

APPENDIX 2-1-V2.4

SOUTHERN CSM WATER SUPPLY PIPELINE ROUTE SELECTION REPORT

Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline

October, 2008

Wandoan Joint Venture



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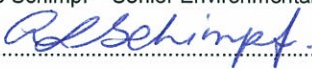
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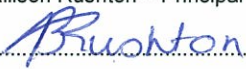
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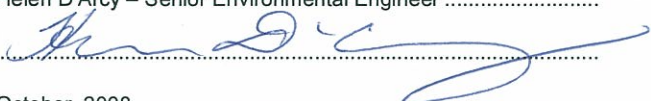
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Executive summary

Parsons Brinckerhoff (PB) has been commissioned by Wandoan Joint Venture (WJV) to undertake a route selection for a proposed southern water supply pipeline between the Condamine Power Station and the Wandoan Coal Project area, approximately 90 km to the north.

The Wandoan Coal Project proposes to develop thermal coal resources situated immediately west of the Wandoan township, located in the Dalby Regional Council area. The mining of the coal resources will be developed using a combination of truck, shovel, dozer and dragline mining equipment. Coal will be mined at a rate of around 30 million tonnes per annum (Mt/a) run of mine coal and may be increased to 40 Mt/a in the future. The coal will be crushed, sized and washed before being transported by rail to the Port of Gladstone.

The Wandoan Coal Project will include on-site coal handling and processing which will require a constant and reliable water supply. It is anticipated that water requirements at the Wandoan Coal Project will be approximately 9,100 ML/a (with potential expansion to 11,400 ML/a if mine production is increased to 40 Mt/a). It is envisaged that the Berwyndale South coal seam methane (CSM) fields, which are located to the south of Columboola, will supply gas and CSM water to the Condamine Power Station. Therefore, to avoid duplication of pipeline infrastructure from the Berwyndale CSM field, it is proposed to source CSM water from the point at which it is delivered for use at the Condamine Power Station.

The purpose of this report is to investigate potential route alignment options for the southern water supply pipeline and specifically to:

- assess potential pipeline route options in the study area based on a selection of identified regulatory, planning, environmental, social and economic criteria
- comparatively assess and analyse the alternative route options
- utilising agreed assessment criteria, identify the preferred pipeline route alignment for further detailed studies in the forthcoming environmental impact assessment.

Investigations of potential pipeline route options involved a review of available desktop information, data sources and also observations made during a field reconnaissance. Potential pipeline route options were assessed by considering a range of issues or selection criteria that could be interpreted from this information. Selection criteria were categorised as regulatory, planning, environmental and social criteria. Each selection criterion was then reviewed to determine whether it would add value to the assessment of corridor options. Where selection criteria would not add value to the assessment process they were not included in the comparative assessment of options.

Four potential pipeline route alignments were identified through desktop assessment and field reconnaissance, to which the identified selection criteria were applied and a comparative assessment undertaken. Additionally, alternative options for the section of the proposed pipeline between the townships of Miles and Gurulmundi have been investigated. These options include alignment within the Leichhardt Highway road reserve and alignment along the existing Miles to Wandoan rail line. The identified selection criteria were applied to these alternatives and a comparative assessment also undertaken.

The comparative assessment of options clearly indicates that of all the options considered, Option 1 is preferred for the majority of performance criteria examined. However, the alignment of Option 1 passes directly through the township of Miles and, for the purposes of this report, potential impacts of this alignment, such as interference with existing community infrastructure (e.g. local roads, property accesses, electricity distribution infrastructure, water reticulation infrastructure etc) within the township of Miles is considered prohibitive. Therefore, for this reason, Option 1 is not considered to be the overall preferred option.

Similarly, Options 2A and 3 are also not preferred alignments for the CSM water supply pipeline from Condamine Power Station. The comparative assessment of the options indicates that Option 2A is the least preferred option with regard to potential impact on the number of properties affected, the amount of good quality agricultural land traversed and the least potential for co-location of infrastructure. Option 3 has the greatest potential impact on mapped regional ecosystems and is also the mostly costly pipeline option.

Option 2 is supported as the preferred option for the CSM water supply pipeline. With regard to mapped regional ecosystems, Option 2 potentially impacts on lesser areas of 'endangered – dominant' and 'of concern – dominant' than Option 1 and also has potential to impact a similar total area of mapped regional ecosystems when compared with Option 1. With regard to the other assessment criteria considered, Option 2 performs well and negatively affects the least number of performance measures. Option 2 has good potential for co-location of infrastructure with local and State roads as well as existing transmission line easements and traverses a moderate area of good quality agricultural land. It is considered that Option 2 is the pipeline option which achieves the most balance overall and across all of the comparative assessment criteria. However, it should be noted that Option 2 is recommended as the preferred option subject to:

- discussions with infrastructure providers (such as the Department of Main Roads, Queensland Rail, local councils, gas producers, electricity providers, and other easement holding parties)
- discussions and negotiations with landowners potentially affected by the proposed Project
- discussions and agreements associated with indigenous cultural heritage groups
- clarification of any associated Native Title issues.

1. Introduction

As part of the assessment of the Wandoan Coal Project on behalf of Wandoan Joint Venture (WJV) Parsons Brinckerhoff (PB) has been commissioned to undertake a route selection for the proposed southern water supply pipeline (the Project) between the Wandoan Coal Project area and the Condamine Power Station located approximately 90 km to the south-east. The Project locality is shown in Figure 1-1. The proposed southern water supply pipeline forms one of three main potential raw water supply options which are being considered for the Wandoan Coal Project. The other two potential raw water supply options will be investigated and reported in separate documents.

1.1 Background

1.1.1 Project description and need

The Wandoan Coal Project proposes to develop thermal coal resources situated immediately west of the Wandoan township, located in Dalby Regional Council. The Wandoan Coal Project site is located approximately 350 km north-west of Brisbane and 60 km south of Taroom as shown in Figure 1-1. The coal reserves for the Wandoan Coal Project exist within the area of three mining lease applications, MLA 50229, 50230 and 50231 and will be developed as an open cut mine and related local infrastructure. The Wandoan Coal Project covers an area of approximately 32,000 ha.

The mining of the coal resources will be developed using a combination of truck, shovel, dozer and dragline mining equipment. Coal will be mined at a rate of around 30 million tonnes per annum (Mt/a) run of mine (ROM) coal, with the potential for future expansion to 40 Mt/a. The coal will be crushed, sized and washed before being transported by rail to the Port of Gladstone.

The Wandoan Coal Project will include on-site coal handling and processing which will require a constant and reliable water supply. It is anticipated that water requirements at the Wandoan Coal Project will be approximately 9,100 ML/a (with potential expansion to 11,400 ML/a if mine production is increased to 40 Mt/a). A potential water resource to satisfy this demand has been identified as coal seam methane (CSM) water from the Berwyndale South CSM extraction fields.

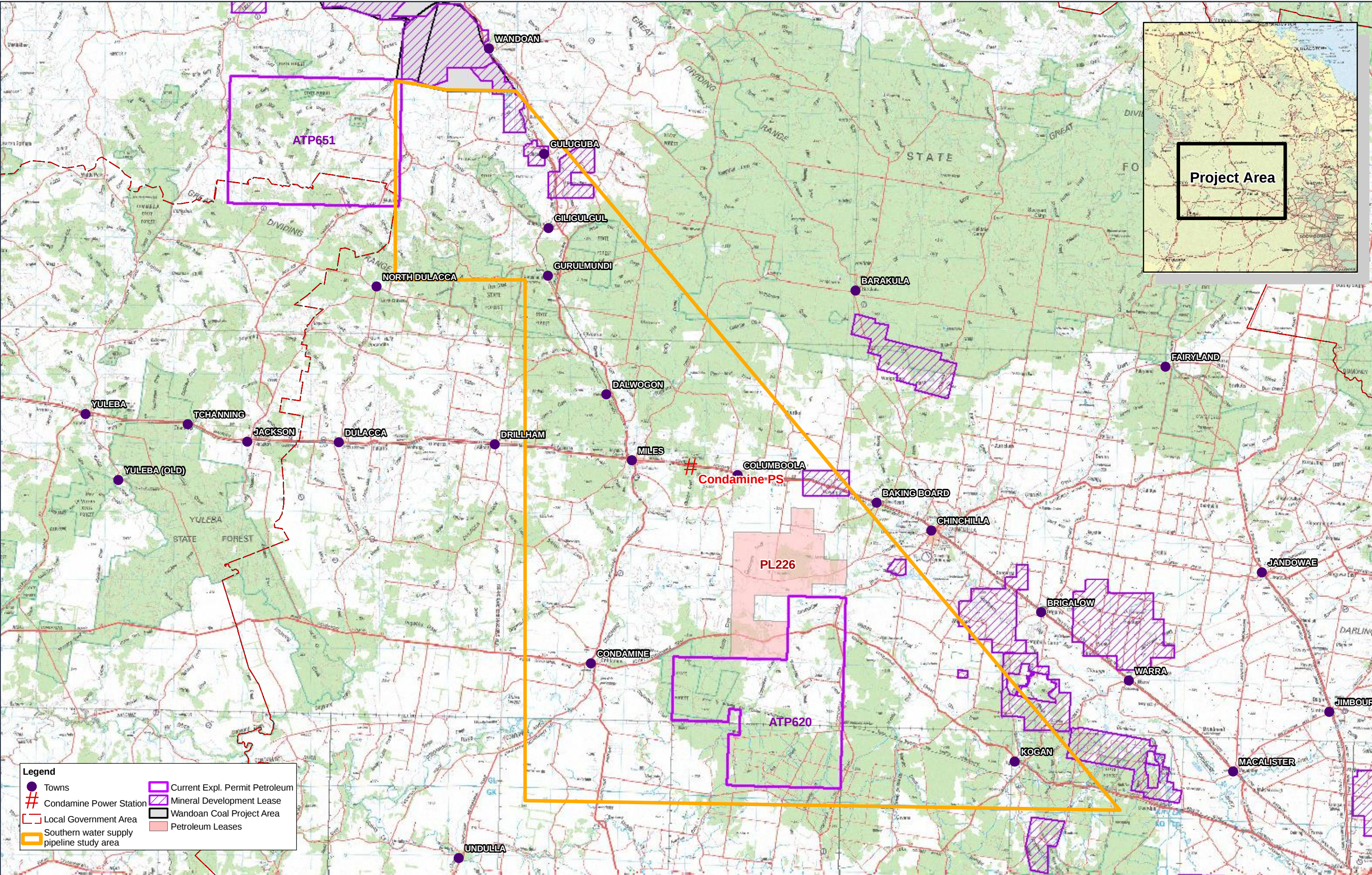
Coal seam gas development, such as that which occurs at the Berwyndale South fields, involves extraction of methane from coal seams by reducing ground water pressure that keeps the methane adsorbed to the coal. Water is the primary by-product of coal seam gas development and this water is often rich in salts and other constituents that render it unsuitable for many direct beneficial uses. The poor quality of the produced water makes the management of this water one of the major concerns associated with coal seam gas development.

However, in order to beneficially re-use coal seam gas wastewater and secure a water supply for the Wandoan Coal Project, it is proposed to establish the southern water supply pipeline and pipe the water from the point at which it is delivered for use at the Condamine Power Station to the Wandoan Coal Project site. Current discussions indicate that full or

partial treatment of the CSM water to a standard suitable for use in coal handling and processing will be undertaken prior to the water leaving the Berwyndale South CSM field.

Initial design concepts indicate that the pipeline will be between approximately 90 km and 110 km in length and will require a lift pump station at the Condamine Power Station point of supply. The pump is expected to operate for 20 hours per day. Additionally, a header tank may be required at a high point between the townships of Gurulmundi and Giligulgul in order to allow for gravity feed to the end point at the Wandoan Coal Project site. A number of pipe diameter sizes and construction materials have been investigated for cost and constructability. The pipeline will generally be located underground, constructed using a section trench and backfill method.

A study area, roughly between the Wandoan Coal Project site, the township of Kogan in the south-east and the township of Condamine in the south-west has been identified (refer Figure 1-1) and preliminary pipeline route alignments have been investigated. A referral to the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA), to determine if the proposed pipeline is a 'controlled action' pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* has been undertaken on this study area as part of the Wandoan Coal Project.



1.2 Purpose of this report

The purpose of this report is to investigate potential route alignment options for the southern water supply pipeline and specifically to:

- assess potential pipeline route options in the study area based on key selection criteria including identified regulatory, planning, environmental, social and economic criteria
- comparatively assess and analyse the alternative route options
- identify the preferred pipeline route alignment for further detailed studies based on agreed assessment criteria.

The assessment aims to identify sensitive areas and recommend a preferred pipeline alignment for further detailed assessment through the Wandoan Coal Project environmental impact assessment. This report details one of two CSM water supply pipeline route selection reports prepared for the Wandoan Coal Project.

1.3 Route assessment methodology

Investigations of potential pipeline route options involved a review of available desktop information, data sources and also observations made during a preliminary field reconnaissance. Potential pipeline route options were assessed by considering a range of issues that could be interpreted from this information.

Route options were initially assessed through preliminary desktop investigations and a field reconnaissance was later conducted to ground-truth desktop information. In order to assess the potential environmental, planning and social constraints associated with these routes, a range of selection criteria were identified. These selection criteria covered all relevant issues that are specific to the Project and also regularly addressed in environmental assessments of pipeline routes.

Potential selection criteria were categorised as regulatory, planning, environmental, social and economic criteria. Each selection criterion was then reviewed to determine whether it would add value to, or provide differentiation in the assessment of corridor options. Where selection criteria would not add value to the assessment process they were not included in the comparative assessment of options. This occurred in cases where:

- there was little or no variation in the selection criterion across the study area, making differentiation between the merits of route options difficult to assess or negligible
- paucity of available information made differentiation between the merits of the different corridor options too difficult to assess without undertaking significant additional studies.

Where it was determined that selection criteria were relevant (either due to relevance to the study area or variation between the route options), performance measures were identified to measure the criteria. Consideration was also given to the balance between selection criteria to ensure that no single criterion received a higher priority than others. As a result, some performance measures provide a measure for more than one criterion. For example, the performance measure 'number of properties affected' provides an assessment for a number of criteria including visual impacts, social receptors and potential construction phase noise

and air quality impacts or nuisance issues. The selection criteria that were chosen for the initial assessment were given an equal weighting. This method is used to avoid creating subjective criteria.

The evaluation of route options was carried out using a comparative assessment approach where each criterion was compared for each route option. A ranking system has been used to provide a comparative measure of how each option meets the relative performance measures. A ranking of 1 indicates the least impact, while 5 represents the greatest impact. The option with the lowest numbers identifies the route with the least impact and highest compliance with performance measures (and therefore criterion). However, a straight numerical comparison of criteria of this sort is considered potentially misleading. To overcome this, judgement was used to differentiate between options, and a reason for the choice is provided.

1.4 Regulatory framework

The design, construction and development approval process for the proposed southern water supply pipeline project will trigger requirements and/or need with regard to Commonwealth, State and local government policies and legislation. These policies and legislation will require a number of approvals, licences and permits to be obtained by the proponent prior to and during the development of the Project. This section of the report summarises the relevant legislation and associated approvals, licences and permits for the Project.

1.4.1 Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects matters of national environmental significance which include: World Heritage areas/places, Ramsar wetlands, listed threatened species and communities, listed migratory species, nuclear actions and the Commonwealth marine environment.

Where a project or action is believed to potentially cause a significant impact on a matter of national environmental significance it is to be referred to the DEWHA for its assessment as to whether Commonwealth approval is required for the proposed action. Where an action requires Commonwealth approval a formal assessment process is undertaken in accordance with provisions of relevant legislation.

A search of the study area using the DEWHA online Protected Matters Search Tool was undertaken on 9 May 2008 and

Table 1-1 summarises the search results with regard to presence of Matters of National Environmental Significance potentially present within the study area.

Table 1-1: Online protected matter search tool results for the study area

World Heritage areas/places

Nil recorded within the study area

National Heritage places

Nil recorded within the study area

Wetlands of international significance

Nil recorded directly within the study area. However, Shoalwater and Corio Bays Area is located off-shore although in same catchment area. Additionally, the Narran Lake Nature Reserve is located in the north-west of New South Wales although not in the same catchment area

Commonwealth marine areas

Nil recorded within the study area

Threatened ecological communities

Community of brigalow (*Acacia harpophylla* dominant and co-dominant) is known to occur within the study area. This community has a conservation status of 'endangered'

Community of semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar regions is likely to occur within the study area. This community has a conservation status of 'endangered'

Community of white box-yellow box-Blakely's red gum grassy woodland and derived native grassland may occur within the study area. This community has a conservation status of 'critically endangered'

Threatened species

Six threatened bird species may or are likely to have habitat occur within the study area

Two mammal species may have habitat occur within the study area

Six reptile species may or are likely to have habitat occur within the study area

Eighteen plant species are known, may or are likely to have habitat occur within the study area

Migratory species

Four migratory terrestrial species may or are likely to have habitat occur within the study area

Five migratory wetland bird species may have habitat occur within the study area

Three migratory marine bird species may have habitat occur within the study area

Nuclear actions

The Project does not involve nuclear actions, neither do any occur within the study area

A referral to the DEWHA, to determine whether or not the Project is a 'controlled action' pursuant to the EPBC Act has been undertaken on this study area as part of the Wandoan Coal Project. The Department has advised that the Project constitutes a 'controlled' action and therefore, approval pursuant to the EPBC Act will be required.

Heritage legislation

Indigenous and non-indigenous cultural heritage is protected by Commonwealth legislation in the form of the *Australian Heritage Council Act 2003*. The regime under this Act has created the National Heritage List and Commonwealth Heritage List. The listing of a place on the National Heritage List is defined as a matter of national environmental significance under the EPBC Act. Other associated Acts include:

- *Environment and Heritage Legislation Amendment Act (No. 1) 2003*
- *Australian Heritage Council (Consequential and Transitional Provisions) Act 2003.*

Categories of places, sites and precincts that may be included on the National Heritage List or Commonwealth Heritage List include the historic environment (the built environment), modified landscapes and archaeological sites. The records of the Australian Heritage Council also include the natural environment and the indigenous environment (archaeological sites, and features of the natural landscape that are culturally significant).

A review of the Australian Heritage Database identified that the proposal is in proximity to the following places:

- Barakula State Forest Area, approximately 30 km north-east of Miles (indicative place)
- three indigenous places located in vicinity of Kogan (registered place)
- Waaje Area, approximately 30 km east of Wandoan, within State Forest 302 (indicative place)
- Boonarga Cactoblastis Memorial Hall, Warrego Highway, Boonarga, 11 km south-east of Chinchilla (registered place)
- Chinchilla Sands Local Fossil Fauna Site, Warrego Highway approximately 3 km south-east of Chinchilla (registered place).

However, no items or places of heritage significance are located along or immediately adjacent to the proposed pipeline route options or within the study area.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

Indigenous cultural heritage is also protected by Commonwealth legislation in the form of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*. This Act provides for interim and final orders to be made protecting Aboriginal Cultural Heritage, including tangible and intangible items. Any Aboriginal or Torres Strait Islander person or organisation may apply to the Minister for a temporary or permanent 'Stop Order' for protection of threatened areas or objects of significant indigenous cultural heritage. The Commonwealth Act overrides state legislation if the Commonwealth Minister is of the opinion that the state legislation (or undertaken process) is insufficient to protect the threatened areas or objects. In the event that an application is made to the Commonwealth Minister for a Stop Order, the Commonwealth Minister will, as a matter of course, contact the Queensland Environmental Protection Agency (EPA) to ascertain what protection is being imposed by the state and/or what mitigation procedures have been proposed by the land user/developer. No specific action is required by the development proponent in this instance.

