocks the lighting at lower level compared to headlight level. Navigating a curve (depending on the radius) may be a different situation.

The process is repeated for environmental zones A1 to A3 inclusive.

3.1 A1 Zone

The distance at which that diminishes to 0.1 lux:

$$d = \sqrt{(20,000/0.7)/0.1}$$

$$d = 534.5 \text{ m}$$

However, as the peak is aimed at 25 m distance, there will be a reduction in the intensity for the angle that 534.5 m makes compared to say 1.2 m mounting height and 25m distance. 2.75 degrees – 0.13 degrees is 2.62 degrees angular offset from peak intensity. If the angular offset was 3.75 degrees, then luminous intensity is 8,800 cd, and if 1.875 degrees, the luminous intensity is 14,400. At 2.62 degrees, it is calculated to be 12,176.8 cd.

$$d = \sqrt{(12,177/0.7)/0.1}$$

$$d = 417.1 \text{ m}$$

Offset x is $\sin(15 + 2.62) = x/417.1$

X=126.3 m less offset from centre of locomotive (say 0.75 m) = 125.6 m

In addition, there will be a minor component from the second visibility light that is cross aimed in the other direction. The only consideration is the 20 degree luminous intensity which is 400 cd. The cross aim being 15 degrees (20 – 15 = 5 degrees to the same side as the first visibility light), therefore the total luminous intensity is 12,177 plus 400 cd.

$$d = \sqrt{(12,577/0.7)/0.1}$$

$$d = 423.9 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 17.62 = x/423.9$$

$$X = 128.3 \text{ m less offset from centre of locomotive (say 0.75 m)} = 127.6 \text{ m}$$

As this dimension exceeds the headlight offset for 0.1 lux (95.98 m), it is the visibility lights that dominate and therefore the 0.1 lux limit should be shown as at least 127.6 m from the centre of the track when the locomotive is travelling in a straight line, unless some physical barrier blocks the lighting at lower level compared to headlight level.

3.2 A2 Zone

The distance at which that diminishes to 1 lux:

$$d = \sqrt{((20,000)/0.7)/1}$$

$$d = 169.0 \text{ m}$$

However, as the peak is aimed at 25 m distance, there will be a reduction in the intensity for the angle that 119.5 m makes compared to say 1.2 m mounting height and 25 m distance. 2.75 degrees – 0.41 degrees is 2.34 degrees angular offset from peak intensity. If the angular offset was 3.75 degrees, then luminous intensity is 8,800 cd and if 1.875 degrees, the luminous intensity is 14,400. At 2.34 degrees, it is calculated to be 13,011 cd.

$$d = \sqrt{((13,011)/0.7)/1}$$

$$d = 136.3 \text{ m}$$

$$\text{Offset } x \text{ is } \sin(15 + 2.34) = x/136.3$$

$$X = 40.6 \text{ m less offset from centre of locomotive (say 0.75 m)} = 39.85 \text{ m}$$

In addition, there will be a minor component from the second visibility light that is cross aimed in the other direction. The only consideration is the 20 degree luminous intensity which is 400 cd. The cross aim being 15 degrees (20 – 15 = 5 degrees to the same side as the first visibility light), therefore the total luminous intensity is 13,011 plus 400 cd.

$$d = \sqrt{((13,411)/0.7)/1}$$

$$d = 138.4 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 17.34 = x/138.4$$

$$X = 41.3 \text{ m less offset from centre of locomotive (say 0.75 m)} = 40.55 \text{ m}$$

As this dimension exceeds the headlight offset for 1 lux (35.35 m), it is the visibility lights that dominate and therefore the 1 lux limit should be shown as at least 40.6 m from the centre of the track when the locomotive is travelling in a straight line.

3.3 A3 Zone

The distance at which that diminishes to 2 lux:

$$d = \sqrt{(20,000/0.7)/2}$$

$$d = 119.5 \text{ m}$$

However, as the peak is aimed at 25 m distance, there will be a reduction in the intensity for the angle that 119.5 m makes compared to say 1.2 m mounting height and 25 m distance. 2.75 degrees – 0.58 degrees is 2.17 degrees angular offset from peak intensity. If the angular offset was 3.75 degrees, then luminous intensity is 8,800 cd and if 1.875 degrees, the luminous intensity is 14,400. At 2.17 degrees it is calculated to be 13,517 cd.

$$d = \sqrt{(13,519/0.7)}/2$$

$$d = 98.3 \text{ m}$$

$$\text{Offset } x \text{ is } \sin(15 + 2.17) = x/98.3$$

$$X = 29.0 \text{ m less offset from centre of locomotive (say 0.75 m) = 28.25 m}$$

In addition, there will be a minor component from the second visibility light that is cross aimed in the other direction. The only consideration is the 20 degree luminous intensity which is 400 cd. The cross aim being 15 degrees (20 – 15 = 5 degrees to the same side as the first visibility light), therefore the total luminous intensity is 13,517 plus 400 cd.

$$d = \sqrt{(13,917/0.7)}/2$$

$$d = 99.7 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 17.17 = x/99.7$$

$$X = 29.4 \text{ m less offset from centre of locomotive (say 0.75 m) = 28.65 m}$$

As this dimension exceeds the headlight offset for 2 lux (21.46 m) and the dimmed headlight offset (13.6 m), it is the visibility lights that dominate and therefore the 2 lux limit should be shown as at least 28.7 m from the centre of the track when the locomotive is travelling in a straight line, unless some physical barrier blocks the lighting at lower level compared to headlight level.

3.4 A4 Zone

The distance at which that diminishes to 5 lux:

$$d = \sqrt{((20,000)/0.7)}/5$$

$$d = 75.6 \text{ m}$$

However, as the peak is aimed at 25 m distance, there will be a reduction in the intensity for the angle that 119.5 m makes compared to say 1.2 m mounting height and 25m distance. 2.75 degrees – 0.58 degrees is 2.17 degrees angular offset from peak intensity. If the angular offset was 3.75 degrees, then luminous intensity is 8,800 cd and if 1.875 degrees, the luminous intensity is 14,400. At 2.17 degrees it is calculated to be 13,517 cd.

$$d = \sqrt{((13,519)/0.7)}/5$$

$$d = 62.5 \text{ m}$$

$$\text{Offset } x \text{ is } \sin(15 + 2.17) = x/62.5$$

$$X = 18.45 \text{ m less offset from centre of locomotive (say 0.75 m) = 17.7 m}$$

In addition, there will be a minor component from the second visibility light that is cross aimed in the other direction. The only consideration is the 20 degree luminous intensity which is 400 cd. The cross aim being 15 degrees (20 – 15 = 5 degrees to the same side as the first visibility light) therefore the total luminous intensity is 13,517 plus 400 cd.

$$d = \sqrt{((13,917)/0.7)}/5$$

$$d = 63.1 \text{ m}$$

$$\text{Offset } x \text{ is } \sin 17.17 = x/63.1$$

$$X = 18.63 \text{ m less offset from centre of locomotive (say 0.75 m) = 17.88 m}$$

As this dimension exceeds the headlight offset for 5 lux (11.1 m) and the dimmed headlight offset (8.6 m), it is the visibility lights that dominate and therefore the 5-lux limit should be shown as at least 17.9 m from the centre of the track when the locomotive is travelling in a straight line, unless some physical barrier blocks the lighting at lower level compared to headlight level.

3.5 Summary of analysis

A summary of the above calculations is shown in Table 3.1.