Native Title Act 1993

The *Native Title Act 1993* recognises Native Title rights and allows ways in which to validate or legitimise past or intermediate acts, such as leases. The registered native title claimants for the study area are the Iman (#2) and Barunggam People with the associated active Native Title Claims QC 97/55 and QC 99/5 respectively. Where required, Xstrata will undertake any necessary action regarding Native Title Claims and the proposed pipeline.

1.4.2 State legislation

Integrated Planning Act 1997

The *Integrated Planning Act 1997* (IPA) governs development in Queensland. The Act applies to development approval (material change of use, reconfiguration of a lot, or operational, building, plumbing or drainage works) outside the scope of the *Mineral Resources Act 1989*. As such, the IPA does not apply to mining activities authorised by the *Mineral Resources Act 1989* and carried out on a relevant mining tenement.

However, with specific regard to the proposed southern water supply pipeline, the holder of a petroleum tenure (i.e. QCG and Origin) is permitted to carry out reasonably necessary, ancillary or authorised activities, including works associated with water pipelines. The lease holder is issued with a specific authority to construct a water pipeline on the lease. The pipeline may only extend beyond the lease where an adjacent petroleum lease is owned by the same holder.

Where the water pipeline lies outside the petroleum lease is proposed to on-supply associated water via a pipeline for any other purpose not authorised under the *Petroleum and Gas (Production and Safety) Act 2004* (PG Act), a development approval is required for the pipeline and associated infrastructure under the IPA.

All development is assumed to be exempt development under the IPA unless otherwise declared self-assessable or assessable development through either Schedule 8 of the IPA or the relevant local government planning scheme. Section 2.3.3 of this report details the level of assessment for the proposed pipeline as outlined under the:

- Planning Scheme for Taroom Shire 2006 (Taroom Planning Scheme)
- Planning Scheme for Murilla Shire 2006 (Murilla Planning Scheme).

The proposed water supply pipeline project would be exempt development under the Taroom and Murilla Planning Schemes. Exempt development does not require a development application and there are no codes or standards which apply to the proposal.

Petroleum and Gas (Production and Safety) Act 2004

The *Petroleum and Gas (Production and Safety) Act 2004* (PG Act) provides regulation for petroleum exploration, extraction and pipeline licensing. This Act is administered by the Department of Natural Resources and Water (DNRW).

The EPA's *Operational policy for management of water produced in association with petroleum activities (associated water) 2007* details that under the PG Act, associated water is defined as underground water that is taken or interfered with, if the taking or interference occurs during the course of, or results from, the carrying out of another authorised activity for the tenure.

The following provides a summary of the currently legislative position in relation to CSM water use:

- under the PG Act, the petroleum licence (PL) holder has the right to extract associated water providing the extraction happens during the course of or results from the carrying out of an authorised activity for the tenure
- the PL holder can use the associated water for activities carried on under the PL

- the PL holder can apply for a water licence to on-supply associated water for all other purposes not expressly authorised under the PG Act
- the PL holder has a "make good" obligation if its extraction of associated water adversely impacts on landowner's ability to extract water from the same aquifer
- once a water licence is granted, the PL holder can on-supply the water but must not charge a fee unless the PL holder is also registered as a water service provider under the *Water Act 2000*.

Mineral Resources Act 1989

The *Mineral Resources Act 1989* (MR Act) provides for the assessment, development and utilisation of mineral resources to the maximum extent practicable consistent with sound economic and land use management. The principal objectives of the MR Act are to encourage and facilitate mining of minerals and encourage environmental responsibility in mining, including responsible land care management.

Schedule 9, Table 5 of the IPA states that development authorised under the MR Act is exempt development under the IPA (i.e. all on mine lease activities).

Therefore, if a water treatment plant (WTP) for treatment of CSM water were to be constructed on the Wandoan mine lease area, it would be exempt development, and not require a development approval under IPA. The WTP would be approved through the environmental authority.

Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides the key legislative framework for environmental management and protection in Queensland. The Act was introduced to protect Queensland's environment while allowing for economic development, consistent with the principles of ecologically sustainable development.

The EPA released the *Operational Policy for the Management of water produced in association with petroleum activities (associated water)* in March 2007.

Section 13 of the EP Act defines waste as '*anything that is left over, or an unwanted product*'. Management of CSM water (considered as waste) was addressed by activity specific conditions on the environmental authority issued for the petroleum activities. Disposal, transport, storage treatment, recycling or reprocessing are listed as Level 1 Environmental Relevant Activity (ERAs 75,81,83,84 and 85).

If the associated water is approved for a beneficial use and the receiver, re-user or recycler has given the environmental authority holder (the producer) written agreement that they can comply with the conditions of the notice of decision to approve a resource for beneficial use (the Notice), there is no requirement for an application for development approval or resignation certificate for regulated waste transport, storage, treatment, recycling or reprocessing, or disposal.

The EP Act further provides for 'general environmental duty' (Section 319) which stipulates that:

A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm.

Additionally, Section 320 of this Act requires that a person must notify the administering authority (the EPA) if they become aware that serious or material environmental harm is caused or threatened by conducting an activity. Failing to notify environmental harm in accordance with the provisions of the Act may lead to a penalty or prosecution by the administering authority.

Environmental Protection Regulation 1998

Pursuant to the Environmental Protection Regulation 1998, activities that will, or have the potential to, release contaminants into the environment and which may cause environmental harm are defined as Environmentally Relevant Activities (ERAs). ERAs are assessable development under the IPA and require development approval.

Where the proposed southern water supply pipeline is proposed to be constructed through or under a watercourse and this requires removal of material from the bed and banks of the watercourse, it is likely that ERA 19 — Dredging will be triggered and an approval to undertake these works will be required from the Environmental Protection Agency (EPA). The trigger for requirement of ERA 19 is the design capacity of the plant or equipment as opposed to the amount of fill/material that is extracted. Further, it is anticipated that all materials will be pre-fabricated and that no actual product manufacture (e.g. concrete batching) will occur along the proposed pipeline route. In this case, it is not anticipated that the proposed water supply pipeline will trigger any other ERAs. However, if it were found that as the project progresses an ERA is required, it would be necessary to submit a development application.

Environmental Protection (Water) Policy 1997

The Environmental Protection (Water) Policy (EPP (Water)) is a policy under the *Environmental Protection Act 1994*. The policy defines and protects environmental values of Queensland waterways.

Under Section 32 of the EPP (Water) it is an offence to allow sand, silt or mud to accumulate in a waterway or where it could wash into a waterway unless it is permitted by an Environmental Authority. A number of waterways which will have to be crossed by the pipeline exist within the study area and therefore, appropriate management strategies will need to be implemented in order to ensure compliance with the provisions of the EPP (Water).

Environmental Protection (Air) Policy 1997

The purpose of the Environmental Protection (Air) Policy 1997 is to achieve the objectives of the *Environmental Protection Act 1994* with regard to Queensland's air environment. The policy provides a framework for:

- identifying air quality values to be enhanced or protected
- specifying air quality indicators and goals to protect the environmental values
- providing processes which manage the air environment and involve the community in achieving air quality goals that best protect Queensland's air environment.

Potential impacts to local air quality may be associated with construction of the western water supply pipeline, such as dust and construction machinery emissions. Management and mitigation strategies may require implementation however, this will be further investigated and reported as part of the environmental impact statement (EIS) for the Project.

Environmental Protection (Noise) Policy 1997

The purpose of the Environmental Protection (Noise) Policy 1997 is to achieve the objectives of the *Environmental Protection Act 1994* in relation to Queensland's acoustic environment. The policy provides a framework for:

- identifying the acoustic (including vibration) values to be enhanced or protected
- specifying the Project's acoustic quality objective
- providing processes to protect Queensland's acoustic environment such as dispute resolution and facilitating the development of noise management programs.

Potential impacts to acoustic quality may be associated with construction of the southern water supply pipeline and also pump station operation, dependent on design. Management and mitigation strategies may require implementation however, this will be further investigated and reported as part of the EIS for the Project.

Environmental Protection (Waste Management) Regulation 2000

The purpose of the Environmental Protection (Waste Management) Regulation 2000 is to provide a strategic framework for managing wastes in Queensland. It does this by establishing a preferred waste management hierarchy and various principles as the basis for waste management.

The waste hierarchy moves from the most preferred alternative, waste avoidance, through re-use, recycling, and energy recovery, to waste disposal, the least preferred. Wastewaters produced as a result of the CSM extraction process may be considered as 'regulated waste' depending on the quality of the waste water produced.

The EPA has produced the 'Operational policy for management of water produced in association with petroleum activities (associated water)'. The aim of this Operational Policy is to promote beneficial use of associated water from petroleum activities in Queensland in accordance with the waste management hierarchy in the Environmental Protection (Waste Management) Regulation 2000 and minimisation of environmental harm. To facilitate the beneficial use of associated water, the EPA has decided to grant a general approval under Section 66F of the Environmental Protection (Waste Management) Regulation 2000 for the use of associated water of certain types, for stated purposes. The approval and general conditions of approval are contained in the 'Notice of decision to approve a resource for beneficial use' which is appended to the Operational Policy. If the associated water complies with the conditions of the General Notice, it is not classified as a waste and can be reused in accordance with the conditions in the General Notice.

Preliminary discussions indicate that depending on water quality, associated waters may first be treated at the Berwyndale South coal seam gas wells prior to being piped to the Condamine Power Station and then onto the Wandoan Coal Project area. This method of beneficial use is considered a 'Treated Use' under the Operational Policy and generally includes treatment of associated water by desalination (including reverse osmosis, ion

exchange, capacitive desalination or deionisation, electrodialysis reversal, freeze/thaw technology or distillation), sterilisation and/or filtration. This form of treatment will also necessarily include the storage of water in dams prior to treatment and the disposal of hyper-saline waste waters.

Water Act 2000

The purpose of the *Water Act 2000* is to provide for the sustainable management of water and other resources. Under Section 266 of the *Water Act 2000*, a Riverine Protection Permit is required from the DNRW to:

- destroy vegetation in a watercourse
- excavate in a watercourse
- place fill in a watercourse.

The proposed pipeline route options traverse a number of watercourses including small creeks and large rivers and therefore, it is likely that approvals will be required under the *Water Act 2000* for pipeline crossings of watercourses. The number of waterway crossings may also have implications for the Project in terms of project approvals timeframes and project costs. Therefore, the number of waterways crossed by a pipeline route option is considered to be an important determining criterion and is further considered in the comparative analysis of options.

Additionally, where waters are to be taken from a watercourse, lake, spring or underground water, e.g. for use in dust suppression during construction works, a permit may be required pursuant to S. 237 of the *Water Act 2000*.

The majority of the study area is located within the Condamine-Balonne Basin which is subject to a water resource plan. The Department of Natural Resources and Water monitors the implementation of water resource plans. Water resource plans are structured under the *Water Act 2000* to deliver new levels of sustainability for river ecosystems and certainty for water users. Additionally, environmental objectives for the relevant catchment/basin are set out in a water resource plan and are subsequently achieved through implementation of Resource Operations Plans that establish day-to-day river management rules and a framework for trading water allocations. The Condamine-Balonne Basin water resource plan, was finalised in 2004 and was approved under the *Water Act 2000* as the Water Resource (Condamine Balonne) Plan 2004.

Transport Infrastructure Act 1994

The *Transport Infrastructure Act 1994* includes provisions relating to interference with railways. Where the pipeline corridor and either existing or future rail corridors cross or otherwise interact, the requirements of the Act must be complied with. The conditions of the rail corridor head lease and any existing sublease agreements will have to be considered, where relevant.

Written approval from the Chief Executive would be required for all three pipeline options where they traverse the proposed Surat rail corridor and State Controlled Road (Leichhardt Highway).

Land Act 1994

The *Land Act 1994* provides a framework for the allocation of state land as either leasehold, freehold or other tenure. Permits may be acquired under this Act from DNRW for the occupation of a reserve, road or unallocated state land.

Under Chapter 4, Part 4 of the Act, a permit to occupy will be required from the Chief Executive of DNRW where the proposed pipeline and ancillary works is developed on unallocated state land, a reserve or a road.

All options traverse land identified as Lands Lease (Unallocated State Land) and is located in State road reserves. As such, this Act is likely to be applicable to the pipeline project.

Land Protection (Pest and Stock Route Management) Act 2002

The *Land Protection (Pest and Stock Route Management) Act 2002* is intended to provide a framework for developing pest management plans for various land types.

At a local government level, both the Taroom and Murilla Shires have prepared Pest Management Plans, which have been endorsed by the Ministers, but are yet to be adopted by the local government areas (i.e. now Dalby Regional Council). The Plans are intended to provide guidance to landowners and stakeholders on appropriate pest control measures.

Section 77 of the Act outlines that landowners (for a mining claim or lease under the *Mineral Resources Act 1989* — the holder of the claim or lessee), unless they possess a declared pest permit, have an obligation to undertake reasonable steps to maintain the land free of Class 1 and Class 2 pests and stop the spread of declared to other areas.

Section 78(1)(b) of the Act also states that it is not necessary for landowners to control Class 3 pests, unless the land is in or adjacent to an environmentally significant area. Declared plants have, or could have, serious economic, environmental or social impacts. Landholders can be required to control these pests if they occur next to 'environmentally significant areas', such as national parks or reserves, but only if the reserve is still free of the pest.

Under the Act, the maintenance of stock routes must also be considered. Chapter 3, Part 3 of the *Land Protection (Pest and Stock Route Management) Act 2002* outlines the need to develop a State stock route management strategy. At this stage the draft strategy is being prepared by the DNRW. The strategy is intended to:

- ensure the network is managed sustainably for the primary purpose of moving stock
- minimise the impact of travelling stock on other users of the network
- minimise the impact of travelling stock on natural resource and cultural values within the network.

Schedule 4 of the *Land Protection (Pest and Stock Route Management) Regulation 2003* identifies the local government areas of Murilla and Taroom as being required to prepare a stock route network management plan. Each of the pipeline options will cross stock routes, however will not restrict any future use of the stock route system as they will be underground structures.

The proposed route options traverse the following stock routes (refer Figure 2-1):

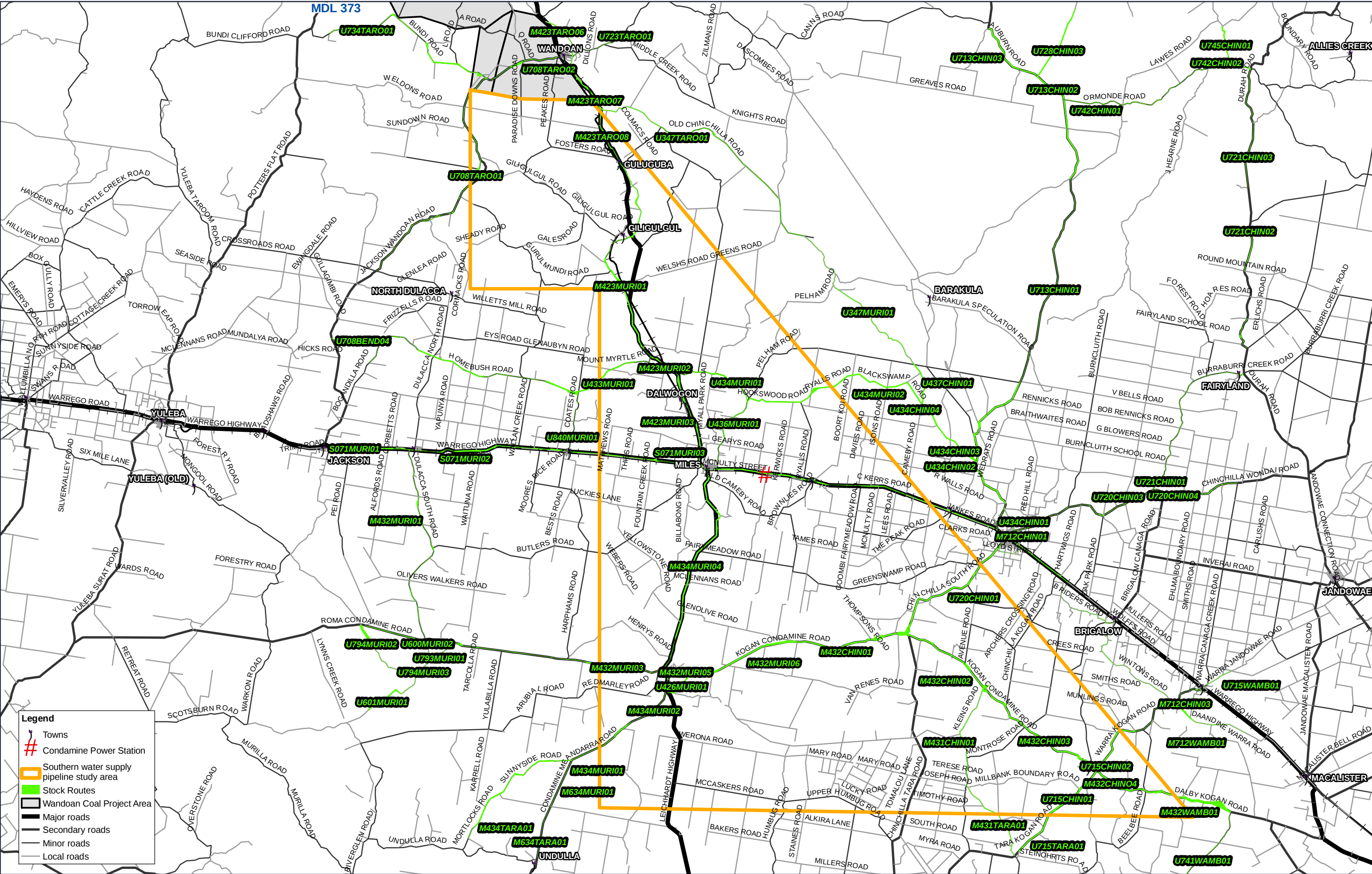
- Route M423
- Route U708
- Route U433
- Route M434
- Route U433
- Route S071
- Route M712
- Route U436
- Route U426
- Route M432
- Route U432
- Route M434
- Route U720.

Vegetation Management Act 1999

The purposes of the *Vegetation Management Act 1999* are to regulate the clearing of vegetation on freehold and leasehold land except where exemptions exist under the *Land Act 1994* and the *Forestry Act 1959*. In addition, the *Vegetation Management Act 1999* aims to:

- preserve vegetation in areas of high nature conservation value
- maintain or increase biodiversity
- maintain ecological processes
- allow for ecologically sustainable land use.

A development permit is not required for the clearing of vegetation that is directly associated with, or facilitates or supports, mining under the *Mineral Resources Act 1989* once the Mining Lease is granted. However, for vegetation clearance in areas of the Project that are located outside the proposed Mining Lease, such as the pipeline route, a vegetation clearing permit is required under the *Vegetation Management Act 1999*. Therefore, if the pipeline alignment proposes to traverse any remnant vegetation areas, an approval for vegetation clearing is required to be sought from the Department of Natural Resources and Water.