Table 3.1 Summary of effective distances of headlight and visibility lights with respect to environmental zone classifications

Environment Zone	Headlight Highbeam Distance (m) after which Environmental Zone Classification Illuminance meets Australian Standards					Visibility Lights Crossed 15 deg Distances (m) Necessary to Meet Australian Standard	Headlights Dimmed Distance (m) Necessary to Meet Australian Standards	
		Angle from peak Intensity (deg)	0	3.75	7.5	20	0	3.75
A1	Peak		1690.3	1467.5			417.0	1069.0
A1	Offset		0.0	96.0			127.6	60.1
A2	Peak		534.5	464.1			136.3	338.0
A2	Offset		0.0	30.4			40.6	19.2
A3	Peak		378.0	328.1			99.7	239.1
A3	Offset		0.0	21.5			28.7	13.6
A4	Peak		240.0	170.3	29.3	10.7	63.1	151.2
A4	Offset		0.0	11.1	3.8	3.7	18.7	8.6

Legend:

	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Also, in the direction of travel, that is the maximum possible and with the direction of travel the light sweeps away from that location as the train negotiates a track curvature.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Also, in the direction of travel, that is the maximum possible, however, with the direction of travel the light sweeps towards that location as the train negotiates a track curvature, prolonging the transient period of exposure.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Due to the distance from the peak beam intensity and with the direction of travel the light sweeps away from that location as the train negotiates a track curvature, it is much less likely to be a technical non-compliance.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be and any adjacent building(s) or density of adjacent vegetation screening. Based on a desktop study it is not possible to determine if there are any habitable rooms, that is rooms occupied for prolonged periods of time such as loungerooms, bedrooms or a study that may be directly affected and that adjacent building(s), topography or screening vegetation are highly likely to reduce any effects below the Australian Standard requirements.

4 Headlight spill re travel along track curvature

The smaller the curvature radius, the greater the potential light spill distance from the track alignment for any given environmental category. Generally, the smallest radius curvature on the track is 1,200 m, except for passing loops where the track curvature radius is 800 m.

4.1 Headlight spill re main track curvature

The largest potential for light spill will be in an A1 environmental zone during curfew. Figure 4.1 illustrates the potential light spill based on a horizontal plane and a 1,200 m track radius – the distance beyond which illuminance is less than 0.1 lux is 873 m. The distance from the track at any one point will depend on the angular curvature (shown as 50.7 degrees in Figure 4.1). If the curvature angle is less, the distance may reduce depending on the angular size. If the angular size is greater than 50.7 degrees, the maximum distance will be as shown.

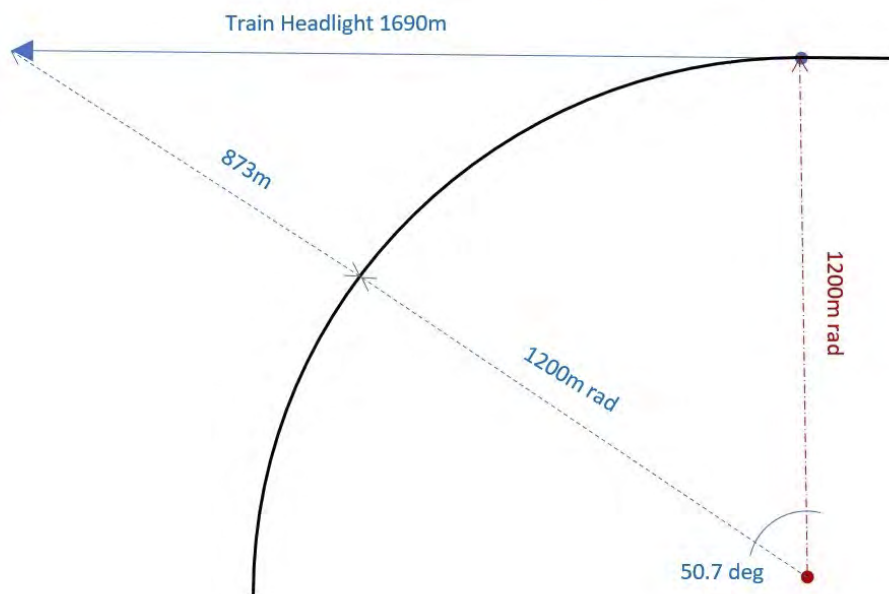


Figure 4.1 Maximum light spill distance from 1,200 m curvature environmental zone A1 during curfew

If the environmental zone is less restrictive during curfew, say A2, then the numbers change to a light spill distance of 114 m and curvature angle of 24 degrees. If A3, then the light spill distance is 58 m and curvature angle is 17.5 degrees.

At any one point, the exposure depends on position relative to the curvature. A positive rotation indicates the main light intensity rotates from the straight alignment through various tangents sweeping across any one point potentially for an increased period of time (Figure 4.2).

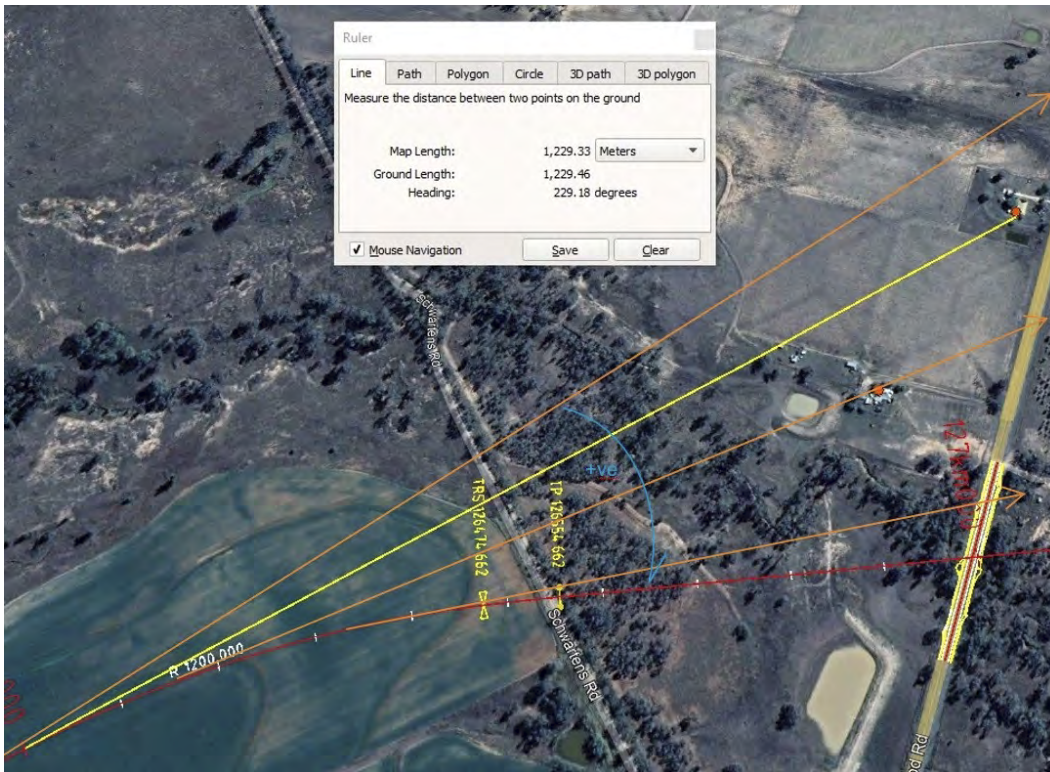


Figure 4.2 +VE Peak intensity rotation



Figure 4.3 -VE peak intensity rotation

A negative rotation means that the light does not sweep across the point as the train travels the curve, but the main light intensity sweeps away from that point as shown in Figure 4.3.

4.2 Headlight spill re passing loop

Passing loops where the track curvature radius is 800 m firstly turning away from the main track alignment and then 800 m radius turning back parallel to main track alignment. The loop track alignment is 4.5 m from the main track alignment centre to centre (Figure 4.4). The train lead locomotive could be either entering the loop track or exiting the loop track. The maximum permissible speed is 80 km/hr and it is assumed that during this operation the headlight(s) will be dimmed in accordance with AS7531:2015 - Lighting and Visibility requirements.

The maximum potential light spill will occur when the train headlights are at the curve inflection point. At that point the train headlight(s) will be aimed 9 degrees away from the main track and loop track straight alignments. If the environmental zone is in a suburban area (say environmental zone A3) and the headlight(s) are dimmed, the headlights will spill light 239 m directly ahead and 36m from the loop track (or main track) straight alignment depending on direction of travel of the train.

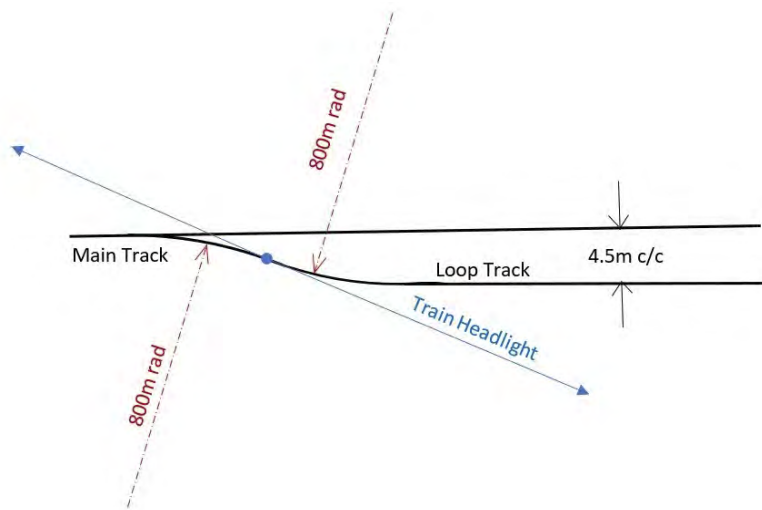


Figure 4.4 Loop track entry and exit potential light spill

If the environmental zone is A1, and the headlight(s) is dimmed, then the distance the train headlight projects is 1,069 m directly ahead and 167 m from the loop track (or main track) straight alignment, depending on direction of travel of the train. In environmental zone A2, that is 338m directly ahead and 51 m from the loop track (or main track) straight alignment, depending on direction of travel of the train.

5 Survey of potentially affected properties along B2G alignment

The above information has been applied to the track alignment B2G as provided, inclusive of the position of all properties in the vicinity of the proposed development. The process is started at the Qld/NSW Border and progresses towards Gowrie. The properties closest the rail alignment were investigated first and then properties progressively further from the track alignment until becoming obvious that properties further distant would clearly comply with any limits and therefore, such properties are not included. In total, 151 properties were investigated as detailed in Appendix A Table A1.

Each property investigation followed a process. Firstly, Google Earth was used to assist in identification of the most appropriate environmental classification (A1 to A4) that should be applied to that property; in particular, searching for any evidence of existing road lighting in the vicinity as the presence of road lighting and the type of lighting are important aspects of environmental classification. The majority of environmental classifications for B2G are A1 with a few instances of A2. Sometimes the interpretation between A1, A2 and potentially A3 is marginal and could be one way or the other. In each instance, the most restrictive condition has been applied.

The largest potential area of light spill occurs as trains negotiate curved track alignment. Analysis relative to track curvature is provided in both directions; that is, for trains travelling towards Gowrie and also for trains travelling from Gowrie towards the border.

Of the 151 properties investigated, 60 potential non-compliances were identified (Appendix A – Table 2). Based on the desktop review three properties (locations 92, 113 and 116) were identified as needing to be acquired due to being directly in the path of the track alignment and/or proposed associated road works. The remaining 57 properties identified as non-compliances were recognised as having potential obtrusive light issues based on the desktop study, post 'ground-truthing'. Consultation with impacted stakeholders will be ongoing to agree on mitigation measures for appropriate treatment of obtrusive lighting at these locations.

Depending on the track alignment relative to the property and the environmental zone classification, some non-compliances are for travel in one direction only, and a smaller number of non-compliances apply to both directions of train travel. A technical non-compliance means that the property is closer than the recommended distance noted in Table 3.1, however, there seems to be a varying presence of potential screening vegetation and some of those 'non-compliances' may be compliant as a result and are provided with a green or orange coloured non-compliance.

The expectation is that train drivers will dim the headlight when travelling parallel to a roadway, approaching built-up areas or in built-up areas, or negotiating loop tracks as noted in Australian Standard® AS 7531 Lighting and Visibility RISSB Rolling Stock Standard. However, in the analysis noted above, only in built-up areas has the lighting assessment been based on dimmed headlight distances in environmental zones.

6 Luminous Intensity Distribution Limits in Accordance with ASNZS 4282: 20019 Table 3.3

Assuming a headlight mounted at 4.2 m above top of track and aimed at 240 m distant at top of track, then the angle of tilt downward would be $\tan^{-1} (4.2/240) = 1.0$ degrees below horizontal. If mounted at 3 m above top of track, then tilted downward it would be $\tan^{-1} (3.0/240) = 0.72$ degrees below horizontal. Assuming the headlight luminous intensity distribution to be symmetrical, both horizontally and vertically, the luminous intensities of the headlight will not comply in any zone during curfew period.

7 Upward Waste Light Ratio

Neither the headlight(s) or the visibility lights will comply with the restrictions on Upward Waste Light Ratio (UWLR) (also called ULR – upward light ratio) for direct light above the horizontal noted in AS/NZS 4282: 2019. In environmental zone A0, the requirement is Nil UWLR, A1 it is also Nil UWLR, A2 it is $\leq 1\%$ UWLR, A3 it is $\leq 2\%$ UWLR, and in A4 it is $\leq 3\%$ UWLR.

8 Speed of travel (m/s) determines exposure time

Top speed 115 km/hr is 31.9m/s, 100 km/hr is 27.8m/s, 80 km/hr is 22.2 m/s, and 50 km/hr is 13.9 m/s.

Unless a train is stationary, any lighting effects are transitory, the frequency of change depending on speed at the time and the intensity at that moment.

In a zone A1:

- If the train is travelling at 115 km/hr, the light will pass a given point during curfew after 53 seconds, and
- At 80 km/hr, it will take 1 minute 16 seconds, and so on.

In a zone A2:

- If the train is travelling at 115 km/hr, the light will pass a given point during curfew after 17 seconds, and
- At 80 km/hr, it will take 24 seconds, etc.

In a zone A3:

- If the train is travelling at 115 km/hr, the light will pass a given point during curfew after 12 seconds, and.
- At 80 km/hr, it will take 17 seconds, etc.

In a zone A4:

- If the train is travelling at 115 km/hr, the light will pass a given point during curfew after 7.5 seconds, and
- At 80 km/hr, it will take 10.8 seconds, etc.

9 Warning lights on vehicular crossing of train tracks

In the absence of light technical information for theoretical analysis, an operating crossing was measured to ascertain the potential for light intrusion. The nature of warning lights at such crossing are intended to be intrusive, particularly to be noticed by motor vehicle drivers.

The crossing at Rawson Road, Woy Woy (Photograph 9.1) was visited both during the daytime and at night. This crossing has both an up track and a down track.



Photograph 9.1 The crossing at Rawson Road, Woy Woy

The warning lights are red. Luminaires are arranged in pairs on each of the posts and one luminaire on each post switches on then off. When that luminaire switches off, the adjacent luminaires switch on, creating a moving light effect. Moving light attracts the human visual system. Also, there are multiple luminaires mounted along each arm and, similar to the post luminaires, alternate luminaires switch on and off creating additional moving lighting directly in front of the driver's view.

Illuminance measurements were recorded at 1.5 m above road level in a vertical plane facing directly towards the crossing and parallel to the centre line of the roadway. As the lighting alternates relatively quickly, any illuminance measurements can only be considered a reasonable indication as it takes a moment for the illuminance meter to react. Two measurements were recorded at each location and the highest value was selected. Also, the measurements were made at the same locations for the street lighting only and then one measurement deducted from the other to determine the contribution of the crossing warning lights only.