Stock Routes within the study area

Nature Conservation Act 1992

The purpose of the *Nature Conservation Act 1992* is to provide for the conservation of nature including important natural areas as well as flora and fauna. A Wildlife Clearing Permit is required where the following activities are proposed:

- taking, using, keeping or interfering with a protected plant, other than under a conservation plan applicable to the plant or under exemption under a regulation
- taking, using, keeping or interfering with cultural or natural resources of a protected area other than under interim or declared management intent for the area or a conservation agreement for the area
- taking, using, keeping or interfering with a protected animal other than under a conservation plan or exemption
- taking, using, keeping or interfering with wildlife (animal or plant) that is not protected, but is found in an area identified as a critical habitat or an area of major interest by a conservation plan
- clearing of a protected plant.

Based on desktop information reviewed for the Project (e.g. Wildlife Online study area search results) there is potential for the proposed pipeline routes to impact on flora and fauna species listed under this Act and therefore, require permits in relation to the above. However, it is recommended that this be further assessed during the detailed studies conducted as part of the environmental impact assessment of the Project.

Soil Conservation Act 1986

The *Soil Conservation Act 1986* provides for the preparation of plans that outline works and measures that may be used to contain soil erosion. There is no requirement on a landholder to actually implement works unless a Notice or Order has been issued requiring compliance with the approved plan. Further, there are provisions in this Act to allow a landholder to seek an amendment to an approved plan, or to have the approval revoked. Plans may show a preferred, or recommended, layout of soil conservation works used to control erosion, principally on cultivation land; however, the plans may not necessarily reflect what has actually been implemented. Any construction activities or maintenance activities (including access requirements and subsequent maintenance operations) will need to recognise the existence of any of the implemented soil conservation works.

Information provided by the Toowoomba office of the Department of Natural Resources and Water indicate that there are 29 properties within the study area that are subject to soil conservation plans approved under the *Soil Conservation Act 1986*. These are identified and described in Section 2.4.2 below.

Queensland Heritage Act 1992

Queensland cultural heritage derives State protection pursuant to the *Queensland Heritage Act 1992*. This legislation protects those areas that are considered to be of State significance and are placed on the 'Queensland Heritage Register', which is administered by the Heritage Council. For these areas, approval of the Heritage Council is required if any development is proposed. A search of the Register indicates that the study area is in close proximity to the following significant heritage place:

- Chinchilla 'Digger' statue, Heeney Street, Chinchilla.

However, no places, objects or sites listed on the Queensland Heritage Register are located directly within the study area or along or immediately adjacent to the proposed pipeline route options.

Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* provides for the protection of significant Aboriginal cultural heritage, including the establishment of a register of Aboriginal cultural heritage and processes for addressing land use impacts. The Cultural Heritage Coordination Unit of the Department of Natural Resources and Water (DNRW) implements this legislation.

A search of the register of Aboriginal cultural heritage administered by the DNRW has been requested for the study area. The results of this request indicate that 298 Aboriginal cultural heritage sites, places and/or objects are recorded within the study area. The details of the sites and relevance to the proposed Project are further discussed in Section 2.5.3 of this report.

WJV is responsible for carrying out activities with reasonable and practical measures to ensure it meets its Duty of Care established under the Act. Where necessary, WJV will implement a Cultural Heritage Management Plan in consultation with the traditional owners of the pipeline route area.

Native Title (Queensland) Act 1993

The objective of the *Native Title (Queensland) Act 1993* is to achieve consistency with the *Native Title Act 1993* (Commonwealth). It validates past acts that were invalidated because of the existence of Native Title and confirms various rights conferred by those Acts. Additionally, the Act aims to ensure the protection of Native Title and establishes ways in which future dealings regarding Native Title may proceed.

The registered Native Title Claimants for the study area are the Iman (#2) and Barunggam People with the associated active Native Title Claims QC 97/55 and QC 99/5 respectively. Where required, Xstrata will undertake any necessary action regarding Native Title Claims and the proposed pipeline.

1.4.3 State planning policies

State planning policies (SPP) are statutory planning instruments that relate to matters of Queensland state interest.

State planning policy 1/03 Mitigating the adverse impacts of flood, bushfire and landslide

The purpose of this policy is to set out the state government's interests with regard to natural hazards of flood, bushfire and landslide and ensure these matters are adequately addressed when carrying out development assessment.

The proposed water supply pipeline will generally be located underground, constructed through a section trench and backfill operation. Therefore, it is expected that the pipeline will be compatible with the impacts of the potential natural hazards. Due to the nature of the proposal being an underground pipeline it is anticipated that the Project would not significantly compromise the intent of this SPP.

- bushfire: bushfire hazard mapping prepared by the Queensland Rural Fire Service indicates the bushfire hazard areas in the Taroom and Murilla Shires. All three water supply pipeline options are predominately beneath land identified as areas of low and medium bushfire hazard. The design is unlikely to impose restrictions upon existing bushfire management techniques; however, the proposal will potentially improve access for ground-based fire fighting vehicles by providing an adequate access road along the easement where road reserves do not exist. The underground pipeline would not be impacted by normal fire events.
- flooding: the proposed pipeline it is unlikely to adversely affect flood events or contribute to increased flood events as it is located underground, and will be constructed underground by section trench and backfill operations.
- landslide: the Project would not involve land containing slopes greater than 6%. (refer Figure 2-5). In accordance with the SPP, a natural hazard management area is defined as a slope exceeding 15%. As such, the Project would not affect any land in a natural hazard management area.

The proposed development will not compromise the SPP outcomes.

State planning policy 1/92 Development and conservation of agricultural land, 1992

This SPP addresses the conservation of good quality agricultural land (GQAL) and provides guidance to local authorities on how this issue should be addressed when carrying out their range of planning duties. Local authorities, the Planning and Environment Court and the Government are required to have due regard to this Policy when carrying out their planning functions.

Four classes of land have been defined for Queensland. These are Classes A, B, C and D, as described in Table 1-2.

Table 1-2: Land classes

Class	Description
Class A	Crop land — land suitable for current and potential crops with limitations to production that range from none to moderate levels. All crop land is considered to be GQAL.
Class B	Limited crop land — land that is marginal for current and potential crops due to severe limitations and suitable for pastures. Engineering and/or agronomic improvements may be required before the land is considered suitable for pasture cropping. Land marginal for particular crops of local significance is considered to be GQAL.
Class C	Pasture land — land suitable only for improved or native pastures due to limitations that preclude continuous cultivation for crop production; but some areas may tolerate a short period of ground disturbance for pasture establishment. There are two types of Class C land, being: Class C1: suitable for improved pasture Class C2: Suitable for native pasture.
Class D	Non-agricultural land — land not suitable for agricultural uses due to extreme limitations. This may be undisturbed land with significant habitat, conservation and/or catchment values, or land that may be unsuitable because of very steep slopes, shallow soils, rock outcrops or poor drainage.

These land classes are based on an assessment of the suitability of the land for specified agricultural uses that involve rating the ability of the land to maintain a sustainable level of productivity using soils, topographic and climatic factors that determine sustainable productivity. The DNRW describes GQAL as Class A, B and C1 land.

Various classes of GQAL are present within the study area and therefore, may be impacted by the proposed pipeline options to different degrees. Potential impacts to GQAL are detailed and discussed in latter sections of this report.

Furthermore, the SPP makes allowances for developments on high quality agricultural land where the Project provides an overriding public benefit and there are no other suitable sites for the purpose.

This matter and any potential implications for the Project are discussed in further detail in Section 3.3.5 below.

Development in the vicinity of certain airports and aviation facilities — SPP 1/02

This SPP sets out broad principles concerning development in the vicinity of airports and aviation facilities considered essential for the State's transport infrastructure or national defence system. This SPP sets out broad principles for protecting airports and associated aeronautical facilities from encroachment by incompatible developments, in the interest of maintaining operational integrity and community safety. Construction of tall physical structures have the potential to pose a hazard to aircraft operations if they protrude through the relevant obstacle limitation surface. This policy also applies to development that has the potential to create adverse effects on the functioning of aviation facilities caused by the following:

- physical 'line of sight' obstructions

- electricity or electro-magnetic emissions
- structures containing a reflective surface.

There are no airports of State significance in the former Taroom or Murilla local government areas and therefore, the provisions of this SPP are not deemed relevant.

An off-airport facility (non-directional beacon and VHF omnidirectional range) is identified in the guideline for the SPP 1/02 for the previous local government area of Taroom. The facility is located along the Leichhardt Highway. The proposed pipeline options do not exceed the minimum development constraint as the Project is for an underground pipeline and therefore, the SPP is not considered relevant to this Project.

No on- or off-airport facilities have been identified in the former Murilla local government area.

Planning and managing development involving Acid Sulfate Soils — SPP 2/02

The Acid Sulfate Soils SPP applies to certain coastal areas of Queensland where the natural ground level is less than 20 m Australian Height Datum (AHD) and soil below 5 m AHD is disturbed by the proposed works.

No areas under 5 m AHD or underlain by estuarine sediments are traversed by the proposed pipeline options, and the requirements of the SPP are therefore not considered relevant as a corridor selection criterion in this instance.

Protection of extractive resources — SPP 2/07

The purpose of this policy is to set out the State's interests with regard to extractive resources and protect the Key Resource Areas (KRA) from incompatible development as a result of poor land use decisions. It is intended that this policy maintains the long-term availability of extractive resources in KRA. The SPP came into effect on 3 September 2007.

No KRA mapping exists within the study area and former Taroom and Murilla local government areas.

State Coastal Management Plan

Under the *Coastal Protection and Management Act 1995*, the State Coastal Management Plan and subsequent Regional Management Plans have the status of a SPP for the purposes of making and amending planning schemes and assessing and deciding development applications. The State Coastal Management Plan provides a framework to address and manage pressures on the coastal zone and as part of its core topics, emphasises that development should occur in an ecologically sustainable manner. The State Coastal Management Plan applies to the coastal zone defined in Section 11 of the Act.

The State Coastal Management Plan is not relevant to the three route options as the subject area:

- is physically distant from coastal environments with the proposed pipeline route options being located in an inland area
- does not contain significant physical features, ecological or natural processes or human activities that affect, or have the potential to affect, the coast or coastal resources or a significant high order stream

- irrespective of whether being a catchment or not, does not comprise proposed development that would have the ability to significantly impact on coastal resources or waters (due to the minor development 'footprint').

As there is no link with the coast or coastal resources, the State Coastal Management Plan is not considered to be applicable to the proposed development.

Housing and residential development — SPP 1/07

This SPP seeks to ensure that large, higher growth local governments identify their community's housing needs and analyse, and modify if necessary, their planning schemes to remove barriers and provide opportunities for housing options that respond to identified needs. SPP 1/07 is supported by a Guideline that provides information and advice on interpreting and implementing the Policy.

Annex 1 of the SPP does not identify the Dalby Regional Council as an area to which this SPP applies. Consequently this SPP is considered not applicable.

1.4.4 Regional and local planning instruments

Central Queensland Regional Growth Management Framework 2002

The Central Queensland Regional Growth Management Framework 2002 is a joint government, community and industry project to develop a long term strategic plan to guide management, growth and development of the region over the following 20 years.

The Central Queensland Regional Growth Management Framework was prepared under Part 5 of the IPA. Once implemented, the local governments are required to develop or amend their planning schemes to reflect the intentions of the Regional Growth Management Framework.

The Central Queensland Regional Growth Management Framework seeks to make Central Queensland the most diverse and prosperous region in Australia through economic growth that is ecologically sustainable and where people and industry work in harmony with the environment for the benefit of both present and future generations whilst respecting the diversity of our past.

Further discussion regarding the association between the Central Queensland Regional Growth Management Framework and the proposed Wandoan Coal Project will be provided in the EIS.

Local government planning schemes

The southern water supply pipeline study area is located wholly within the Dalby Regional Council area. Due to recent local government amalgamations which have occurred, the study area remains subject to previously implemented planning instruments including:

- Planning Scheme for Taroom Shire 2006
- Planning Scheme for the Murilla Shire 2006.

The provisions of these planning instruments have been considered in this route selection process and details are provided in subsequent sections of this report.

Local laws

There are no local laws identified under the Dalby Regional Council for the previous local government areas of Taroom and Murilla.

2. Route option evaluation

2.1 Information sources

Information sources used in researching the constraints for each of the proposed corridors include those listed below in Table 2-1.

Table 2-1: Desktop review information sources

Potential constraint	Information and data sources
Commonwealth threatened species	<i>Environment Protection and Biodiversity Conservation Act 1999</i> online 'Protected matters search tool'
Commonwealth listed migratory species	<i>Environment Protection and Biodiversity Conservation Act 1999</i> online 'Protected matters search tool'
Commonwealth threatened ecological communities	<i>Environment Protection and Biodiversity Conservation Act 1999</i> online 'Protected matters search tool'
State listed threatened species (<i>Nature Conservation Act 1992</i>)	Wildlife On-line (EPA)
State listed conservation significant vegetation communities (<i>Vegetation Management Act 1999</i>)	Remnant vegetation and Regional Ecosystem mapping (current version 5.0 with the addition of any certified changes) produced by the EPA.
Watercourses	Land, Vegetation and Water Packaged Digital Data produced by the DNRW
Water catchments and water resource planning	Water Resource (Fitzroy Basin) Plan 1999 produced by the DNRW
Mining and petroleum tenements	Department of Mines and Energy on-line interactive mapping tool
CSM wells	Department of Mines and Energy on-line interactive mapping tool
State controlled roads	Department of Main Roads South Western District 4 map
Railways	Network system information produced by Queensland Rail
Land tenure	Land, Vegetation and Water Packaged Digital Data produced by the DNRW
Good quality agricultural land	Dalby Regional Council: Planning Scheme for Taroom Shire 2006 Planning Scheme for Murilla Shire 2006
Town planning land designation	Dalby Regional Council: Planning Scheme for Taroom Shire 2006 Planning Scheme for Murilla Shire 2006
Topography	SRTM data sets produced by the National Aeronautics and Space Administration and the National Imagery and Mapping Agency

Potential constraint	Information and data sources
Geology	Land, Vegetation and Water Packaged Digital Data produced by the DNRW
Soils	Digital Atlas of Australian Soils produced by CSIRO
Properties subject to approved Soil Conservation Plans	Information provided by the DNRW, Toowoomba office
Local authority roads	Land, Vegetation and Water Packaged Digital Data produced by the DNRW
Key/future resource areas	Department of Mines and Energy on-line interactive mapping tool
Properties, residences	1:250,000 Digital Topographic Data produced by Geosciences Australia
Existing infrastructure (e.g. pipelines, powerlines etc)	Department of Mines and Energy on-line interactive mapping tool Planning Scheme for Taroom Shire 2006 Planning Scheme for Murilla Shire Council 2006
Fire hazard	Rural Fire Service bushfire hazard mapping for local government areas
Cost to construct (indicative)	Pipeline designers (PB)
Native title	National Native Title Tribunal mapping and Register information
Cultural Heritage (non-indigenous)	Queensland Heritage Register, National Heritage List, Commonwealth Heritage List
Cultural heritage (indigenous)	Register of Aboriginal cultural heritage (DNRW), National Heritage List, Commonwealth Heritage List

It should be noted that whilst all of the above potential constraints were identified and information collated, not all of these potential constraints were ultimately considered as principal determining criteria in the route selection study. For example, local topography within the study area may influence pipeline design and construction however, this criteria is expected to render similar constraint level for all potential pipeline route options. Therefore, not all of the above listed constraints have been utilised in the route option evaluation and comparative assessment.

2.2 Selection of assessment criteria

The issues typically addressed in environmental impact assessments are also relevant to the comparison of alternatives in a route evaluation, and can be used to develop suitable criteria for selecting a preferred alignment. The criteria can be broken into regulatory, planning, environmental, social and economic categories. These criteria typically consist of:

Regulatory criteria

- provisions of relevant Commonwealth legislation
- provisions of relevant state legislation and policies.

Regulatory provisions, as they relate to this Project, are generally associated with the use, development or potential impact to environmental, planning, social and economic criteria. Therefore, whilst noteworthy that these criteria exist, in the context of this assessment, regulatory criteria will be considered in conjunction with relevant environmental, planning, social and economic assessment criteria.

Planning assessment criteria

- land use and tenure
- location of petroleum and mining leases
- location of resource (e.g. coal, petroleum, mineral) areas
- local governments and planning schemes
- location of existing infrastructure such as pipelines, roads (local and state controlled), railway lines, dams/water infrastructure etc.

Environmental assessment criteria

- topography
- geology and soils
- watercourses and wetlands
- fire risk
- flora and vegetation communities
- fauna and habitat values.

Social assessment criteria

- proximity of residences and other sensitive receptors to the proposed development
- properties and landholders affected
- visual amenity
- cultural heritage (indigenous and non-indigenous).

Economic assessment criteria

- indicative pipeline cost.

Sections 2.3 to 2.6 (inclusive) describe how these assessment criteria were considered in developing the performance measures, against which each option will be measured. As mentioned above, in some cases it is possible to establish that a particular criterion will not be useful in the assessment process and therefore no further analysis will be undertaken. A summary of the selection criteria and relevance to the proposed Project is provided in Table 2-4.

2.3 Planning assessment criteria

2.3.1 Land use and tenure

The existing land uses within the study area are predominantly agricultural and resource based (refer Figure 2-1). The proposed Wandoan Coal Project area is located within the north of the study area, and the associated MLAs 50229, 50230 and 50231 cover an approximate area of 32,000 ha. The Berwyndale South CSM wells, operated by Origin and the Queensland Gas Corporation, are located within the southern portion of the study area, approximately 100 km to the south of Wandoan. The townships of Gurulmundi, Giligulgul and Guluguba are located within the northern portion of the study area whilst the townships of Dalwogon, Miles and Columboola are located central to the study area. The townships of Condamine and Kogan are located within the south-west and south-east portions of the study area respectively. The balance of the land within the study area is predominantly utilised for agricultural purposes, including grazing and cropping activities. The Cherwondah State Forest reserve is located within the northern portion of the study area and the Condamine Power Station is located in the central portion of the study area, adjacent to the Warrego Highway and west of the township of Columboola.