The measurements were taken between 10:25 pm and 10:30 pm, the sky was overcast and there was no moon at that time and the road surface was damp, although it was not raining at that moment.



Photograph 9.2 Night-time view of crossing – no trains and no vehicles. Roadway well lit (category V3 minimum).



Photograph 9.3 Night-time view of crossing – train approaching but no motor vehicles. Roadway well lit (category V3).

The measurements were made 15.0 m from the centre line between both tracks. Measurements were made using a digital Minolta Illuminance Meter T-1.

Using the relationship $E = I/d^2$

Where:

E = illuminance (lux)

I = Luminous intensity (cd)

d = distance (m)

At X1, the intensity calculates to 1,980 cd and at X2, calculates to 1,710 cd. That simply indicates that, as the observer moves to the side of the roadway, the light intensity decreases as expected and that would be expected to decrease rapidly the greater the distance from the centre line of the roadway. Converting the 1,980 cd into distance based on environmental zone classifications using curfew period limits:

- A1 (0.1 lux) distance is 141 m
- A2 (1 lux) distance is 45 m
- A3 (2 lux) distance is 32 m
- A4 (5 lux) distance is 20 m

Warning lighting is intended to be intrusive and attention grabbing. Red is the colour used for danger but red also has the least disruptive effect on night-time vision. This assessment is only approximate due to the many factors involved. Motor vehicle rear lights, brake lights and headlight effects associated with traffic waiting at a crossing is outside the scope of this assessment. The measurements and results are practical and based on an existing installation.

10 Construction camp and production facility lighting

10.1 Area lighting general principles

Lighting of large open outdoor areas for car parking and vehicle movement, general pedestrian circulation, security lighting, production equipment lighting are generally mounted on poles or equipment and structures of sufficient height to suit the task.

All lighting must be installed with the front glass horizontal to avoid any direct upward light spill and night sky pollution. This also provides the least glare to any observers in the neighbourhood and minimises any unnecessary light spill beyond the boundaries of the application. Achievement of this important objective is a combination of an appropriate mounting height and asymmetric light distribution floodlighting as required to meet Australian Standards for the application. During detailed design phase comply with AS/NZS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting and the National Light Pollution Guidelines for Wildlife (2020) for endangered species identified in that location.

It is recommended that white light of 3,000 kelvin (K) colour temperature or less be used, as higher colour temperature lighting will have a higher blue content which is to be avoided wherever possible to minimise adverse effects on the night sky.

10.2 Construction camp, circulation and production facility lighting principles

Lighting of these general areas is typically achieved using weatherproof battens and or bulkhead type luminaires in addition to the floodlights noted above.

Weatherproof battens typically produce a very wide distribution of light, particularly those that have opal diffusers. It is important that these types of luminaires are not wall mounted directing light sideways with substantial direct upwards light pollution and glare to adjacent observers. These types of luminaires must be mounted with the diffuser aimed directly downwards and preferably also mounted beneath awnings or other overhanging building elements that will ensure minimisation of any direct upward light into the night sky.

Bulkhead type luminaires, if wall mounted, must have asymmetric light distribution with no light emitted above the horizontal in the installed location.

Also, appropriate use of sensor activated timed lighting controls and zoning will both reduce unnecessary night-time lighting and minimise energy wastage.

11 Mitigation measures

Locomotive headlight and visibility lighting performance is provided for safety and a requirement of Australian Standard® AS 7531 Lighting and Visibility RISSB Rolling Stock. Use of headlight high beam or dimmed headlight is for the locomotive driver and is normally required when a train travels parallel to a road or approaches and enters a built-up area. Mitigation measures where feasible vary depending on circumstances in any one location:

- Negotiating entering or leaving a loop track is limited to a maximum speed of 80 km/hr for safety and this should not require headlight high beam use. Headlights should be operated at a dimmed level during this process.
- Many of the non-compliances are associated with track alignment curvature; potential light spill from train headlights could be minimised or eliminated by providing earthworks and planting to screen the Project wherever practicable and appropriate to maintain local character and desirable views. This includes further opportunity for design of targeted planting adjacent to major earthworks where possible to the extent consistent with railway safety requirements and ARTC Engineering (Track & Civil) Code of Practice Section 17 Right of Way Requirements. For example, planting strips could be introduced adjacent to significant embankments to reduce visual impact and assist in integrating the landform into the existing landscape setting.
- Some locations are very close to existing and/or proposed track alignments and could benefit from appropriate vegetation screening.
- Railway crossing automated red warning lighting is a critical safety issue and nothing should be introduced to reduce the effectiveness of that lighting communicating with road users. Red light has less of a lasting effect on the vision of observers at night than any other source. Any residence sufficiently close to this type of railway crossing could utilise vegetation screening (e.g. South Kurumbul Road, Kurumbul).
- The effect of construction camp and/or production facility lighting can be minimised by following the design principles as noted in Section 10.

12 Conclusion

There is no known light technical standard or definition of ‘visual amenity’ and the loss thereof. A moving spot of light from a vehicle in the far distance travelling at night using headlights could be interpreted as momentarily reducing the visual amenity for an observer, even though without advanced instrumentation, no measurable light technical parameter is discernable. Loss of visual amenity relates to the views and surroundings that create the backdrop to an area prior to being subjected to the project lighting proposed. In the absence of any measurable light technical criteria, Australian New Zealand Standard, ASNZS4282:2019 Control of Obtrusive Effects of Outdoor Lighting has been used as a guide but should only be a general guide as there are many aspects of ASNZS 4282:2019 that are not appropriate as noted in Sections 6 and 7 above.

Australian New Zealand Standard, ASNZS4282:2019 Control of Obtrusive Effects of Outdoor Lighting classifies various ambient lighting environments from very dark (A0) to much brighter, such as suburban and city CBD areas (A4). The appropriate classifications for this project are A1 through to A4. It should be noted that transient lighting such as motor vehicle headlights and train headlights are not included in any part of the ASNZS4282:2019 Standard.

ASNZS4282:2019 separates two lighting periods, namely, before curfew and during curfew, with curfew taken as 11:00pm through to dawn the following day unless stated differently by a controlling authority. Light technical values permissible are much more restrictive during curfew compared to prior to curfew and therefore, the above analysis relates to the more stringent curfew period restrictions.

As the B2G track alignment and various properties have been provided, each property investigation for B2G followed a process as noted in Section 5. Google Earth was used to assist in identification of the most appropriate environmental classification (A1 to A4) applicable to that property. The distance of the property from the track alignment was measured as detailed in the report above and as documented in Section 5 and Appendix A. The result is a short list of situations (Appendix A Table A2) that may require some mitigation measures (Section 11) to produce the best results and recommendations for construction camp and or production facility lighting.

Consultation with Siding Spring Observatory in New South Wales and Mt Kent Observatory in Queensland reveals that, unlike New South Wales, there is no equivalent legislation in Queensland protecting the night-time environment associated with Mt Kent; however, Toowoomba Regional Council is keen to protect Mt Kent Observatory. Mt Kent Observatory (University of Southern Queensland) has been directed to the draft EIS that is currently available on the Coordinator-General’s website and the Inland Rail Community Consultation hotline. During the last few years Siding Spring Observatory has assessed proposed new rail infrastructure and increased night-time activity at Dubbo as part of upgrade works and had no issue with the proposed works and activities. University of Southern Queensland indicated that they would need full details before any official position could be declared, however, based on the experience with Siding Spring Observatory it seems highly unlikely that there will be issues for Mt Kent Observatory and consultation is expected to be on-going.

Appendix A

60553814 Lighting Analysis B2G Properties

Table A1 Short list of technically non-compliant locations

Table notes:

^ The following notes apply to the technical non-compliances identified:

	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Also, in the direction of travel, that is the maximum possible and with the direction of travel the light sweeps away from that location as the train negotiates a track curvature.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Also, in the direction of travel, that is the maximum possible, however, with the direction of travel the light sweeps towards that location as the train negotiates a track curvature, prolonging the transient period of exposure.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Due to the distance from the peak beam intensity and with the direction of travel the light sweeps away from that location as the train negotiates a track curvature, it is much less likely to be a technical non-compliance.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be and any adjacent building(s) or density of adjacent vegetation screening. Based on a desktop study it is not possible to determine if there are any habitable rooms, that is rooms occupied for prolonged periods of time such as loungerooms, bedrooms or a study that may be directly affected and that adjacent building(s), topography or screening vegetation are highly likely to reduce any effects below the Australian Standard requirements.

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
1	6.18	Yelarbon Kurumbul Rd	70		N	N	Y	Y	Y	Y	A1	96	1690		19.2	128	N	Headlight should be dimmed
2	8.17	Yelarbon Kurumbul Rd	409		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
3	9.10	Yelarbon Kurumbul Rd	85		N	N	Y	N	Y		A1					128	N	Currently no vegetation in the vicinity of the dwelling shown
										Y		96	1690					
				1000						Y		96	1690	+ve			N	Residence 260 m offset from main beam
4	15.20		283		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
5	15.30		46		N	N	Y	N	Y	Y	A1	96	1690			128	N	Ressmerino - trees surround residence
6	19.50		127		N	N	Y	N	Y	Y	A1	96				128	N	Some trees in vicinity
7	24.00		129		N	N	Y	N	Y	Y	A1	96				128	Y	Some trees in vicinity
8	26.20	Railway Pde (14)		81	Y	N	Y	Y	Y		A2			-ve	19.2	40.6	N	Turning into loop 10m offset from centre of beam - significant vegetation
			15														N	
9	26.32	Taloom St (30)	65		Y	Y	Y	Y	Y	Y	A3				13.6	29	Y	Applies to all residences on town centre south side Wondalli St (4 to 40)
10	26.33	Railway Pde (22)		193	Y	N	Y	Y	Y		A2			+ve	19.2	40.6	N	Turning into loop - 0m offset from main beam
			16													40.6	N	
11	26.65	Railway Pde (43)	57		Y	N	Y	Y	Y		A2			+ve		40.6	Y	
				301											19.2	40.6	Y	Turning into loop - 33m offset from main beam
12	35.00		200		N	N	Y	N	Y	Y	A1	96				128	Y	
13	46.00		1148		N	N	Y	N	Y		A1		1690				N	Significant screening vegetation therefore OK
14	50.00		1090		N	N	Y	N	Y		A1	96				128	Y	Residences too distant offset therefore OK
15	53.00		338		N	N	Y	N	Y		A1	96				128	Y	
				1820						Y			1690				Y	
16	54.60		162		N	N	Y	N	Y	Y	A1	96				128	Y	Trees surround residence
17	61.40		392		N	N	Y	N	Y	Y	A1	96				128	Y	Significant screening vegetation

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
18	73.50		628		N	N	Y	N	Y		A1	96				128	Y	
				1722						Y			1690				Y	
19	80.90		1384		N	N	Y	N	Y	Y	A1	96				128	Y	
20	96.80		295		N	N	Y	N	Y	Y	A1	96				128	Y	Some adjacent trees
21	97.30		226		N	N	Y	N	Y	Y	A1	96				128	Y	Surrounded by vegetation
22	98.40		133		N	N	Y	N	Y	Y	A1	96				128	Y	
23	100.10		174		N	N	Y	N	Y		A1	96				128	Y	
				1041						Y		96	1690	-ve			N	Significant screening vegetation therefore OK
24	101.30			1245	N	N	Y	N	Y		A1	228	1690	-ve			Y	Residence offset 228m from centre line of beam
			507							Y		96					Y	
25	103.40		328		N	N	Y	N	Y		A1	96				128	Y	
				908						Y		96	1690	-ve			Y	Residence offset 151m from centre line of beam
26	105.00			1014	N	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 574m from centre line of beam
			755							Y		96				128	Y	
27	107.00		607		N	N	Y	N	Y	Y	A1	96				128	Y	
28	107.90		575		N	N	Y	N	Y	Y	A1	96				128	Y	
29	108.20		330		N	N	Y	N	Y	Y	A1	96				128	Y	
30	113.40		470		N	N	Y	N	Y	Y	A1	96				128	Y	
31	114.90		734		N	N	Y	N	Y	Y	A1	96				128	Y	
32	115.20		733		N	N	Y	N	Y		A1	96				128	Y	
				1335						Y		96	1690	-ve			Y	Residence offset 187m from centre line of beam
33	116.67	Millmerran Inglewood Rd	429		N	N	Y	N	Y	Y	A1	97				128	Y	Some shielding vegetation
34	116.70	Heckendorf Rd	488		N	N	Y	N	Y	Y	A1	97				128	Y	Shielded by topography and vegetation
35	118.90		370		N	N	Y	N	Y	Y	A1	96				128	Y	
36	120.15		1188		N	N	Y	N	Y		A1					128	Y	
				1781						Y		96	1690				Y	Residence offset 755m from centre line of beam
37	122.60		252		N	N	Y	N	Y	Y	A1	96				128	Y	
38	123.60	Scragg Rd	116		N	N	Y	N	Y		A1	96				128	Y	
				675						Y			1690	+ve			N	Residence offset 0m from centre line of beam
39	126.93	Millmerran Inglewood Rd		1065	N	N	Y	N	Y		A1	96	1690	+ve			Y	Residence offset 0m from centre line of beam - shielded by vegetation
			210							Y						128	Y	
40	127.09	Millmerran Inglewood Rd		1229	Y	N	Y	N	Y		A1	96	1690				Y	Residence offset 0m from centre line of beam but shielded by topography and vegetation
			436							Y						128	Y	
41	129.20		233		N	N	Y	N	Y	Y	A1	96				128	Y	
42	129.60	Owens Shrub Rd		960	N	N	Y	N	Y		A1	96	1690				N	Residence offset 20m from centre line of beam, surrounded by trees
			238							Y						128	Y	
43	131.70		266		N	N	Y	N	Y	Y	A1	96				128	Y	