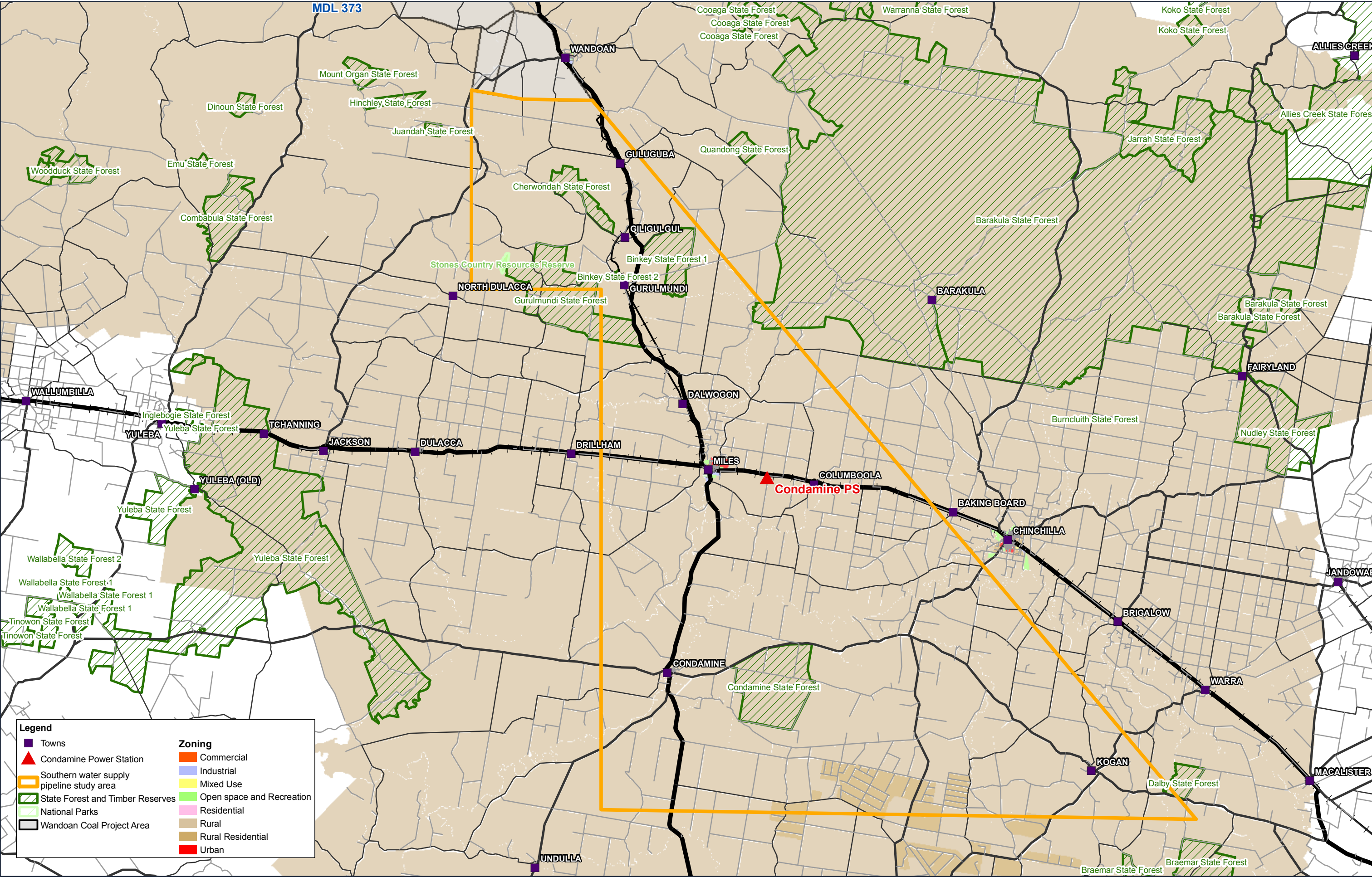
In terms of future land use, the Central Queensland Regional Growth Management Framework (Central Queensland Regional Planning Advisory Committee, 2002) provides a strategic vision for the Central Queensland Region, including the previous Taroom Shire local government area. The Central Queensland Regional Growth Management Framework indicates that the following future uses are to be provided for along and adjacent the proposed alignment:

- ecologically significant areas (i.e. Brigalow Belt Bio-region and State Forest Reserves)
- extractive industry areas (i.e. Bowen Basin Coal Resources and Mineral and Extractive Resources)
- agricultural (i.e. Key Agriculture Areas).

Other land use features in the study area include:

- the town of Guluguba which includes Small Town land use designations
- the town of Condamine which includes Small Town and industrial land use designations
- the town of Miles which includes commercial, industrial, mixed use, open space and recreation and urban land use designations.

Sensitive land uses such as schools, community facilities and land uses associated with temporary or permanent infrastructure or equipment i.e. gas fields, agricultural irrigation etc have been considered during the route selection process and avoided where possible. However, there is likely to be significant land use impacts where route options go through higher density population centres such as Miles, Gurulmundi and Giligulgul. While it is difficult to attribute a quantitative performance measure to this assessment criteria (for example, due to the exact location of underground infrastructure being unknown) a qualitative assessment has been undertaken based on the proximity of the routes to population centres and therefore the greater likelihood of impacting on associated infrastructure.



2.3.2 Mining and petroleum leases

Mining

Reference to the Department of Mines and Energy interactive online search tool (conducted 22 May 2008) indicates that the following Mining Leases (MLs) are located within or in close proximity to the study area:

- ML 50229 Wandoan No. 1, held by Xstrata Coal Queensland Pty Ltd (application status)
- ML 50230 Wandoan No. 2, held by Xstrata Coal Queensland Pty Ltd (application status)
- ML 50231 Wandoan No. 3, held by Xstrata Coal Queensland Pty Ltd (application status)
- ML 5092, ML 5095, ML 5906 and ML 5898, held by Unimin Australia Limited (granted status)
- ML 5907 Ausben No. 2, held by Unimin Australia Limited (granted status)
- ML 50179, held by Volclay International Pty Ltd (granted status)
- ML 5910, ML 5911 and ML 6960, held by Bioclay Pty Ltd (granted status)
- ML 50233 Cameby Downs, held by Syntech Resources Pty Ltd (application status)
- ML 50242 Hopeland No. 1, held by Linc Energy Limited (application status)
- ML 50243 Hopeland No. 2, held by Linc Energy Limited (application status).

Additionally, a number of Mineral Development Licences (MDLs) are located within the study area including:

- MDL 246, held by AMH (Chinchilla Coal) Pty Ltd (granted status)
- MDL 247, held by AMH (Chinchilla Coal) Pty Ltd (granted status)
- MDL 224, held by Xstrata Coal Queensland Pty Ltd (granted status)
- MDL 187, held by Surat Coal Pty Limited (granted status)
- MDL 223, held by Xstrata Coal Queensland Pty Ltd (granted status).

The location of existing MLs and MDLs is considered to be a significant constraint to the water supply pipeline route alignment and therefore, was considered during development of the preliminary route options. The current options discussed in this report generally avoid crossing existing MLs or MDLs. However, where crossing is required, proposed pipeline alignment options are restricted to existing road reserves. Potential sterilisation of extractive resources is considered to be an important selection criterion and therefore, the distance of proposed pipeline over existing ML's and MDLs is included in the comparative assessment below.

Petroleum

Reference to the Department of Mines and Energy interactive online search tool (conducted 22 May 2008) indicates that a number of Petroleum Leases (PLs) are located within the study area including the following:

- PLs 226 and 209, held by Origin Energy CSG Limited (granted status)
- PLs 201, 179, 229, 228, 201, held by the Queensland Gas Company Limited (granted status)
- PLs 247, 211, 212, 257, 263, 180, held by the Queensland Gas Company Limited (application status)
- PL 265, 215, 216 held by Origin Energy CSG Limited (application status)
- PL 253, held by Australian CBM Pty Ltd (application status)
- PL 171, held by Roma Petroleum NL (granted status).

The majority of these PLs constitute the Berwyndale South CSM fields operated by Origin and the Queensland Gas Corporation within the southern portion of the study area (refer Figure 2-2). The location of existing PL's is considered to be a significant constraint to the water supply pipeline route alignment and therefore, was considered during development of the preliminary route options. Where pipeline options propose to traverse PLs, discussions with the PL holders will be required in order to ascertain if the proposed arrangement or alignment is considered appropriate. These discussions have not yet taken place and therefore, this criterion must still be considered in the comparative assessment of options.

Resource areas

Reference to the Department of Mines and Energy interactive online search tool (conducted 22 May 2008) indicates that a number of coal resource areas have been identified within the study area. These areas are located predominantly within the central-eastern and northern portions of the study area. Additionally, a small number of CSM wells (in various stages of exploration or development) occur sporadically across the entire study area and a concentration of CSM wells forming the Berwyndale South fields is located in the southern portion of the study area. Location of key resource areas is a principal determining criterion in the pipeline route selection process to ensure that these resource areas are not sterilised to future development.

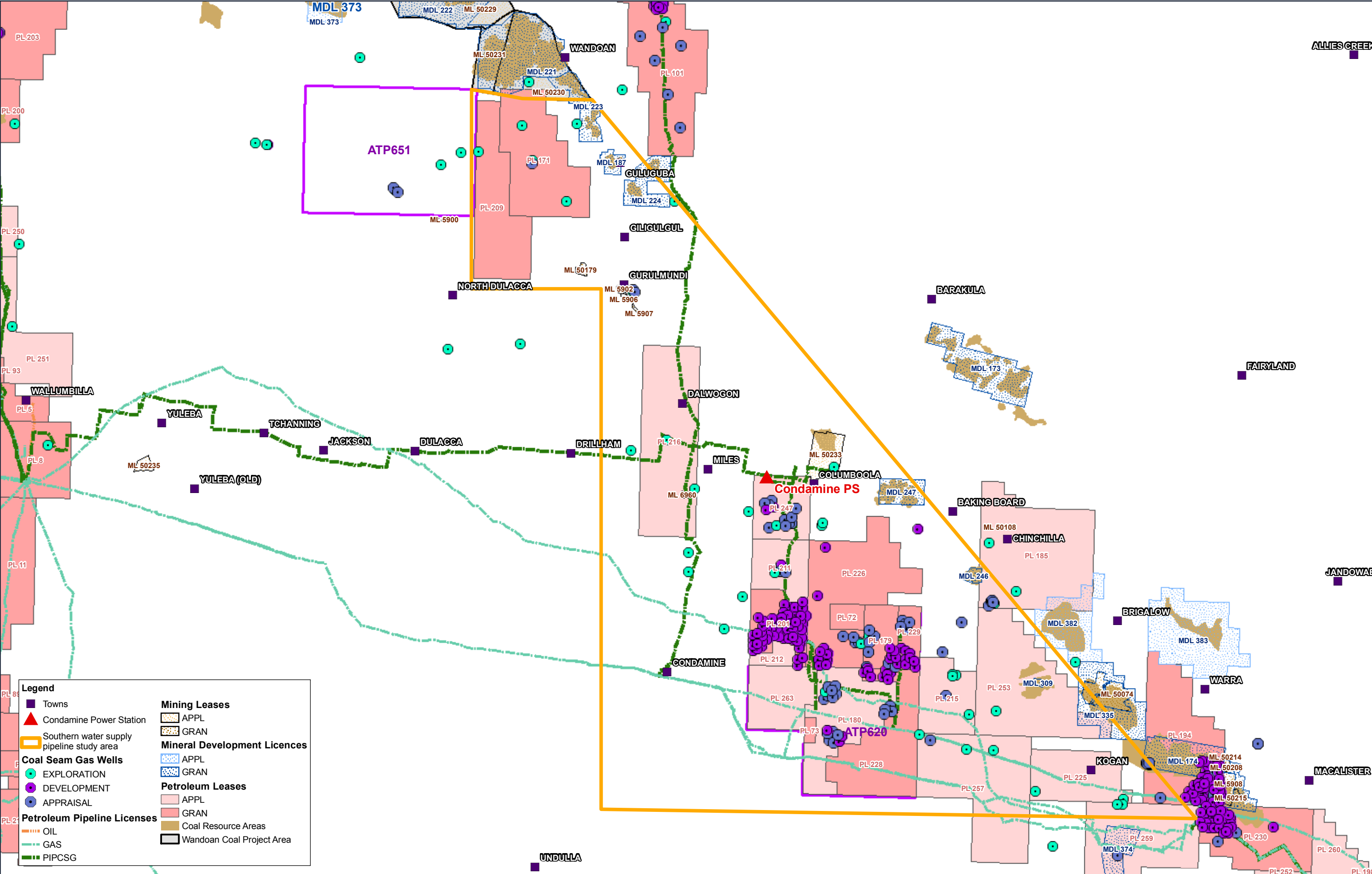
2.3.3 Local governments and planning schemes

The proposed pipeline would be developed on land within the Dalby Regional Council (amalgamated Chinchilla, Dalby, Murilla, Tara, Wambo and division two of Taroom Shire Councils) local government.

The Regional Council was formed on 17 March 2008 and will continue to operate under the current IPA compliant planning schemes relevant to the previous local government areas. The planning schemes applicable to the proposed pipeline alignment are:

- Planning Scheme for Taroom Shire 2006 (Taroom Planning Scheme)
- Planning Scheme for Murilla Shire Council Area 2006 (Murilla Planning Scheme).

The following section details the assessment process under each planning scheme.



Mining, petroleum leases and resource areas within the study area

Level of assessment

A review of the Taroom Planning Scheme identified the water pipeline would potentially be exempt development. Section 1.4 (2)(V) of the planning scheme states the following development is exempt (not requiring approval under the planning scheme) from requiring development approval:

‘Development’ involving water cycle management infrastructure, including infrastructure for water supply, sewerage, collecting water, treating water, stream managing, disposing of waters and flood mitigation, but excluding water supply or sewage treatment plants.

Section 1.4(2) of the Murilla Planning Scheme detailed that the proposed water pipeline would be exempt development where:

‘Development’ involving water cycle management infrastructure, including infrastructure for water supply, sewerage, collecting water, treating water, stream managing, disposing of waters and flood mitigation, but excluding water supply or sewage treatment plants.

Notwithstanding this, where the associated works (i.e. pump stations) are to be developed above ground, a building works approval would be required from Council.

Furthermore, where the pipeline traverses or interacts with existing pipeline or other easements, approval from the relevant authority will be required, including sign off on the proposed pipeline standard to be used.

As the proposed pipeline is exempt development under the planning schemes, further assessment of the development codes contained in the Taroom and Murilla Planning Schemes is not deemed necessary.

Confirmation from Dalby Regional Council would be required for this interpretation, prior to acting on this advice.

2.3.4 Existing infrastructure

Local government roads

A number of local government roads are located within the study area for the southern water supply pipeline and are proposed to be utilised by the water supply pipeline. The length of pipeline within road reserves may have implications for the Project in terms of:

- remnant vegetation which is required to be cleared to facilitate construction of the pipeline
- negotiating with local government authorities to get approval for utilisation of the road reserve
- removing and replacing existing road surfaces (e.g. subgrade and asphalt) where road crossings are required.

However, location of the pipeline within road reserves may provide beneficial outcomes in terms of:

- reducing or limiting the number of affected landowners and associated acquisition processes which will need to be conducted

- reducing or limiting potential sterilisation of agricultural land use activities occurring within the study area
- reducing or limiting potential sterilisation of resources within established MLs, MDLs and PLs by utilising existing road reserve through these areas.

Therefore, given that the length of proposed pipeline route within the road reserve has been identified as having both unfavourable and beneficial outcomes, it has been included as a criterion in the comparative assessment of options.

State controlled roads

A number of State controlled roads (SCR) are located within the study area including:

- Jackson —Wandoan Road (SCR 4302)
- Leichhardt Highway (SCR 26B, 26C)
- Warrego Highway (SCR 18C, 18D)
- Roma — Condamine Road
- Kogan — Condamine Road
- Chinchilla — Tara Road
- Dalby — Kogan Road
- Tara — Kogan Road
- Condamine — Meandarra Road.

Due to the location of the SCRs within the study area, the pipeline route options cross a number of these SCRs. Additionally, various sections of the pipeline route options are proposed to be located within the existing road reserves of state controlled roads (such as the Leichhardt Highway) and will require approval/agreement by the Department of Main Roads. Therefore, as above, the length of proposed pipeline within existing road reserves is considered important to route selection and has been included as a criterion in the comparative assessment of options.

A number of the pipeline options proposed have significant lengths sited within existing road reserves. These options have been developed to minimise impacts to existing land uses in the study area including state forests, national parks gas wells, resource areas and agricultural operations. While those options sited along existing infrastructure corridors will be preferred to those outside of these corridors this performance criteria is essentially picked up through the impact of the options on private properties.

Rail infrastructure

Reference to Queensland Rail network mapping indicates that a single track rail line operates from Toowoomba to Quilpie, passing through Dalby, Miles and Roma. Additionally, another single track network exists which connects Miles and Wandoan. Due to the location of the rail infrastructure within the study area, all pipeline route options will be required to cross the existing single track line at some point and therefore, potential impacts in this regard are considered uniform across the proposed pipeline options. Therefore, this criterion will not be utilised in the comparative assessment of options undertaken in Section 4.

However, a pipeline alignment option which is aligned with a section of the Miles to Wandoan railway has been identified and is proposed as an alternative alignment to utilising the Leichhardt Highway road reserve. A comparison between these two proposed alignment options is further discussed and detailed in Sections 3 and 4.

Existing pipelines, powerlines etc and other infrastructure

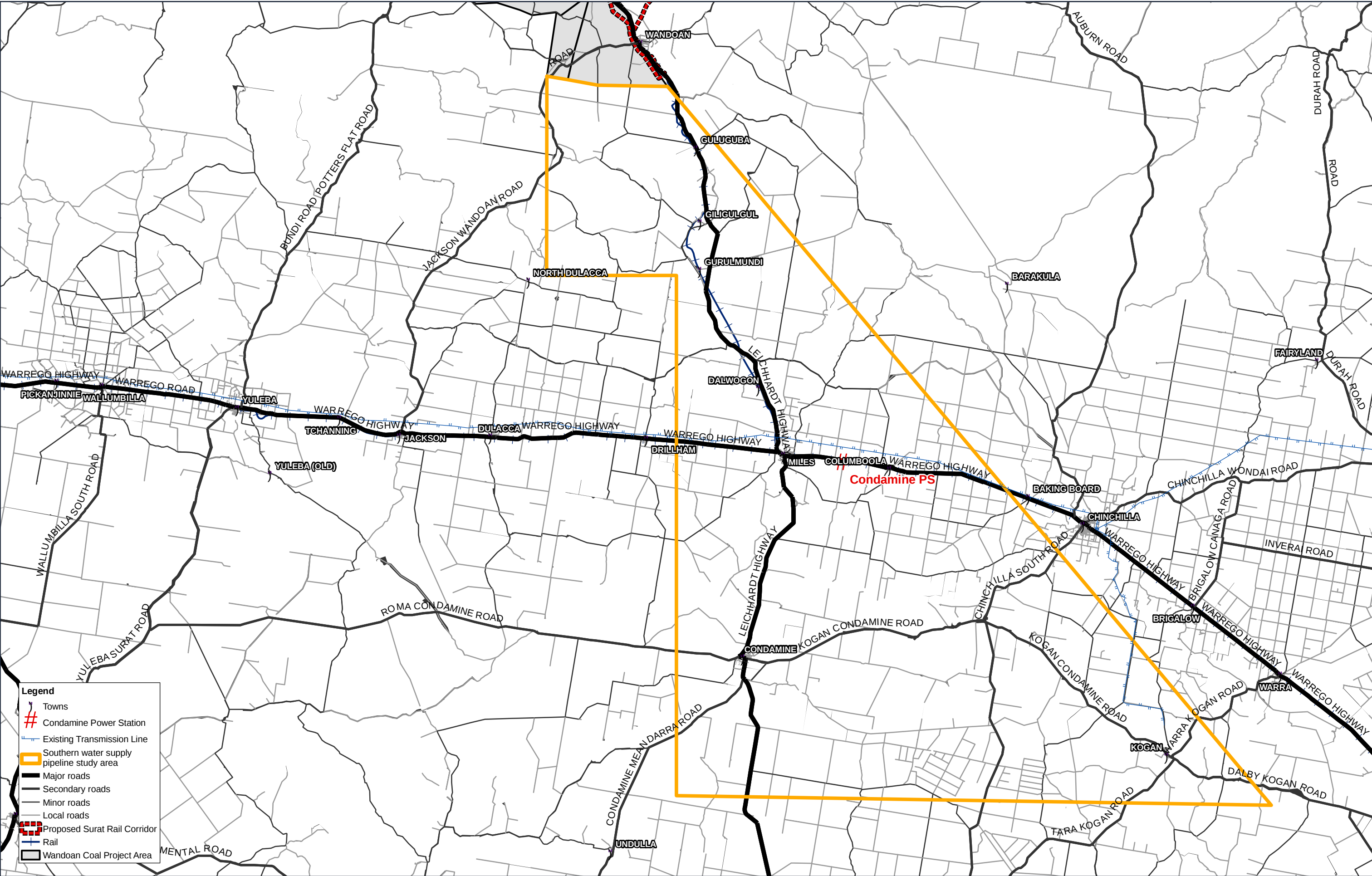
Existing pipeline infrastructure is present within the study area for the proposed southern water supply pipeline, predominantly constructed in an east-west direction across the study area. High voltage transmission pipelines and petroleum pipelines (authorised under a petroleum pipeline licence) are present and will be traversed by the pipeline route options.