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
44	132.20		1968		N	N	Y	N	Y	Y	A1	96				128	Y	
45	136.70		1154		N	N	Y	N	Y	Y	A1	96				128	Y	
46	139.00		165		N	N	Y	N	Y	Y	A1	96				128	Y	
47	141.90		613		N	N	Y	N	Y	Y	A1	96				128	Y	
48	145.60			1427	N	N	Y	N	Y		A1	96	1690				Y	Residence offset 337m from centre line of beam
			803							Y						128	Y	
49	146.20			2149	N	N	Y	N	Y		A1	96	1690				Y	
			963							Y						128	Y	
50	146.70		748		N	N	Y	N	Y	Y	A1	96				128	Y	
51	147.10		695		N	N	Y	N	Y	Y	A1	96				128	Y	
52	148.10	Pampas	62		N	N	Y	N	Y	Y	A2				19.2	40.6	Y	Significant tree screen
53	148.20		102		N	N	Y	N	Y	Y	A2				19.2	40.6	Y	
54	148.60		74		N	N	Y	N	Y	Y	A2				19.2	40.6	Y	
55	148.80		199		N	N	Y	N	Y		A1				60.7	128	Y	
				1098						Y		96	1690	-ve			N	Residence offset 0m from centre line of beam - some shielding trees
56	149.60		128		N	N	Y	N	Y	Y	A1	96				128	Y	
57	151.00		302		N	N	Y	N	Y		A1	96				128	Y	
				1350						Y			1690	+ve			N	Residence offset 0m from centre line of beam
58	151.60		120		N	N	Y	N	Y		A1	96				128	N	
			1135							Y			1690				Y	Residence offset 194m from centre line of beam
59	153.00	Ware St (86)	157		Y	Y	Y	N	Y		A1	96				128	Y	
				787						Y			1069		60.7	128	N	
60	153.20	Ware St (68)	160		Y	N	Y	N	Y	Y	A1				60.7	128	Y	Mostly unlit
61	153.40		156		Y	Y	Y	N	Y	Y	A2				19.2	40.6	Y	Only 3 road lights in Ware Street
62	153.52		128		Y	Y	Y	N	Y	Y	A2				19.2	40.6	Y	
63	153.63		124		Y	N	Y	N	Y		A1					128	N	
				721						Y		96	1690		60.7		N	Unlit roads
64	153.65	Ware St (32)	114		Y	Y	Y	N	Y	Y	A2				19.2	40.6	Y	Vegetation screen in front - single road light in front
65	153.90		109		Y	N	Y	N	Y	Y	A1				60.7	128	N	Unlit roads, vegetation screen in front
66	153.95		122		Y	N	Y	N	Y	Y	A1				60.7	128	N	Unlit roads, vegetation screen in front
67	161.80		243		N	N	Y	N	Y		A1	96				128	Y	
				1145						Y		96	1690	-ve		128	N	Residence offset 0m from centre line of beam
68	161.91		127		N	N	Y	N	Y		A1	96				128	Y	
				446						Y		96	1690	-ve		128	N	Residence offset 32m from centre line of beam
69	162.80			932	N	N	Y	N	Y		A1	96	1690	-ve			N	Residence offset 92m from centre line of beam
			346							Y		96				128	Y	
70	163.95		203		N	N	Y	N	Y	Y	A1	96				128	Y	

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
71	164.88			1083	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence offset 114m from centre line of beam - good tree belt shield, plus lee side of hill therefore OK
			134							Y		96					Y	
72	166.10		418		N	N	Y	N	Y	Y	A1	96				128	Y	Plus dense tree screening
73	166.66		249		N	N	Y	N	Y	Y	A1	96				128	Y	
74	166.70			716	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence 25m offset from centre of beam, screened by many trees plus may be on lee side of hill
			32							Y		96					N	Many screening trees
75	169.30			402	N	N	Y	N			A1	96	1690				N	Residence offset 30m from centre line of beam
			110									96					N	Many screening trees
76	169.42			490	N	N	Y	N	Y		A1	96					N	Residence offset 22m from centre line of beam - screening vegetation
			67							Y		96					N	Screening vegetation
77	169.63			755	N	N	Y	N	Y		A1	96	1690				N	Residence offset 85m from centre line of beam, plus screening vegetation
			242							Y		96					Y	
78	169.83		355		N	N	Y	N	Y		A1	96					Y	
				1128						Y		96	1690	+ve			N	Residence offset 119m from centre line of beam
79	170.95	Pittsworth		1122	N	N	Y	N	Y		A2	30.4	1690	-ve			Y	Residence offset 140m from centre line of beam - road lighting Gap Rd
		Hausiers Rd	560							Y		30.4					Y	
80	171.05	Hausiers Rd		1318	N	N	Y	N	Y		A2	30.4	1690	-ve			Y	Residence offset 113m from centre line of beam - road lighting Gap Rd
			677							Y		30.4					Y	
81	171.10	Hausiers Rd		1360	N	N	Y	N	Y		A2	30.4	1690	-ve			Y	Residence offset 72m from centre line of beam - screening trees - road lighting Gap Rd
			687							Y		30.4					Y	
82	171.15	Hausiers Rd		1423	N	N	Y	N	Y		A2	30.4	1690	-ve			Y	Residence offset 43m from centre line of beam - road lighting Gap Rd
			702							Y		30.4					Y	
83	171.18	Hausiers Rd		1448	N	N	Y	N	Y		A2	30.4	1690	-ve			Y	Residence offset 40m from centre line of beam - road lighting Gap Rd
			713							Y		30.4					Y	
84	171.25	Hausiers Rd		1467	Y	N	Y	N	Y		A1	96	1690	+ve			N	Residence offset 95m from centre line of beam - screening foliage
			584							Y		96					Y	
85	171.58	Hausiers Rd		1738	Y	N	Y	N	Y		A2	30.4	1690	+ve			Y	Residence offset 90m from centre line of beam - road lighting Gap Rd
			763							Y		30.4					Y	
86	171.88	Bowden St (24)		1732	Y	Y	Y	N	Y		A2	30.4	464	+ve			Y	Nil offset depending on point on curve
			654							Y			464				Y	

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
87	172.18	Ebony Cir (1)		1638	Y	Y	Y	N	Y		A2	30.4	464				Y	Local category P lighting - Nil offset depending on point on curve
			338							Y						40.6	Y	
88	172.63	Quibet Rd	46		N	N	Y	N	Y	Y	A1						N	This property would have to be removed for road works
89	172.81	Dallman Rd	184		Y	N	Y	N	Y		A1					128	Y	
				1197						Y		96	1690	+ve	60.7	128	N	Unless dimmed then distance reduces to 1069m
90	172.88	Stanley St (54-60)	142		Y	Y	Y	N	Y	Y	A2	30.4	464			40.6	N	Existing tree screening to Hwy A39
91	172.89		594		N	N	Y	N	Y		A1					128		
				1540						Y		96	1690	+ve			N	
92	172.90	Dallman Rd	9		Y	N	Y	N	Y	Y	A1	30.4	1690			128	N	Within the Project's permanent footprint
93	173.18		503		N	N	Y	N	Y		A1					128	Y	
				1345						Y		96	1690	+ve			N	
94	173.19		713		N	N	Y	N	Y		A1					128	Y	
				1554						Y		96	1690	+ve			N	
95	173.26		937		N	N	Y	N	Y		A1					128	Y	
				1770						Y		96	1690				Y	
96	173.57	Vines St	105		Y	N	Y	N	Y		A1				60.7	128	N	
				827						Y		96	1690	+ve			N	Some shielding vegetation
97	173.70	Lovedays Ln	309		N	N	Y	N	Y		A1					128	Y	
				1750						Y		96	1690	+ve			Y	
98	173.79		110		N	N	Y	N	Y		A1					128	Y	
				583						Y		96	1690	+ve			N	
99	173.85	Lochaber Rd	224		N	N	Y	N	Y		A1					128	Y	
				733						Y		96	1690	+ve			N	
100	173.85	McEwen Ln	521		N	N	Y	N	Y		A1					128	Y	
				1245						Y		96	1690	+ve			N	
101	102	103	713		N	N	Y	N	Y		A1					128	Y	
				1398						Y		96	1690	-ve			N	Surrounded by thick vegetation - 63m offset from main beam
102	173.90	Lochaber Rd	827		N	N	Y	N	Y		A1					128	Y	
				1450						Y		96	1690	-ve			N	Shielded by other farm buildings - 167m offset from main beam
103	175.05		300		N	N	Y	N	Y		A1					128	Y	
				1049						Y		96	1690	+ve			N	Residence offset 78m from centre line of beam - road lighting Gap Rd
104	176.71		65		N	N	Y	N	Y	Y	A1	96	1690			128	N	
105	176.40		208		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
106	177.46		373		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
107	177.70		454		N	N	Y	N	Y	Y	A1	96	1690			128	Y	