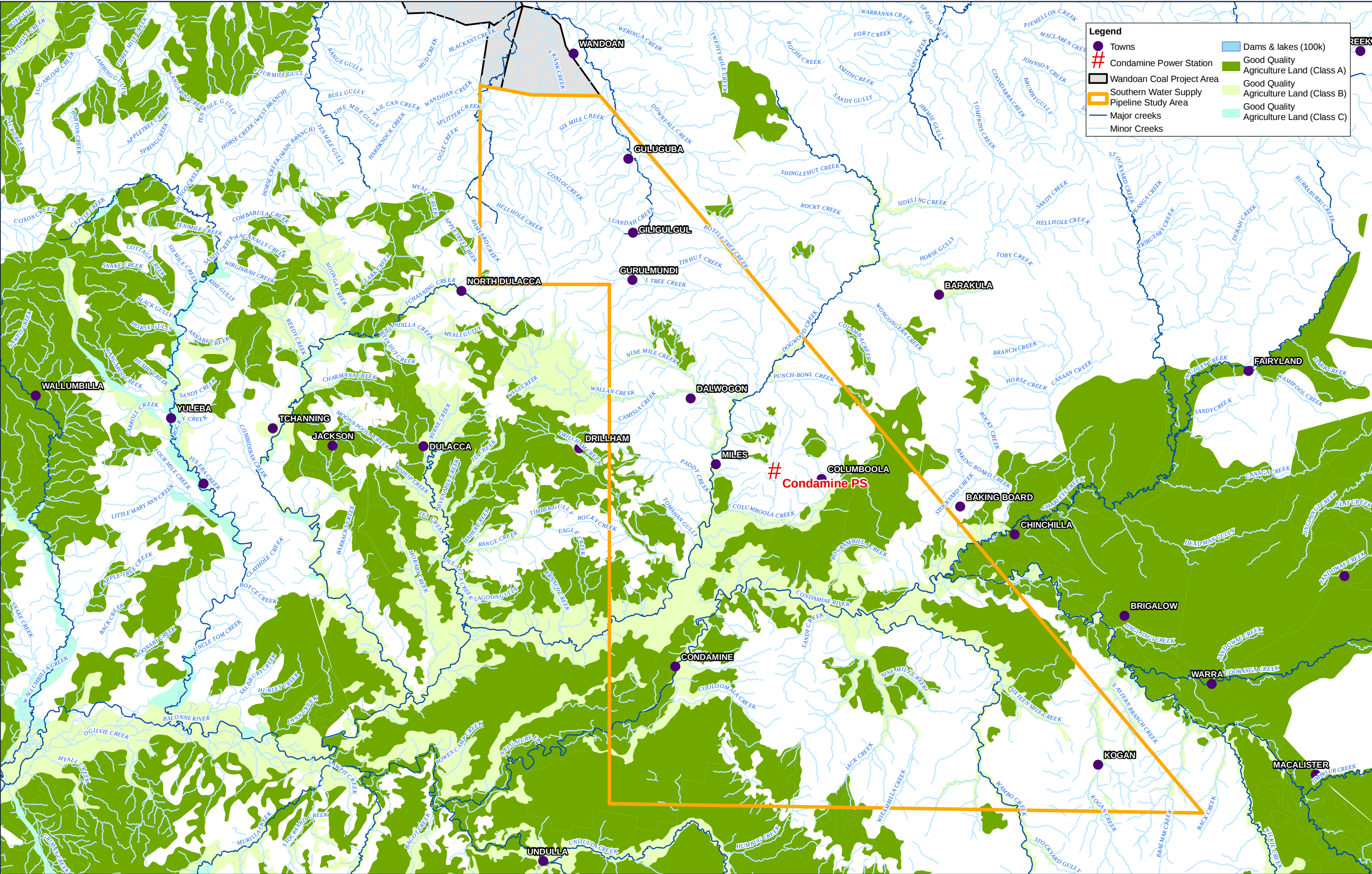
Where the proposed pipeline options traverse or intersect with existing pipelines or other infrastructure easements, approval from the relevant authority will be required, including sign off on the proposed pipeline standard to be used.

Land acquisition has already been undertaken in order to facilitate implementation of existing infrastructure and therefore, opportunities exist for co-location of infrastructure. Co-location is a means by which to, on a regional scale, reduce or minimise constraints and impacts resulting from provision of infrastructure such as the number of landowners impacted and severance of properties. Therefore, co-location is included as a criterion in the comparative assessment of options of the proposed gas supply pipeline.

2.3.5 Good quality agricultural land

Good quality agricultural land within the study area is predominantly restricted to central and south-western portions of the study area, associated with the alluvial floodplains of Dogwood Creek and the Condamine River. Specifically, the proposed pipeline options traverse areas mapped as Class A and Class B good quality agricultural land. Figure 2-4 illustrates the occurrence of good quality agricultural land within the study area. Whilst any pipeline option is proposed to be constructed underground, an easement will be required over the pipeline and terms and conditions of the easement agreement may limit (in some cases) or restrict the land use activities which can be conducted within the easement area, thereby potentially affecting a landowners use of the easement area and good quality agricultural land. Therefore, the imposition of the pipeline easement over good quality agricultural land is considered important to route selection and has been included as a criterion in the comparative assessment of options.





2.4 Environmental assessment criteria

2.4.1 Topography

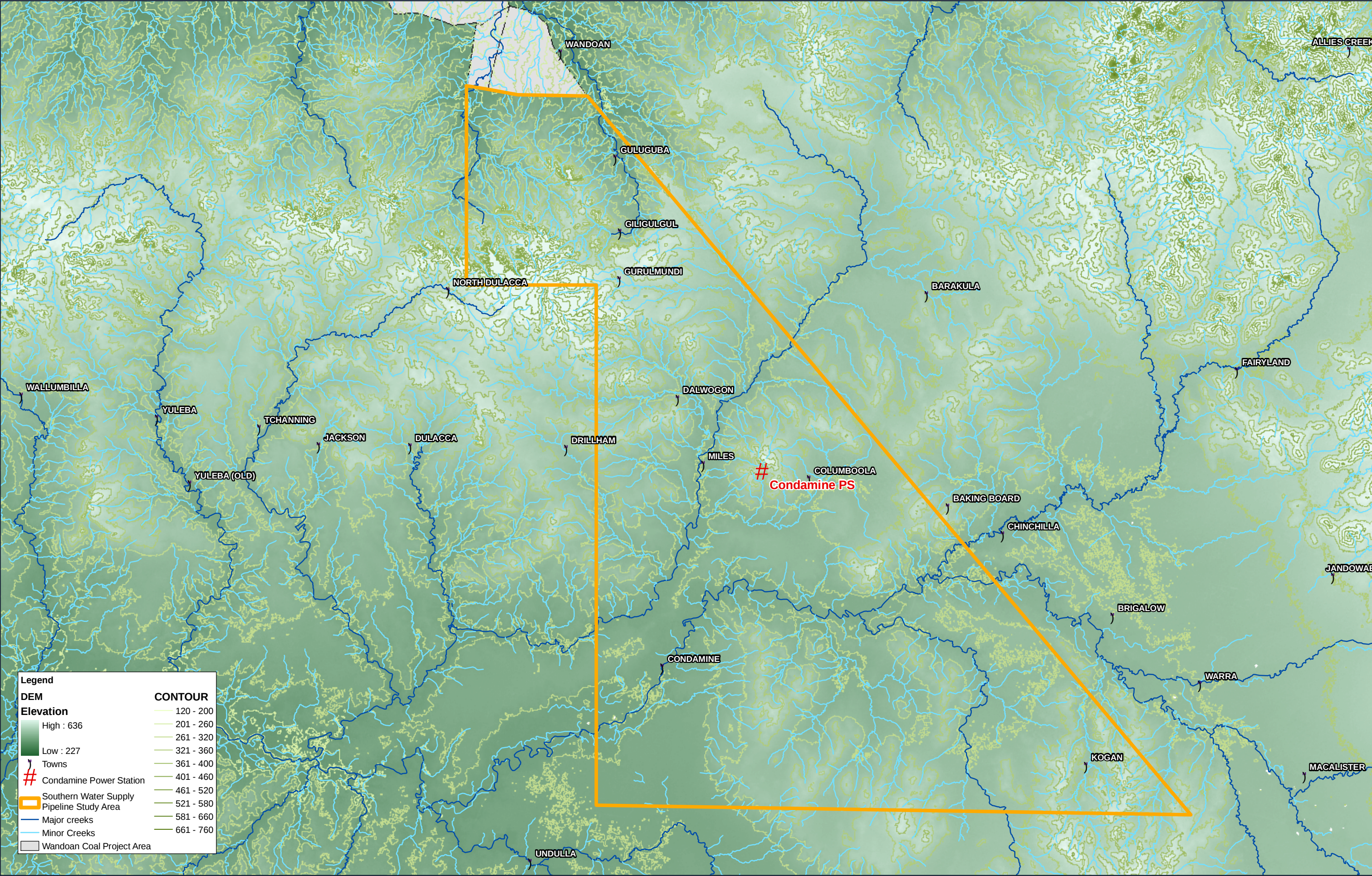
Generally, the central and southern portions of the study area exhibit little topographical relief and constitute alluvial plains associated with the Condamine River and Dogwood Creek. Slight elevation to approximately 360 m AHD occurs within the southern extent of the study area to the south of the Berwyndale South CSM fields. The northern section of the study area exhibits some topographical relief around and to the west of the townships of Giligulgul and Guluguba. All proposed pipeline options will traverse a similar route in terms of topography and terrain and therefore, relevance of topography as a determining criterion for pipeline route alignment is considered to be consistent across route options and will not be considered in the comparative assessment of options undertaken in Section 4.

2.4.2 Geology and soils

The study area comprises a number of different geological units which generally occur in east to west bands across the study area. These geological units include (but are not limited to):

- Kumbarilla beds (sedimentary rock) comprising sandstone, siltstone, mudstone and conglomerate
- Gubberamunda sandstone (arenite) comprising sandstone, minor conglomerate and siltstone
- Injune Creek Group (sedimentary rock) comprising calcareous lithic sandstone, siltstone, mudstone, coal, conglomerate
- Orallo formation (sedimentary rock) comprising sandstone, siltstone, mudstone, conglomerate and coal
- Bungil Formation (arenite-mudrock) comprising glauconitic, labile to quartzose, siltstone and mudstone
- Alluvium of older flood plains, sand, gravel, soil.

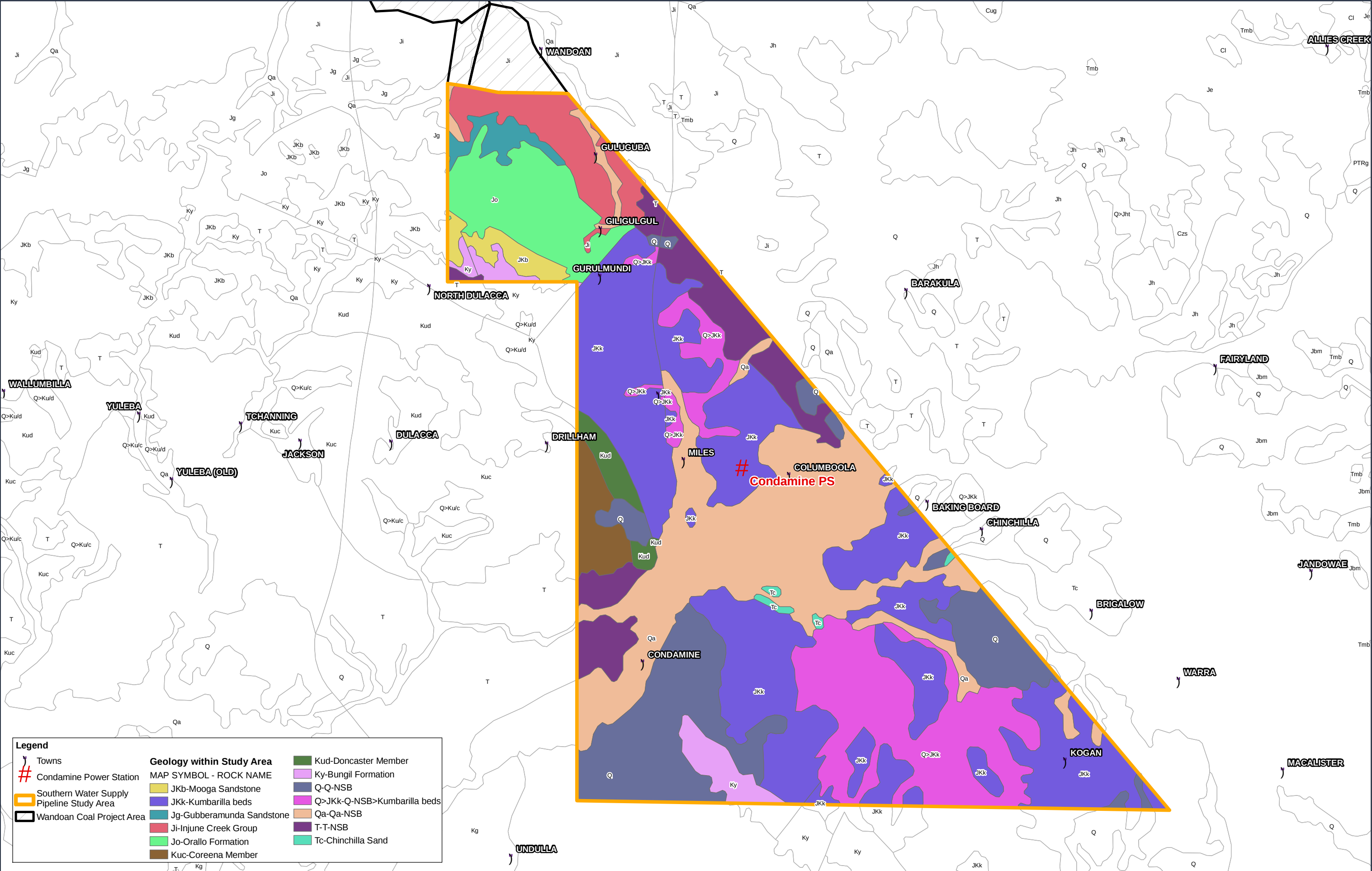
Given that these geological units generally occur in east to west bands across the study area, all proposed pipeline options will traverse similar geology and therefore, relevance of geology as a determining criterion for pipeline route alignment is considered to be consistent across route options and will not be utilised in the comparative assessment of options undertaken in Section 4.



Similar to geology, soils units within the study area are varied and generally occur in east to west bands across the study area. These soils units (and their association with general topography) include:

- gentle to moderately undulating or rolling lands with dominant soils of moderate to shallow depth. Mainly soils include grey clays but with important areas of dark clays or brown clays. Associated soils are mainly loamy duplex soils
- plains of slightly gilgaied cracking clays associated with major and minor functional and non-functional drainage-ways. Soils mainly include grey and brown clays
- gently undulating cracking clay plains with moderate to strong gilgai microrelief. Soils are mainly deep grey clays with smaller areas of brown clays
- low hills and dissected low ranges, with mesa or butte-like remnants. Soils mainly include shallow stony loamy soils. A variety of shallow stony soils may also occur locally. The associated valley floors and slopes have mainly loamy to sandy-surfaced soils with occasional areas of red earths
- gently undulating or almost level plains where dominant soils are brown clays with important areas of grey clays and smaller areas of dark clays. A slight gilgai microrelief may be present and some areas may have a surface veneer of silcrete (billy) gravel
- gently undulating plains with occasional high ridges and cuesta-like scarps. Soils in the gently sloping to flat areas are red earths with some yellow earths, all often with a surface scattering of ironstone gravel. On the higher ridges and scarps shallow loams occur
- undulating to gently undulating elevated plains bounded by steep lateritic scarps. The dominant soils are slightly acid loamy red earths. Smaller areas of loamy yellow earths also occur
- gently undulating plains where dominant soils are hard alkaline brown soils. In many instances the deeper subsoils may be extremely acid. A slight gilgai microrelief is often present
- strongly undulating or low hilly lands where the dominant soils are gravelly shallow loamy duplex soils with mottled clay subsoils. A wide range of other shallow duplex soils also occur and drainage lines have small flood-plains with loamy soils
- small stream flood-plains that rise gradually to moderately undulating marginal valley slopes where dominant soils of the level areas are loamy duplex soils. Some stream levees have deep sand soils and marginal valley slopes have alkaline soils
- gently undulating plains of hard alkaline and neutral yellow mottled soils with some acid variation occurring.

All proposed pipeline options will traverse similar soils units and therefore, relevance of soils as a determining criterion for pipeline route alignment is considered to be consistent across route options and will not be utilised in the comparative assessment of options undertaken in Section 4.