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
108	178.70		114		N	N	Y	N	Y		A1					128	N	
				1185						Y		96	1690	+ve			N	
109	179.16		137		N	N	Y	N	Y		A1					128	Y	
				424						Y		96	1690	-ve			N	Residence offset 84m from centre line of beam - some vegetation screening
110	179.55		301		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
111	179.85		229	582	N	N	Y	N	Y		A1	96	1690	-ve		128	Y	Residence offset 97m from centre line of beam - significant vegetation screening
				1401						Y		96	1690	-ve			Y	Residence offset 80m from centre line of beam - significant vegetation screening
112	179.97		376		N	N	Y	N	Y		A1					128	Y	
				1284						Y		96	1690	-ve			N	Residence offset 38m from centre line of beam - some vegetation screening
113	180.11		13		N	N	Y	N	Y	Y	A1	96	1690			128	N	Within the Project's permanent footprint
114	180.22		579		N	N	Y	N	Y		A1					128	Y	
				1112						Y		96	1690	-ve			Y	Residence offset 318m from centre line of beam - significant vegetation screening
115	180.36		292		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
116	180.80		0		N	N	Y	N	Y	Y	A2	96	1690			128	N	Within the Project's permanent footprint
117	182.23	Linthorpe Valley Rd (319)		873	Y	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 490m from centre line of beam
			680							Y						128	Y	
118	182.30	Linthorpe Valley Rd (159)		1183	Y	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 163m from centre line of beam
			338							Y						128	Y	
119	182.90			1658	N	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 434m from centre line of beam
			385							Y						128	Y	
120	184.13	Bushy Ln	87		Y	N	Y	N	Y		A1					128	N	
				314						Y		96	1690	-ve			N	Residence offset 46m from centre line of beam - some shielding by adjacent buildings and vegetation
121	184.47	Harelma Rd		185	Y	N	Y	N	Y		A1	96	1690	-ve			Y	Building offset 170m from centre line of beam - Street view shows no building even though in plan view
			192							Y						128	Y	
122	185.22	Biddeston Southbrook Rd (1145)	0		Y	N	Y	N	Y	Y	A1	96	1690			128	N	Track runs straight through house - house will have to be removed
123	185.63			1368	N	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 100m from centre line of beam
			327							Y						128	Y	
124	186.46		181		N	N	Y	N	Y	Y	A1	96	1690			128	Y	Significant vegetation screening
125	186.47		32		N	N	Y	N	Y	Y	A1	96	1690			128	N	Some vegetation screening - brightly lit fuel station truck stop 350m
126	187.77		267		N	N	Y	N	Y		A1					128	Y	
				1151						Y		96	1690	+ve			N	Residence offset 230m from centre line of beam - significant vegetation screening

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
127	188.73	Gore Hwy (48)		870	N	N	Y	N	Y		A1	96	1690	-ve			N	Residence offset 0m from centre line of beam - good vegetation screening
			304							Y						128	Y	
128	189.16	Athol School Rd (45)		1429	N	N	Y	N	Y		A1	96	1690	+ve			Y	Residence offset 178m from centre line of beam - some vegetation screening
			537							Y						128	Y	
129	189.22			733	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence offset 0m from centre line of beam - significant vegetation screening
			177							Y						128	Y	
130	189.27	Athol School Rd (73)		975	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence offset 0m from centre line of beam
			278							Y						128	Y	
131	189.27	Athol School Rd (117)	214		Y	N	Y	N	Y		A1					128	Y	
				239						Y		96	1690	-ve			Y	Residence offset 203m from centre line of beam
132	190.58	Athol School Rd (256)		1378	Y	N	Y	N	Y		A1	96	1690				Y	Residence offset 0m from centre line of beam - significant vegetation screening
			290							Y						128	Y	
133	190.85			1641	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence offset 88m from centre line of beam
			251							Y						128	Y	
134	193.20		412		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
135	197.53	Toowoomba Cecil Plains Rd	900		Y	N	Y	N	Y		A1					128	Y	
				1451						Y		96	1690				Y	Residence offset 264m from centre line of beam
136	190.85		393		N	N	Y	N	Y		A1					128	Y	
				971						Y		96	1690	-ve			N	Residence offset 18m from centre line of beam
137	197.70		229		N	N	Y	N	Y		A1					128	Y	
				764						Y		96	1690	+ve			N	Residence offset 0m from centre line of beam
138	197.76		366		N	N	Y	N	Y		A1					128	Y	
				1282						Y		96	1690	+ve			N	Residence offset 0m from centre line of beam
139	199.88	Brimblecombe Rd (522)		647	Y	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 278m from centre line of beam
			433							Y						128	Y	
140	200.45			1479	N	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 267m from centre line of beam
			834							Y						128	Y	
141	200.55			1490	N	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 240m from centre line of beam
			829							Y						128	Y	
142	200.57		107		N	N	Y	N	Y	Y	A1	96	1690	+ve		128	N	Residence shielded by vegetation
143	201.57		183		N	N	Y	N	Y	Y	A1	96	1690	+ve		128	Y	
144	202.23		263		N	N	Y	N	Y	Y	A1	96	1690	+ve		128	Y	
145	203.39		227		N	N	Y	N	Y		A1					128	Y	
				720						Y		96	1690	-ve			Y	Residence offset 53m from centre line of beam
146	203.57		254		N	N	Y	N	Y		A1					128	Y	
				571						Y		96	1690	-ve			Y	Residence offset 138m from centre line of beam

Loc. No.	Track Loc. (Chainage km)	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
147	204.29	Warrego Hwy (11169)		604	Y	N	Y	N	Y		A1	96	1690	-ve			Y	Residence offset 139m from centre line of beam
			269							Y						128	Y	
148	205.00		880		N	N	Y	N	Y		A1					128	Y	
				1813						Y		96	1690	-ve			Y	
149	205.12		128		N	N	Y	N	Y	Y	A1	96	1690			128	Y	
150	207.67		70		N	N	Y	N	Y	Y	A2	96	1690			128	N	
151	207.74	Leesons Rd (246)	162		N	N	Y	N	Y	Y	A3	96	1690			128	Y	

Table A2 **Locations assessed for compliance/non-compliance**

Table notes:

^ The following notes apply to the technical non-compliances identified:

	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Also, in the direction of travel, that is the maximum possible and with the direction of travel the light sweeps away from that location as the train negotiates a track curvature.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Also, in the direction of travel, that is the maximum possible, however, with the direction of travel the light sweeps towards that location as the train negotiates a track curvature, prolonging the transient period of exposure.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be. Due to the distance from the peak beam intensity and with the direction of travel the light sweeps away from that location as the train negotiates a track curvature, it is much less likely to be a technical non-compliance.
	Does not technically comply with the curfew period limit applicable for the environmental classification ignoring how brief the transient exposure may be and any adjacent building(s) or density of adjacent vegetation screening. Based on a desktop study it is not possible to determine if there are any habitable rooms, that is rooms occupied for prolonged periods of time such as loungerooms, bedrooms or a study that may be directly affected and that adjacent building(s), topography or screening vegetation are highly likely to reduce any effects below the Australian Standard requirements.