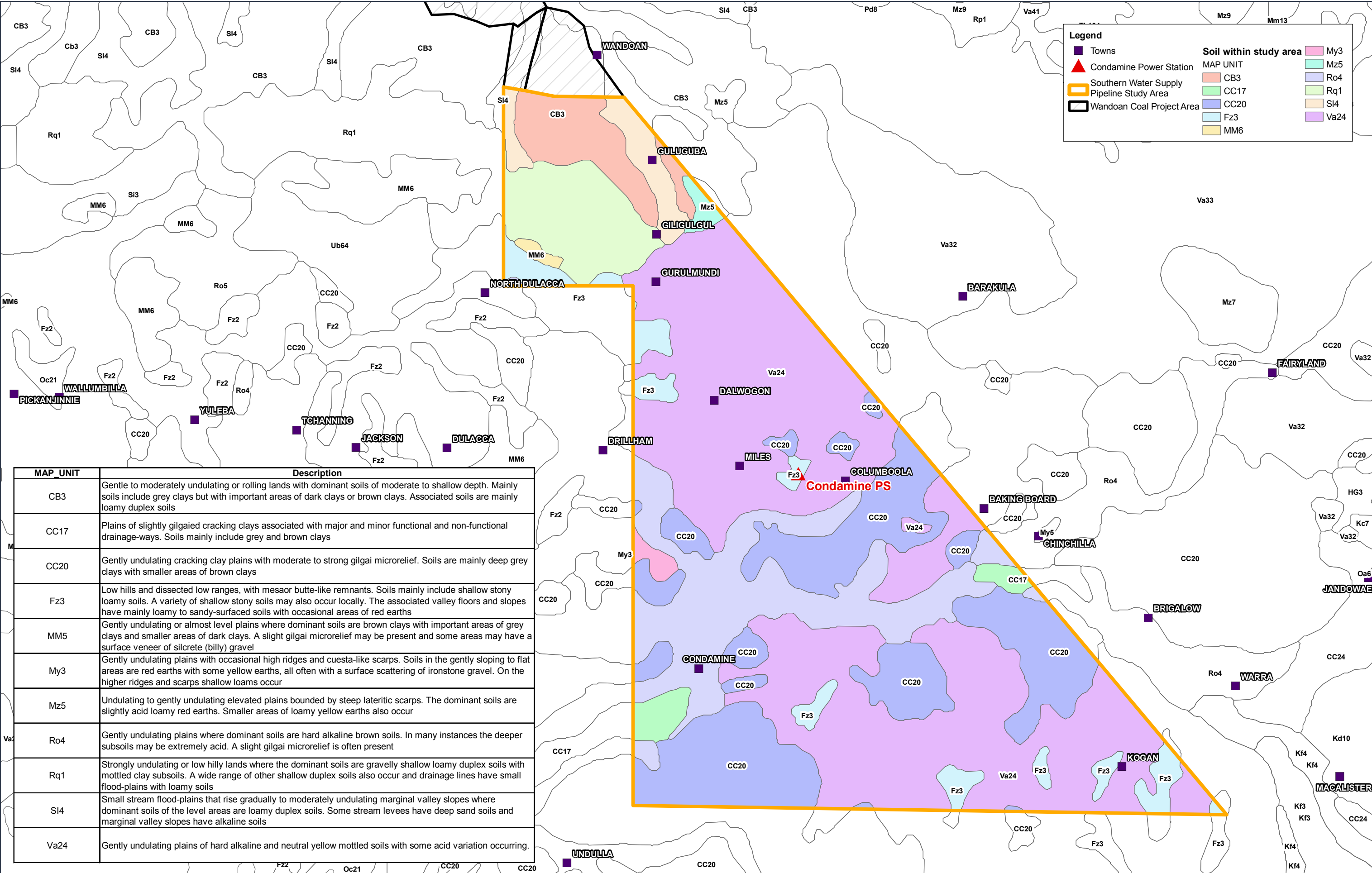
Soil Conservation Plans

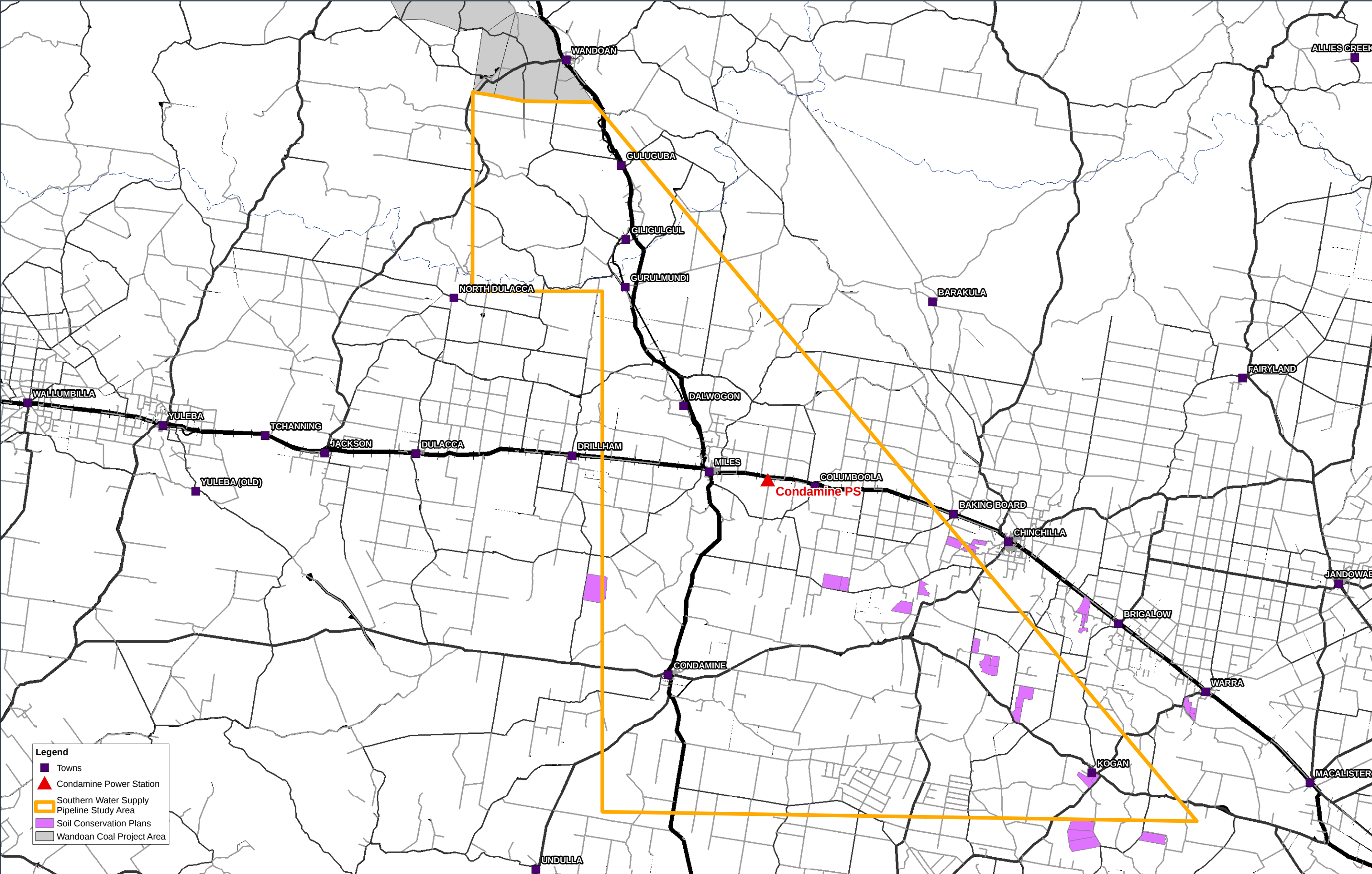
As mentioned above in Section 1.4.2, discussions with the DNRW Toowoomba office (Mr Barry Stone) indicate that a number of properties within the study area are subject to approved Soil Conservation Plans.

Table 2-2 indicates that 29 properties in the study area are subject to approved soil conservation plans approved under the *Soil Conservation Act, 1986*. As can be seen in Figure 2-8, the locations of these properties are all within the southern portion of the study area and will not be affected by the proposed pipeline alignments. Therefore, this criterion has not been further discussed in the comparative assessment of options.

Table 2-2: Properties subject to approved Soil Conservation Plans within the study area

Soil conservation Plan No.	Lot/Plan description	Soil conservation Plan No.	Lot/Plan description
SC330176	Lot 34 on BWR127	SC340069	Lot 35 on DY76
SC330238	Lot 51 on LY33	SC340069	Lot 36 on DY76
SC330238	Lot 1 on LY783	SC340147	Lot 80 on DY1099
SC330238	Lot 50 on LY33	SC340158	Lot 34 on RP12566
SC330344	Lot 10 on RG9	SC340158	Lot 39 on RP912566
SC330374	Lot 47 on L34196	SC340207	Lot 40 on L34238
SC330374	Lot 2 on RP203178	SC340207	Lot 46 on L34248
SC330523	Lot 1 on RP196753	SC340221	Lot 2 on RP126858
SC340037	Lot 44 on DY68	SC340221	Lot 89 on DY1046
SC340037	Lot 45 on DY68	SC340221	Lot 1 on RP108267
SC340069	Lot 37 on DY76	SC340251	Lot 1 on BWR17
SC340251	Lot 14 on BWR49	SC340298	Lot 2 on RP138182
SC340298	Lot 1653 on L34117	SC340298	Lot 1652 on L34117
SC340298	Lot 3 on RP138182	SC340298	Lot 1 RP210311
SC346525	Lot 33 on BWR466		





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2.4.3 Climate

The township of Miles is located centrally within the study area and therefore, climate data for this locality has been included (refer Table 2-3). In general, the Miles region receives summer rainfall and summer temperatures are typically hot. Annual rainfall is markedly less than coastal regions to the east with an annual average rainfall of 651.2 mm. Average temperatures during summer months are in the low 30's whilst average temperatures during the winter months are in the low 20's. Winters are generally dry and cold at night with morning frosts not uncommon. Humidity is generally moderate throughout the year.

Table 2-3: Climate data for Miles

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean max. temp	33.2	32.3	30.8	27.5	23.2	19.8	19.3	21.4	25.1	28.6	31.2	32.9	27.1
Mean min. temp	19.5	19.3	17.0	12.4	7.9	5.0	3.6	4.9	8.5	13.1	16.3	18.4	12.2
Mean rainfall	95.2	75.0	58.6	36.8	39.3	39.6	37.5	29.4	30.8	54.0	66.0	88.6	651.2
Mean 9:00 am relative humidity	60	64	63	64	71	75	72	63	55	53	53	56	62
Mean 3:00 pm relative humidity	41	42	40	41	46	48	44	38	34	34	35	37	40

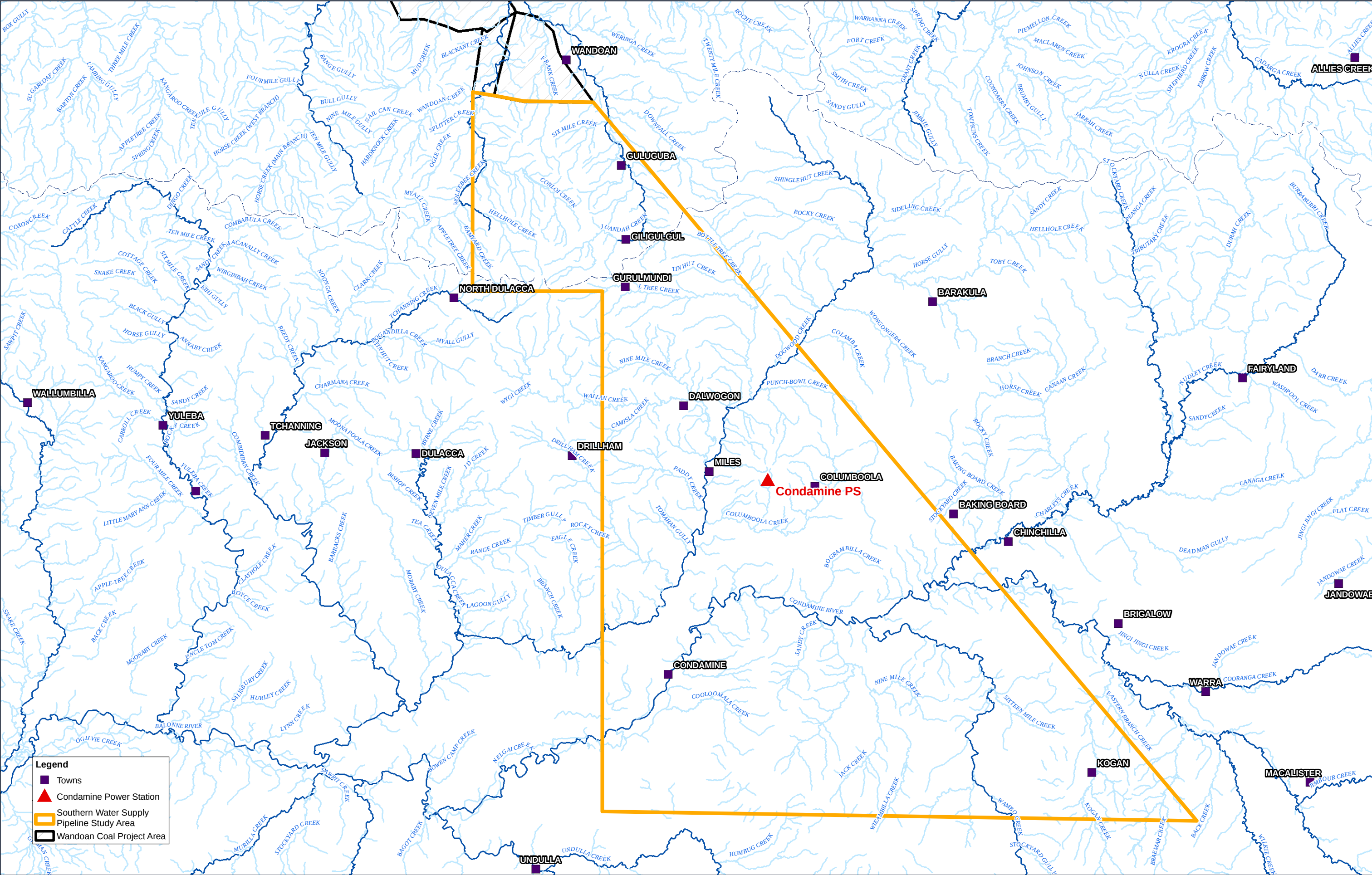
Source: Bureau of Meteorology (downloaded 28 April, 2008)

The general climatic conditions are not expected to differ substantially across the study area and between pipeline route options. Therefore, this criterion is not considered to be a significant determinant in alignment of the pipeline route and will not be considered in the comparative assessment of options undertaken below in Section 4.

2.4.4 Watercourses

For water resource planning purposes, the study area is located in the greater Condamine - Balonne basin which includes the Condamine, Balonne, Maranoa and Merivale River systems. A number of smaller watercourses which are tributaries of the Condamine River system, traverse the study area (refer Figure 2-9). These include (but are not limited to) Dogwood Creek, Wieambilla Creek, Wallan Creek, Bottle Tree Creek and Drillham Creek.

Disturbance of watercourses (e.g. disturbance to bed and banks, removal of vegetation, excavation or placement of fill) generally require statutory approval under the *Water Act 2000* and possibly the Environmental Protection Regulation 1998 (Environmentally Relevant Activity 19 — Dredging). The number of watercourses crossed and the number of regulatory approvals required may have implications for Project timelines and costs. Therefore, the number of watercourse crossings is considered important to route selection and have been included as a criterion in the comparative assessment of options.



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2.4.5 Noise

Limited noise data is currently available for the study area. Background noise levels in the existing environment would be typical of most rural areas and would vary from 30–40 dB(A) at night to 50–60 dB(A) during the day depending on the extent of traffic, machinery operations and general activity in the area. Township areas such as Miles may have slightly higher background noise levels due to the concentration of population and associated noise generating activities.

Given the nature of the proposed pipeline options, operational acoustic emissions are expected to be minimal. Some acoustic emissions can be expected from the pump stations, however, the extent of acoustic emission and potential nuisance caused will depend upon pump station design and separation distance from noise sensitive receivers. Construction of the proposed pipeline may also cause temporary nuisance to surrounding noise sensitive receivers.

Potential impacts to the acoustic environment associated with construction and operation of the proposed pipeline are expected to be consistent across the different pipeline route options and, therefore are not considered to be a significant determining criterion between the different options. No further consideration of potential acoustic impacts has been included in the comparative analysis undertaken in Section 4. Detailed acoustic studies will be completed as part of the EIS process and appropriate management strategies to limit any potential impact to noise sensitive receivers will be identified for implementation where considered necessary.

2.4.6 Fire risk

Bushfire risk analysis mapping prepared by the Queensland Rural Fire Service indicates that bushfire risk is relatively consistent across the study area ranging from low to medium bushfire hazard. The elevated northern portion of the study area containing State Forest reserves is allocated a medium bushfire hazard, whilst the central portion of the study area is allocated a low bushfire hazard. Bushfire hazard increases again in the southern portion of the study area around the Berwyndale South CSM fields. Given that the bushfire hazard trend is consistent across the study area and route options, this criterion is not considered to be a significant determinant between route options and, therefore will not be considered further in the comparative assessment undertaken in Section 4.

2.4.7 Air quality

Limited air quality data is currently available for the study area, however, the study area is expected to encompass the typical characteristics of a largely rural air shed. Local air quality is expected to vary from time to time and associated with land use activities such as machinery operations (ploughing etc).

Localised impacts to air quality may occur as a result of construction of the proposed pipeline, however, negligible impacts are expected during the operation phase due to the nature and design (i.e. underground) of the proposed development. Potential impacts to the local air environment associated with construction and operation of the proposed pipeline are expected to be consistent across the different pipeline route options and, therefore, no

further consideration of potential air quality impacts has been included in the comparative analysis undertaken in Section 4.

Detailed air quality studies will be completed as part of the EIS process and appropriate management strategies to limit any potential impact to nearby sensitive receivers will be identified for implementation where considered necessary.

2.4.8 Flora and fauna

Historical land use practices within the same sections of the study area have resulted in significant clearance of vegetation. Reference to EPA Regional Ecosystem mapping (Version 5.0) indicates that larger areas of 'not of concern' regional ecosystems are located in the southern portion of the study area around the Berwyndale South CSM fields and also within the northern portion of the study area around the townships of Gurulmundi and Giligulgul. Additionally, a number of small, isolated pockets of 'of concern' and 'endangered' regional ecosystems remain scattered throughout the study area, predominantly associated with vegetation in road reserves and waterway riparian vegetation (refer Figure 2-10).

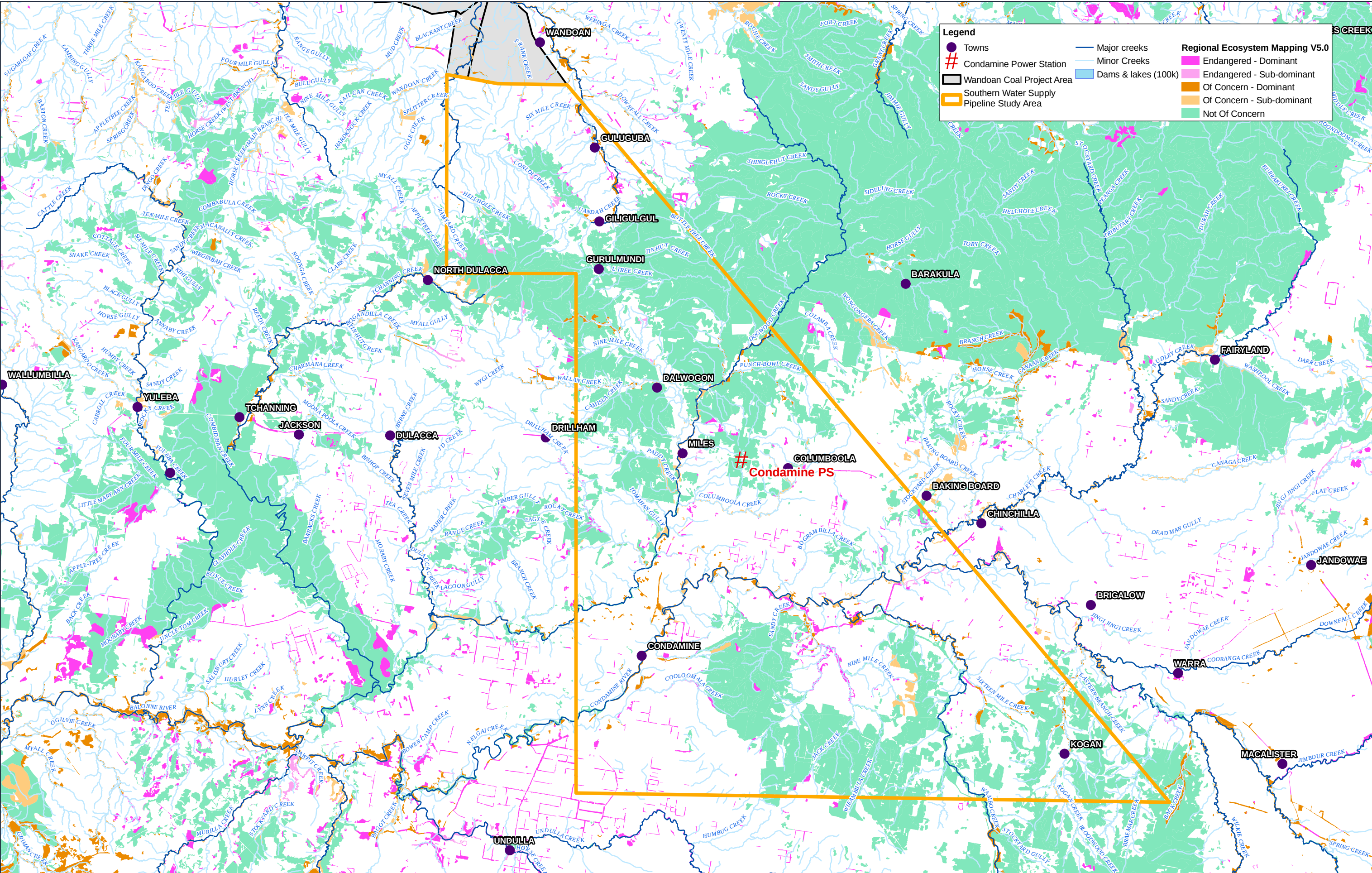
Reference to DEWHA Protected Matters Search Tool results indicate that a number of threatened ecological communities and species are known, may or are likely to occur within the study area. Given the regulatory provisions at both the state and Commonwealth level which apply to use or development of these resources, consideration of protected flora and fauna values is considered to be important to route selection and therefore have been included as a criterion in the comparative assessment of options.

2.5 Social, culture and heritage assessment criteria

2.5.1 Houses and properties

The study area generally comprises rural allotments of varying size which are utilised for predominantly agricultural land use activities including cropping and live-stock grazing. A number of homesteads (residences) and associated out-buildings are located within the study area, particularly within the central and southern portions, associated with good quality agricultural land and the townships of Miles, Columboola and Condamine (refer Figure 2-11).

Acquisition of private property for construction of infrastructure can introduce issues such as increased cost for the Project, increased community anxiety and increased complexity in the acquisition process if a large number of property owners are involved. Proposed pipeline options have deliberately been located within local and State administered road reserves in order to reduce potential impact to local landholders and reduce complexity and cost issues associated with land acquisition/easement establishment. However, a number of the proposed pipeline options still propose to traverse private land and therefore, the number of properties impacted by the proposed pipeline is considered to be an important selection criterion and has been included in the comparative assessment which has been undertaken in Section 4.



Source: Vegetation Communities and Regional Ecosystems of Queensland, Ver 5.0, Environmental Protection Agency 2006. Interactive Resource and Tenure Maps, Department of Natural Resources and Mines 2007. Essential habitat info sourced from the Environmental Protection Agency.

Regional Ecosystems Mapping within the study area



2.5.2 Visual amenity

The proposed pipeline infrastructure is proposed to generally be constructed underground and therefore, is not expected to contribute to on-going visual amenity impacts. However, vegetation clearing will be required in order to facilitate construction of the pipeline and such works may have visual amenity impacts. The extent of vegetation clearing is assessed under the impact on mapped regional ecosystems and therefore is not considered again here.

2.5.3 Cultural heritage

Indigenous cultural heritage

A search of DNRW's register of Aboriginal cultural heritage was undertaken for the study area. The search results revealed that 298 sites, places or artefacts of Aboriginal cultural heritage significance are located within the study area. The types of recorded cultural heritage sites, places and artefacts include (but are not limited to) rock shelters, trees, tools, quarries, weirs and middens. Predominantly, these sites, places and artefacts are located along the Condamine River, however have also been recorded within other locations in the study area. Review of preliminary desk-top information indicates that the proposed pipeline route options will not impact on registered Aboriginal cultural heritage sites. Therefore, this criterion has not been further considered in the comparative assessment of options.

It is to be noted that the accuracy of the locations of the sites as provided by DNRW has not been verified, and the results represent only known sites on the register that have been identified through surveys undertaken as part of other infrastructure development projects. Accordingly, there is potential for further cultural heritage sites to be present in the study area, particularly in the vicinity of watercourses and permanent or semi permanent waterholes or natural springs or locations with outstanding landscape features such as rock outcrops or caves. Cultural heritage surveys and consultation with relevant indigenous groups/stakeholders will be conducted as part of the EIS undertaken for the Wandoan Coal Project.

Non-indigenous cultural heritage

As mentioned above in Section 1, no places, objects or sites listed on the Queensland Heritage Register or Register of the National Estate are located along or immediately adjacent to the proposed pipeline route options. Therefore, minimal impacts to non-indigenous cultural heritage values are anticipated and this criterion will not be considered further in the comparative assessment of options.

2.5.4 Native title

The registered Native Title Claimants for the study area are the Iman (#2) and Barunggam People with the associated active native title claims QC 97/55 and QC 99/5 respectively. Given the presence of Native Title claims over the entire study area, this matter will apply to all pipeline route options and is not dependent upon route selection. Therefore, this criterion will not be further considered in the comparative analysis of options undertaken in Section 4 below.

2.6 Economic criteria

For commercial in confidence reasons, an analysis of costs associated with the various pipeline options is not included within this assessment.

2.7 Summary of assessment criteria

Table 2-4 below indicates how these assessment criteria were considered in developing the performance measures, against which each option will be measured. As mentioned above, in some cases it is possible to establish that a particular criterion will not be useful in the assessment process and therefore no further analysis will be undertaken.

Table 2-4: Assessment of potential selection criteria

Assessment criteria	Relevance	Criteria relevant?	Performance measures
Regulatory			
Commonwealth legislation (commensurate with flora and fauna criteria below)	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Yes	Approximate area of threatened ecological communities to be cleared
State legislation (commensurate with flora and fauna criteria below)	<i>Vegetation Management Act 1999</i>	Yes	Approximate area of mapped regional ecosystems to be cleared
Planning			
Land use	Land uses associated with temporary or permanent infrastructure or equipment i.e. gas fields, irrigation etc. Sensitive land uses such as schools, community facilities, cemeteries etc.	No	N/a
Land tenure	Land tenure across the study area is consistent (i.e. Rural A, Rural B, road reserve) and does not vary significantly between pipeline options.	No	N/a
Good Quality Agricultural Land	Sterilisation of or impact on productive and intensive agricultural land (e.g. good quality agricultural land should be minimised).	Yes	Area of GQAL traversed
Petroleum and mining leases	Pipeline has potential to sterilise resources to future use. Approval from lease holders required for pipeline alignment, design and construction.	Yes	- Length of ML's and MDL's traversed - Length of PLs traversed
Future resource areas	Resource areas have been identified for future development within the study	Yes	Length of identified key resource areas to be crossed

Assessment criteria	Relevance	Criteria relevant?	Performance measures
	area. Pipeline route options should avoid sterilisation of these resources.		
Local government planning schemes	The proposed pipeline is considered to be exempt development in relevant planning schemes.	No	N/a
Existing infrastructure	Pipeline within existing/proposed infrastructure easement etc will require approval from administering authority. Implications for property access, traffic control during construction. Opportunities for co-location of infrastructure.	Yes	Length of pipeline co-located with existing/reserved infrastructure
Environment			
Topography	The general terrain is generally consistent across the study area and varies from relatively flat alluvial plains within the central and southern portions of the study area to elevated areas within the north.	No	N/a
Geology and soils	All pipeline options will traverse a similar route in terms of soils and geology. Therefore, the overall relevance of this criterion to options assessment and comparison is considered to be negated.	No	N/a
Watercourses and wetlands	Crossing waterways and wetlands may have implications such as application of regulatory provisions and increased costs for design and construction. Therefore, the number of crossings may influence the route selection.	Yes	Number of waterways to be crossed
Fire risk	Bushfire fire risk mapping indicates that the study area varies between low and medium bushfire hazard. Fire risk does not vary significantly between options.	No	N/a
Flora and fauna values	Potential impacts on threatened vegetation communities could differentiate between route options and may influence route selection.	Yes	Approximate area of mapped regional ecosystems to be cleared

Assessment criteria	Relevance	Criteria relevant?	Performance measures
Social			
Residences and sensitive receptors	Existing residences and associated buildings will be identified and avoided during the route selection process.	No	N/a
Properties and landholders	The pipeline route options may traverse privately owned and leased land. This may have implications for Project consultation and cost.	Yes	Number of properties affected
Visual amenity	The proposed pipeline will be located underground and therefore, operational visual amenity is expected to be minimal. Construction impacts through clearance of vegetation may be evident, however, this will be assessed under flora and vegetation criteria.	No	N/a
Indigenous cultural heritage	Registered Aboriginal cultural heritage sites, places and/or objects within the study area will not be impacted by the proposed pipeline options.	No	N/a
Non-indigenous cultural heritage	Non-indigenous places, sites, objects etc have not been identified within the study area. Therefore, no impact to these cultural resources is expected.	No	N/a
Economic			
Indicative pipeline cost	Length of pipeline, number of pump stations etc are all factors which may influence the cost of the proposed pipeline.	Yes	N/a

3. Option development

The development of pipeline route options for consideration in this route selection was based on a number of common requirements for the proposed infrastructure which included:

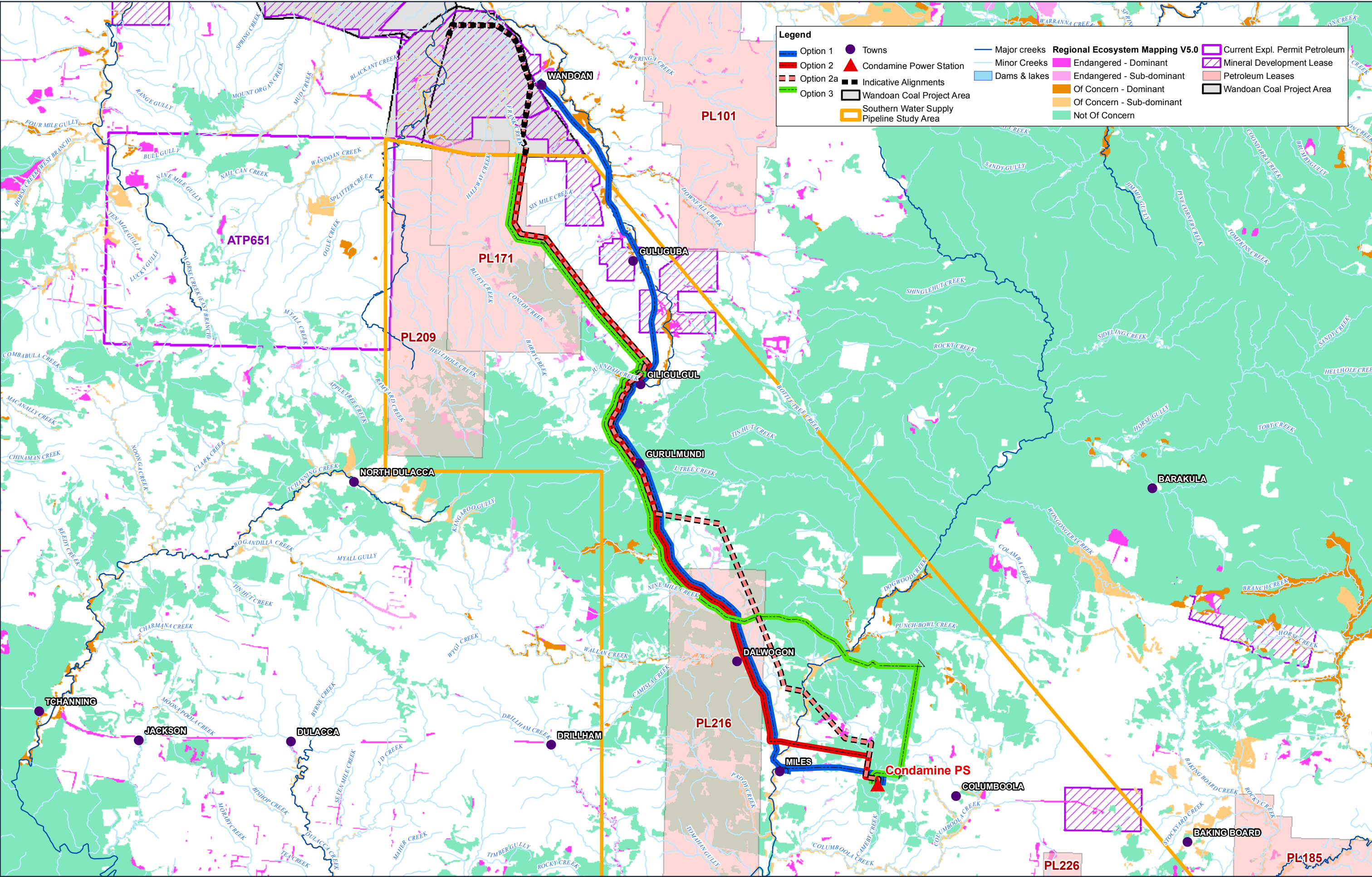
- transport of CSM water from the Condamine Power Station to the Wandoan Coal Project area
- has capacity for delivery of up to 11,400 ML/a
- delivery of the water direct to a water storage tank/dam on the Wandoan Coal Project area
- minimisation of overall route length to reduce the dynamic (friction) head loss and capital cost associated with the pipeline
- adopting a configuration warranting minimal capital cost in terms of pipeline class and diameter, against the cost of a secondary pumping station.

Additionally, a number of site specific, practicality and constructability issues were identified for inclusion in pipeline option development. The additional criteria considered included:

- minimisation of height extremes to reduce the overall static head, number of required pump stations and overall pipe diameter
- preferable co-location of infrastructure in order to reduce or avoid potential land use impacts on local landowners and reduce the number of parties involved in subsequent land acquisition/easement establishment negotiations.

Based on the issues outlined above, four potential pipeline route alignments were identified, to which the selection criteria detailed in Section 2 have been applied and a comparative assessment undertaken (refer Section 4). Additionally, a pipeline alignment which is aligned with a section of the Miles to Wandoan railway has been identified as an alternative alignment to utilising the Leichhardt Highway road reserve. A comparative assessment between pipeline alignment along rail as opposed to road infrastructure has been undertaken for this section (Miles to Gurulmundi) of the overall pipeline length.

A description of the proposed pipeline alignments is included in the following sections and the proposed alignments are diagrammatically displayed in **Error! Reference source not found.**



Source: Vegetation Communities and Regional Ecosystems of Queensland, Ver 5.0, Environmental Protection Agency 2006. Interactive Resource and Tenure Maps, Department of Natural Resources and Mines 2007. Essential habitat info sourced from the Environmental Protection Agency.

Proposed water supply pipeline route options

3.1 Description of options

The following Sections 3.1.1 to 3.1.5 provide a brief description of the general alignment of the proposed pipeline routes. A number of similarities between the pipeline options occur including:

- all options will commence at the Condamine Power Station
- all options deviate from the Leichhardt Highway at Baileys Road, south of Gurulmundi and rejoin the Leichhardt Highway north of the Giligulgul township. This deviation is made to include suitable topography and land tenure for location of a header tank which may be required in order to allow for gravity feed to the end point at the Wandoan Coal Project site
- all options terminate at a water storage dam/tank at the proposed mine infrastructure area within the Wandoan Coal Project area.

The following option descriptions indicate the similarities and differences between the pipeline route options considered as part of this report.

3.1.1 Option 1

Option 1 commences at the Condamine Power Station and progresses in a westerly direction along the Warrego Highway toward the township of Miles. At Miles, the alignment turns to the north and follows the Leichhardt Highway. A deviation south of the township of Gurulmundi is made as described above and then the pipeline follows the Leichhardt Highway for the remainder of its length until it meets the eastern boundary of the Wandoan Coal Project MLA. It then travels in a westerly direction to its subsequent termination point at the proposed mine infrastructure area of the Wandoan Coal Project site. The Toowoomba-Quilpie rail line is intersected at Miles, whilst the Miles-Wandoan rail line is intersected on the Leichhardt Highway in the vicinity of Lot 7 on plan RP59707. Option 1 is approximately 99 km in length.

3.1.2 Option 2

Option 2 commences at the Condamine Power Station and progresses in a northerly direction to an existing high voltage transmission line easement. A turn to the west is then made and the pipeline travels along the existing transmission line easement until it intersects with the Leichhardt Highway. A turn to the north is made and the pipeline travels along the Leichhardt Highway road reserve until the deviation (as described above) is made south of Gurulmundi. North of Giligulgul the pipeline turns to the north-west and traverses Lot 28 CP885313, Lot 44 FT988, Lot 36 FT213, Lot 4 FT526 and Lot 39 FT1000 prior to meeting with Fosters Road. The alignment then follows Fosters Road in a westerly direction and then turns north to run along Peakes Road to meet the southern boundary of the Wandoan Coal Project MLA. The alignment across the MLA area from the boundary to the mine infrastructure area has not yet been determined and will depend upon finalisation of a mine layout including haul road, pit and dump locations. Option 2 is approximately 93 km in length.

3.1.3 Option 2A

Option 2A is similar to Option 2 described above for the majority of the proposed pipeline alignment. A deviation between the two routes occurs at the existing high voltage transmission line easement where Option 2A continues in a northerly direction to Gearys Road. A turn to the west is made and the pipeline continues along Geary's Road to the north-east corner of Lot 12 on plan RP893200. From this point, the alignment turns north-west and traverses several properties prior to intersecting Pelham Road and Dogwood Creek. After its intersection with Dogwood Creek, the alignment turns west and joins with Myall Park Road. From Myall Park Road, the alignment continues in a north-west direction across several properties, almost parallel to Eleven Mile Creek. The alignment crosses Leichhardt Creek-Taroom Road in the vicinity of Lot 4 on plan AU18. The alignment continues in a north-westerly direction, traversing several properties, until it meets an un-named road reserve in the vicinity of Lot 36 on plan AU35 and Lot 31 on AU36. A turn to the west is then made and the alignment continues along the un-named road reserve until its intersection with the Leichhardt Highway. The proposed alignment intersects the Miles-Wandoan rail line prior to meeting the Leichhardt Highway. From this point on the Leichhardt Highway, Option 2A follows the alignment of Option 2 until it meets the southern boundary of the Wandoan Coal Project MLA and its subsequent termination point at the proposed mine infrastructure area of the Wandoan Coal Project site. The alignment across the MLA area from the boundary to the mine infrastructure area has not yet been determined and will depend upon finalisation of a mine layout including haul road, pit and dump locations. Option 2A is approximately 100 km in length.

3.1.4 Option 3

Option 3 crosses the Toowoomba-Quilpie rail line between the township of Columboola and the Condamine Power Station and then turns east along the Warrego Highway for a short distance. The alignment then turns north at Kerwicks Road and this road is utilised until the intersection with Hookwood Road where the alignment turns west and after some distance crosses Pelham Road and the confluence of Punchbowl and Dogwood creeks. From here, the alignment continues to run to the north along Myall Park Road and then Leichhardt Creek-Taroom Road to the Leichhardt Highway. From the Leichhardt Highway, Option 3 follows the alignment of Option 2 until it meets the southern boundary of the Wandoan Coal Project MLA and its subsequent termination point at the proposed mine infrastructure area of the Wandoan Coal Project site. The alignment across the MLA area from the boundary to the mine infrastructure area has not yet been determined and will depend upon finalisation of a mine layout including haul road, pit and dump locations. Option 3 is approximately 108 km in length.