Loc. No.	Track Loc.km	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
1	6.18	Yelarbon Kurumbul Rd	70		N	N	Y	Y	Y	Y	A1	96	1690		19.2	128	N	Headlight should be dimmed
3	9.10	Yelarbon Kurumbul Rd	85		N	N	Y	N	Y		A1					128	N	Currently no vegetation in the vicinity of the dwelling shown
										Y		96	1690					
				1000						Y		96	1690	+ve			N	Residence 260m offset from main beam
5	15.30		46		N	N	Y	N	Y	Y	A1	96	1690			128	N	Ressmerino - trees surround residence
6	19.50		127		N	N	Y	N	Y	Y	A1	96				128	N	Some trees in vicinity
8	26.20	Railway Pde (14)		81	Y	N	Y	Y	Y		A2			-ve	19.2	40.6	N	Turning into loop 10m offset from centre of beam - significant vegetation
			15														N	
10	26.33	Railway Pde (22)		193	Y	N	Y	Y	Y		A2			+ve	19.2	40.6	N	Turning into loop - 0m offset from main beam
			16													40.6	N	
13	46.00		1148		N	N	Y	N	Y		A1		1690				N	Significant screening vegetation therefore OK
23	100.10		174	1041	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Significant screening vegetation therefore OK
38	123.60	Scragg Rd	117	675	N	N	Y	N		Y	A1		1690	+ve		128	N	Residence offset 0m from centre line of beam
42	129.60	Owens Shrub Rd	238	960	N	N	Y	N	Y		A1	96	1690			128	N	Residence offset 20m from centre line of beam, surrounded by trees
55	148.80		199	1098	N	N	Y	N		Y	A1	96	1690	-ve	60.7	128	N	Residence offset 0m from centre line of beam - some shielding trees
57	151.00		302	1350	N	N	Y	N		Y	A1	96	1690	+ve		128	N	Residence offset 0m from centre line of beam
58	151.60		120	1135	N	N	Y	N	Y		A1	96	1690			128	N	
59	153.00	Ware St (86)	158	787	Y	Y	Y	N		Y	A1	96	1069		60.7	128	N	
63	153.63		124		Y	N	Y	N	Y		A1					128	N	
				721						Y		96	1690		60.7		N	Unlit roads
65	153.90		109		Y	N	Y	N	Y	Y	A1				60.7	128	N	Unlit roads, vegetation screen in front
66	153.95		122		Y	N	Y	N	Y	Y	A1				60.7	128	N	Unlit roads, vegetation screen in front
67	161.80		243	1145	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Residence offset 0m from centre line of beam
68	161.91		127	446	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Residence offset 32m from centre line of beam
69	162.80		346	932	N	N	Y	N	Y		A1	96	1690	-ve		128	N	Residence offset 92m from centre line of beam
71	164.88			1083	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence offset 114m from centre line of beam - good tree belt shield, plus lee side of hill therefore OK

Loc. No.	Track Loc.km	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
74	166.70			716	N	N	Y	N	Y		A1	96	1690	+ve			N	Residence 25m offset from centre of beam, screened by many trees plus may be on lee side of hill
			32							Y		96				128	N	Many screening trees
75	169.30			402	N	N	Y	N			A1	96	1690				N	Residence offset 30m from centre line of beam
			110									96				128	N	Many screening trees
76	169.42			490	N	N	Y	N	Y		A1	96				128	N	Residence offset 22m from centre line of beam - screening vegetation
			67							Y		96				128	N	Screening vegetation
77	169.63		242	755	N	N	Y	N	Y		A1	96	1690			128	N	Residence offset 85m from centre line of beam, plus screening vegetation
78	169.83		355	1128	N	N	Y	N		Y	A1	96	1690	+ve		128	N	Residence offset 119m from centre line of beam
84	171.25	Hausiers Rd	584	1467	Y	N	Y	N	Y		A1	96	1690	+ve		128	N	Residence offset 95m from centre line of beam - screening foliage
88	172.63	Quibet Rd	46		N	N	Y	N	Y	Y	A1						N	This property would have to be removed for road works
89	172.81	Dallman Rd	185	1197	Y	N	Y	N		Y	A1	96	1690	+ve	60.7	128	N	Unless dimmed then distance reduces to 1069m
90	172.88	Stanley St (54-60)	142		Y	Y	Y	N	Y	Y	A2	30.4	464			40.6	N	Existing tree screening to Hwy A39
91	172.89		594	1540	N	N	Y	N		Y	A1	96	1690	+ve		128	N	
92	172.90	Dallman Rd	9		Y	N	Y	N	Y	Y	A1	30.4	1690			128	N	Suspect something might happen to this property - it is too close
93	173.18		503	1345	N	N	Y	N		Y	A1	96	1690	+ve		128	N	
94	173.19		713	1554	N	N	Y	N		Y	A1	96	1690	+ve		128	N	
96	173.57	Vines St	105		Y	N	Y	N	Y		A1				60.7	128	N	
				827						Y		96	1690	+ve			N	Some shielding vegetation
98	173.79		110	583	N	N	Y	N		Y	A1	96	1690	+ve		128	N	
99	173.85	Lochaber Rd	225	733	N	N	Y	N		Y		96	1690	+ve		128	N	
100	173.85	McEwen Ln	522	1245	N	N	Y	N		Y	A1	96	1690	+ve		128	N	
101	173.86	Lochaber Rd	714	1398	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Surrounded by thick vegetation - 63m offset from main beam
102	173.90	Lochaber Rd	828	1450	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Shielded by other farm buildings - 167m offset from main beam
103	175.05		300	1049	N	N	Y	N		Y	A1	96	1690	+ve		128	N	Residence offset 78m from centre line of beam - road lighting Gap Rd
104	176.71		65		N	N	Y	N	Y	Y	A1	96	1690			128	N	
108	178.70		114		N	N	Y	N	Y		A1					128	N	
				1185						Y		96	1690	+ve			N	
109	179.16		137	424	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Residence offset 84m from centre line of beam - some vegetation screening
112	179.97		376	1284	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Residence offset 38m from centre line of beam - some vegetation screening
113	180.11		13		N	N	Y	N	Y	Y	A1	96	1690			128	N	Suspect something might happen to this property - it is too close
116	180.80		0		N	N	Y	N	Y	Y	A2	96	1690			128	N	Suspect something might happen to this property - it is too close

Loc. No.	Track Loc.km	Road/ town/ city	Offset distance (m) from track alignment to residence(s)	Distance (m) from tangent point	Google Earth street view	Road lighting	Main track	Loop track	Towards Gowrie	Towards Border	Environmental category	Headlight offset (m)	Headlight (track curvature)	Light beam rotation	Headlight offset dimmed (m)	Visibility lights offset (m)	Within limits (i.e. pass)^	Comments
120	184.13	Bushy Ln	87		Y	N	Y	N	Y		A1					128	N	
				314						Y		96	1690	-ve			N	Residence offset 46m from centre line of beam - some shielding by adjacent buildings and vegetation
122	185.22	Biddeston Southbrook Rd (1145)	0		Y	N	Y	N	Y	Y	A1	96	1690			128	N	Track runs straight through house - house will have to be removed
125	186.47		32		N	N	Y	N	Y	Y	A1	96	1690			128	N	Some vegetation screening - brightly lit fuel station truck stop 350m
126	187.77		267	1151	N	N	Y	N		Y	A1	96	1690	+ve		128	N	Residence offset 230m from centre line of beam - significant vegetation screening
127	188.73	Gore Hwy (48)	304	870	N	N	Y	N	Y		A1	96	1690	-ve		128	N	Residence offset 0m from centre line of beam - good vegetation screening
129	189.22		177	733	N	N	Y	N	Y		A1	96	1690	+ve		128	N	Residence offset 0m from centre line of beam - significant vegetation screening
130	189.27	Athol School Rd (73)	278	975	N	N	Y	N	Y		A1	96	1690	+ve		128	N	Residence offset 0m from centre line of beam
133	190.85		251	1641	N	N	Y	N	Y		A1	96	1690	+ve		128	N	Residence offset 88m from centre line of beam
136	190.85		393	971	N	N	Y	N		Y	A1	96	1690	-ve		128	N	Residence offset 18m from centre line of beam
137	197.70		229	764	N	N	Y	N		Y	A1	96	1690	+ve		128	N	Residence offset 0m from centre line of beam
138	197.76		366	1282	N	N	Y	N		Y	A1	96	1690	+ve		128	N	Residence offset 0m from centre line of beam
142	200.57		107		N	N	Y	N	Y	Y	A1	96	1690	+ve		128	N	Residence shielded by vegetation
150	207.67		70		N	N	Y	N	Y	Y	A2	96	1690			128	N	