3.1.5 Miles to Gurulmundi alternatives

Miles to Wandoan railway

This alternative, which utilises the railway alignment generally between the Myall Park Road/Leichhardt Highway intersection (north of Miles) and the township of Gilgilgul is approximately 30 km in length.

Leichhardt Highway

This alternative, which is proposed to be generally located within the road reserve of the Leichhardt Highway, is approximately 31 km in length. This alignment follows the deviation onto Bailey's Road and through the township of Gilgulgul.

4. Comparative assessment of options

This section provides a comparative assessment of pipeline route options according to performance criteria identified in Section 2. A ranking approach has been used. These rankings relate to the extent the option results meet performance criteria, taking into consideration level of impact and other aspects discussed in Section 2. The ranking system ranges from 1 (least impact or preferred option), represented by green colouring, to 5 (greatest impact or least preferred), indicated by red. It should be noted that more than one option can be awarded the same ranking should assessment against the performance criteria be equal or comparative. An assessment is made based on professional judgement if necessary as to whether any difference between options is significant for the purpose of this coding. An option with all 1's, or green colouring, is preferred over one with one or more 5's (red colouring). Otherwise, for the purpose of this assessment the preferred option is generally the option with fewer rankings of 5.

Where a simple comparison of rankings for the options under consideration might be misleading because of the relative importance of the criteria being considered, an assessment has been made based on the professional judgement of relevant specialists and commentary provided on the assessment table. Table 4-1 shows the four options that have been comparatively assessed to determine the optimal pipeline route alignment. This table is intended as a visual tool only, and a description of the assessment against each performance criteria is discussed in Section 4.1.

It should be noted that a pipeline corridor width of 50 m has been used in calculations prepared for Table 4-1. Whilst it is expected that the actual pipeline and access track will likely only have a construction footprint of 10 m width, designs are still in preliminary stages and it would be inappropriate to fix the width at this stage. Additionally, adopting a pipeline corridor width of 50 m will allow for realignment of the pipeline in some areas where additional environmental values may be observed on-the-ground as part of field studies conducted during the environmental impact assessment. The calculations in Table 4-1 do not include any areas for stockpiling or laydown of equipment. It is assumed that existing and suitable cleared areas will be found for this purpose during construction works. The only land requirement will be the area of any future easement which will only be known once the detailed design has been completed.

Table 4-1: Comparative assessment of options (for pipeline corridor width of 50 m)

Performance measure	Option 1	Option 2	Option 2A	Option 3
Properties				
Number of properties affected	1	4	5	3
Co-location of infrastructure				
Length of pipeline co-located with existing/reserved infrastructure	1	3	5	3
Waterways				
Number of waterways to be crossed	4	2	2	2
Approximate area mapped of mapped regional ecosystems to be cleared				
Total area of all regional ecosystems along option alignment	2	1	3	5
GQAL				
Area of GQAL traversed outside of road reserves	1	3	5	1
MLs, MDLs, PLs and resource areas				
Total length of MLs, MDLs, PLs and resource areas to be traversed	1	5	3	3

4.1 Review of criteria

4.1.1 Number of properties affected

Table 4-2 outlines the number and area (ha) of privately owned properties which would be affected by each proposed pipeline alignment option. The area calculation is based on a potential corridor width of 50 m.

Table 4-2: Comparison properties affected across pipeline route options

Route option	Total no. of properties affected	Total area of properties affected (ha)
Option 1	14	84.5
Option 2	34	213.2
Option 2A	39	264
Option 3	24	177.4

Location of large sections of the pipeline within privately owned allotments may have implications including increased Project cost associated with greater area of land easement and access requirements and (possible) more complex negotiation processes given the increased number of landholders involved. In terms of the alignment options considered, Option 1 would affect the least amount of private properties, followed by Option 3 which affects an additional 10 properties and then Option 2 which affects an additional 10 properties to Option 3. Option 2A affects the greatest number of privately owned properties.

An alignment along the Leichhardt Highway would affect significantly less private properties than an alignment along the Miles-Wandoan railway line and hence is preferred for this performance criteria (refer Table 4-3).

Table 4-3: Comparison between Leichhardt Highway and Miles-Wandoan railway alignments

Route option	Total no. of properties affected
Leichhardt Highway	3
Miles – Wandoan railway	35

Option 1, aligned along the Leichhardt Highway, is the preferred alignment option based on this performance measure.

4.1.2 Length of pipeline within road reserve

Table 4-4 outlines the length of the pipeline options which are proposed to be co-located with existing infrastructure within the study area, namely local government and state controlled roads and existing transmission line easements. Co-location of infrastructure is considered to be beneficial and to create opportunities on a regional scale for reducing or minimising potential impacts associated with provision of infrastructure.

Table 4-4: Comparison of pipeline lengths associated with existing and/or proposed infrastructure reserves or easements

Route option	Length of pipeline (km)	Length of pipeline proposed within road reserve (km)	Length of pipeline within transmission line easement	% of total pipeline length co-located
Option 1	98.6	81.7	--	82.86
Option 2	92.8	50.1	8.7	63.36
Option 2A	99.6	46.8	--	46.98
Option 3	107.9	72.4	--	67.09

A majority of the length of pipeline Options 1, 2 and 3 are located within local government and state controlled road reserves. Part of Option 2 is also located within an existing high voltage transmission line easement located to the north of and parallel to the Warrego Highway. As mentioned in preceding sections, the study area contains a large amount of productive and intensive land uses as well as resource based land uses. Location of a pipeline across these land uses and resource areas may actually sterilise areas of land to these uses, thereby reducing opportunity for local landowners and future resource development. For this reason, those pipeline routes which have the greatest length co-located with existing infrastructure are expected to render the least potential for sterilisation of land use and resource development and therefore are preferred.

It should be noted, however, that approval and/or consent from the administering authority for the existing infrastructure will be required in order to construct the pipeline within any associated easements.

In terms of this performance measure Option 1 is the preferred alignment option.

4.1.3 Number of waterway crossings

The waterways potentially impacted by the proposed pipeline development include (but are not limited to) Dogwood Creek, Nine Mile Creek, Juandah Creek and Six Mile Creek. As detailed in Table 4-5, Options 2, 2A and 3 traverse a similar number of watercourses across their total length whilst Option 1 traverses a greater number of watercourses along its total length.

In terms of this performance criteria, Options 2, 2A and 3 are equally preferred route options.

Table 4-5: Comparison of waterway and wetland crossings across pipeline route options

Route option	Total number of waterway crossings
Option 1	35
Option 2	29
Option 2A	27
Option 3	29

There is little difference between an alignment along the Leichhardt Highway or along with Miles-Wandoan rail line with respect the number of watercourse crossings and therefore there is not a clear preference for either of these options based on this performance criteria.

4.1.4 Approximate area of mapped Regional Ecosystems to be cleared

Calculations prepared for this comparative assessment of options indicate that all four proposed pipeline alignment options will involve clearing of some mapped regional ecosystem areas, as shown in Table 4-6.

Initial ecological field assessments of the proposed pipeline alignments have not yet been conducted and, therefore potential inaccuracies in the regional ecosystem mapping may exist which have not yet been identified. It is recommended that areas of mapped regional ecosystems are considered during the detailed assessment of the alignment, and where required, mitigation measures developed to minimise any impacts.

Table 4-6: Comparison of regional ecosystem areas to be crossed

Route option	Area (ha) of 'endangered – dominant' regional ecosystem	Area (ha) of 'of concern – dominant' regional ecosystem	Area (ha) of 'of concern – subdominant' regional ecosystem	Area (ha) of 'not of concern' regional ecosystem	Total area (ha) of regional ecosystem areas to be crossed
Option 1	4.54	20.11	7.3	101.97	133.92
Option 2	1.32	4.57	7.69	120.63	134.21
Option 2A	5.97	1.56	1.8	138.4	147.73
Option 3	1.32	5.65	--	183.6	190.57

Note: 'endangered — subdominant' regional ecosystems will not be affected by the proposed pipeline alignments and therefore, is not listed in the above table.

Option 3 has the potential to impact the largest area of mapped regional ecosystems and includes the largest area 'not of concern – dominant' mapped regional ecosystem and second largest area of 'of concern - dominant' regional ecosystem. Therefore, Option 3 is the least preferred pipeline alignment option based on this performance measure.

Option 1 has the potential to impact the least overall amount of mapped regional ecosystems within the pipeline alignment. However, this option would impact the second largest amount of 'endangered — dominant' and 'of concern — dominant' mapped regional ecosystems. The overall area of mapped regional ecosystems potentially impacted by Option 2 is slightly larger than compared with Option 1, however, it has the potential to impact on a lesser areas of 'endangered — dominant' and 'of concern — dominant' mapped regional ecosystems than Option 1. Option 2A has the potential to impact on a greater overall amount of mapped regional ecosystem areas than Options 1 and 2 and therefore, is not the preferred option based on this performance measure.

Given that the calculations contained in Table 4-6 are based on a 50 m wide corridor, it is possible that the pipeline alignment may be repositioned or relocated within the corridor to avoid 'endangered — dominant' remnant vegetation and therefore, reduce any associated impacts and areas of 'endangered — dominant' remnant vegetation required to be cleared. It is recommended that final positioning of the pipeline within the corridor be undertaken as

part of the environmental impact assessment and only be undertaken after field inspections have been conducted to ratify the accuracy of the regional ecosystem mapping.

In summary, Options 1 and 2 potentially impact on similar amounts of mapped regional ecosystem areas however, Option 1 potentially impacts on greater areas of 'endangered — dominant' and 'of concern — dominant' than Option 2. Therefore, Option 2 is the preferred alignment option based on this performance criteria.

There is little difference between an alignment along the Leichhardt Highway or along with Miles-Wandoan rail line with respect the amount of mapped regional ecosystems potentially impacted and therefore there is not a clear preference for either of these options based on this performance criteria.

4.1.5 Good quality agricultural land

As detailed in Table 4-7, all four options traverse land mapped as Class A and Class B GQAL. Whilst all pipeline options are proposed to be constructed underground, an easement will be required in which the pipeline and associated infrastructure (e.g. access and maintenance track) will be accommodated. The terms and conditions of the easement agreement may limit (in some cases) or restrict the land use activities which can be conducted within the easement area, thereby potentially affecting a landowner's use of the easement area and GQAL.

Table 4-7: Good quality agricultural land

Route option	Class A (ha)	Class B (ha)	Total (ha)
Option 1	0	0.926	0.926
Option 2	4.07	8.56	12.63
Option 2A	9.49	10.6	20.09
Option 3	0.03	0.19	0.22

There is a significant difference between an alignment along the Leichhardt Highway or along with Miles-Wandoan rail line with respect the amount of GQAL traversed. An alignment along the Miles-Wandoan rail line has the potential to impact a greater amount of GQAL and hence is the least preferred in terms of this performance criteria.

In terms of this criterion, Options 1 and 3 aligned along the Leichhardt Highway traverse the least amount of GQAL outside of road reserves and therefore, are equally preferred alignment options.

4.1.6 Mining leases, petroleum leases and resource areas

All four pipeline alignment options have been designed to minimise conflict with existing MLs, MDLs, PLs and identified resource areas. However, all pipeline alignment options still traverse these areas (refer Table 4-8), although where crossing is required, proposed pipeline alignment options are restricted to existing road reserves.

Table 4-8: Comparison of MLs, MDLs, PLs and resource areas to be crossed

Route option	Length of MLs/MDLs traversed (km)	Length of PLs traversed (km)	Length of resource areas traversed (km)	Total (km)
Option 1	7.36	14.73	10.74	32.83
Option2	17.63	23.98	9.86	51.47
Option 2A	17.63	15.54	9.94	43.11
Option 3	17.63	19.11	9.96	46.7

Option 1 traverses two (2) existing MDLs located between the townships of Giligulgul and Guluguba whereas Options 2, 2A and 3 do not traverse any existing MDLs outside of the Wandoan MDL area. All four (4) pipeline options traverse existing PLs with Option 1 traversing the shortest length and Option 2 traversing the greatest length. All proposed pipeline options traverse similar lengths of identified resource areas with Option 1 traversing a slightly greater amount.

In terms of overall potential impact to these assessment criteria, Option 1 is the preferred option as it traverses the least combined distance of existing MLs, MDLs, PLs and resource areas.

4.1.7 Indicative pipeline cost

For commercial in confidence reasons, an analysis of costs associated with the various pipeline options is not included within this assessment.

4.1.8 Comparative analysis

A preliminary hydraulic analysis has been performed on each of the four options. Maximum elevations on all pipeline routes are of the order of 405 m and occur between the townships of Gurulmundi and Giligulgul. Surface elevations fluctuate with minimum elevations on the order of 240 m AHD in stream beds. The final elevation at the mine infrastructure area on the Wandoan Coal Project MLA is approximately 250 m AHD.

The initial design seeks to minimise the pipe diameter as much as possible, to reduce overall costs. As pipe diameters are reduced, friction within the pipe increases. As a result, the pump head required to drive the water through the pipeline increases.

It is assumed that one pump station at Condamine Power Station will provide sufficient head to drive the water nearly 100 km to the raw water dam in the Wandoan Coal Project mine infrastructure area.

Preliminary hydraulic analysis draped all four routes over existing topographic data. While the use of PE pipe was considered, high heads at the pump station require a very thick walled pipe. As a result PE pipe is not cost competitive to ductile iron with cement mortar lining (DICL) or mild steel with cement mortar lining (MSCL) pipe. Maximum pressure in the pipe was limited to 350 m of head so that DICL PN35 could be used. It was assumed that a single pipe diameter would be used for the length of the route. During subsequent design stages the pipeline design should be optimised to ensure that both capital costs associated with pipe and pump works and operation costs are minimised. Note that water hammer analysis must be performed in subsequent design stages and incorporated into pipeline

design and material selection, however this is not expected to significantly impact pipeline design or relative capital cost estimates. Indicative design parameters for all proposed pipeline options (for 40 Mt/a scenario) are provided in Table 4-9.

Table 4-9 Indicative design parameters for pipeline options (40 Mt/a scenario)

Design parameter	Option 1	Option 2	Option 2A	Option 3
Pipe specification	DICL pipe — DN600 PN35 AS/NZS 2280 K9	DICL pipe — DN600 PN35 AS/NZS 2280 K9	DICL pipe — DN600 PN35 AS/NZS 2280 K9	DICL pipe — DN600 PN35 AS/NZS 2280 K9
Pipeline length	99 km	101 km	100 km	108 km
Pump power requirement (kW)	1,188	1,279	1,255	1,376
Maximum pressure head (m)	195	214	210	230
Static head (m)	69	69	69	69
Loss factor K	0.15	0.15	0.15	0.15
Pumping hours (hr/day)	20	20	20	20
Flow rate (l/s)	434	434	434	434
Flow rate (ML/day)	31	31	31	31
Flow rate (ML/annum)	11,400	11,400	11,400	11,400

4.1.9 Qualitative assessment of land use

As noted in Section 2.3.1, there are likely to be significant land use impacts where proposed route options pass through different existing land uses. Some quantitative assessment of the potential impacts of the pipeline alignments on existing land uses has been undertaken in other assessment criteria such as good quality agricultural land and location of MLs, MDLs, PLs and resource areas. However, the comparative assessment has not considered potential impacts to higher density population centres such as Miles, Gurulmundi and Giligulgul. A quantitative performance measure for this assessment criteria has not been developed and therefore a qualitative discussion is required.

A number of higher density population areas occur within the study area such as Miles, Condamine and other smaller townships including (but not limited to) Dalwogon, Giligulgul and Gurulmundi. These townships generally exhibit higher concentration of population and increased provision and standard of associated services and community infrastructure such as electricity, water and sewage reticulation, telephone services, sealed roads with kerb and channel, concrete footpaths, kerbside landscaping, private property accesses etc. These services are usually provided within the road reserve and therefore already exist within the same corridor proposed for the pipeline alignments. For this reason, it is considered that proposed pipeline alignments which pass through higher density population areas would result in an unacceptable level of community inconvenience and potential impacts to services and existing community infrastructure.

A qualitative assessment of proposed pipeline route options and existing land use indicates that Option 1 is least preferred as this proposed alignment passes through Miles, which is an area of high population density (relative to the study area). It is considered that the potential impacts of this alignment, such as interference with existing community infrastructure (e.g. local roads, property accesses, electricity distribution infrastructure, water reticulation infrastructure etc) within the township of Miles would be prohibitive. Options 2, 2A and 3 are not aligned through Miles, however do pass through a number of small townships within the northern part of the study area such as Gurulmundi, Giligulgul and Guluguba. Options 2 and 2A are equally preferred in this regard as, whilst these alignments pass through the townships of Gurulmundi and Giligulgul, the alignments turn west prior to passing through the township of Guluguba, through which Option 3 also passes.

4.2 Conclusion

Four options were considered for analysis for a proposed route to supply the Wandoan Coal Project with water from the Condamine Power Station, approximately 90 km to the south-east near the township of Columboola. Additionally, alternative alignments, being the Leichhardt Highway and the Miles-Wandoan rail line, were identified for the section between Miles and Giligulgul.

With regard to the alternative alignments proposed along the Leichhardt Highway or the Miles-Wandoan railway corridor, the preference is for utilising the Leichhardt Highway road reserves due to lesser impact on private properties and good quality agricultural land. For all other performance criteria examined there was minimal preference indicated between these options.

The comparative assessment of options clearly indicates that of all the options considered, Option 1 is preferred for the majority of performance criteria examined. However, the alignment of Option 1 passes directly through the township of Miles and, for the purposes of this report, potential impacts of this alignment, such as interference with existing community infrastructure (e.g. local roads, property accesses, electricity distribution infrastructure, water reticulation infrastructure etc) within the township of Miles is considered prohibitive. Therefore, for this reason, Option 1 is not considered to be the overall preferred option.

Similarly, Options 2A and 3 are also not preferred alignments for the CSM water supply pipeline from Condamine Power Station. The comparative assessment of the options indicates that Option 2A is the least preferred option with regard to potential impact on the number of properties affected, the amount of good quality agricultural land traversed and the least potential for co-location of infrastructure. Option 3 has the greatest potential impact on mapped regional ecosystems and is also the mostly costly pipeline option.

Option 2 is supported as the preferred option for the CSM water supply pipeline. With regard to mapped regional ecosystems, Option 2 potentially impacts on lesser areas of 'endangered — dominant' and 'of concern — dominant' than Option 1 and also has potential to impact a similar total area of mapped regional ecosystems when compared with Option 1. With regard to the other assessment criteria considered, Option 2 performs well and negatively affects the least number of performance measures. Option 2 has good potential for co-location of infrastructure with local and State roads as well as existing transmission line easements and traverses a moderate area of good quality agricultural land. It is considered that Option 2 is the pipeline option which achieves the most balance overall and across all of the comparative assessment criteria. However, it should be noted that Option 2 is recommended

is recommended as the preferred option subject to:

- discussions with infrastructure providers (such as the Department of Main Roads, Queensland Rail, local councils, gas producers, electricity providers, and other easement holding parties)
- discussions and negotiations with landowners potentially affected by the proposed Project
- discussions and agreements associated with indigenous cultural heritage groups
- clarification of any associated Native Title issues.

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