

APPENDIX 2-1-SV2.4

ADDENDUM TO SOUTHERN CSM WATER SUPPLY PIPELINE ROUTE SELECTION REPORT

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

February, 2009

Wandoan Joint Venture



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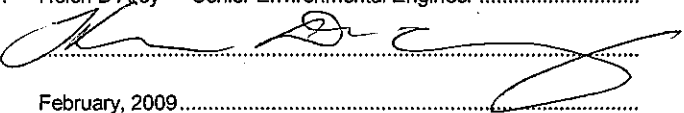
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Executive summary

As part of the assessment of the Wandoan Coal Project on behalf of the Wandoan Joint Venture (WJV), Parsons Brinckerhoff (PB) was commissioned to undertake a route selection for the proposed southern coal seam methane (CSM) water supply pipeline between the Wandoan Coal Project mining lease application (MLA) areas and the Condamine Power Station located approximately 90 km to the south-east of the MLA areas. This route selection exercise resulted in a preferred alignment for the water supply pipeline being recommended (refer to Option 2 in 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB).

Within the northern portion of Option 2, the preferred alignment traversed a number of private properties to the north-east of Cherwondah State Forest, generally between Giligulgul township in the south-east to Peakes Road in the north-west. Following public and landholder consultations, alternative alignments for this section of the proposed water supply pipeline have been investigated and are the subject of this addendum report.

The purpose of this report is to investigate potential route alignment options for the northern portion of the southern CSM 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 supplementary environmental impact assessment.

Investigations of potential pipeline route options involved a review of available desktop information and data sources. Potential pipeline route options were assessed by considering a range of issues or selection criteria that could be interpreted from this information. Three potential pipeline route alignments (Options A, B and C) were identified for the comparative assessment. A number of assessment criteria were identified and investigated with regard to the identified route options and the subsequent comparative assessment indicates that Option B provides the best outcome with regard to the criterion considered. However, it should be noted that Option B is recommended as the preferred option subject to:

- discussions with infrastructure providers (such as the Department of Transport and Main Roads, Queensland Rail, local councils, and other easement holding parties where relevant)
- field validation of the presence/absence and locality of mapped state and Commonwealth vegetation of conservation significance
- 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 the Wandoan Joint Venture (WJV), Parsons Brinckerhoff (PB) was commissioned to undertake a route selection for the proposed southern coal seam methane (CSM) water supply pipeline between the Wandoan Coal Project mining lease application (MLA) areas and the Condamine Power Station located approximately 90 km to the south-east. This route selection exercise resulted in a preferred alignment for the water supply pipeline being recommended (refer to Option 2 in 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB.).

Within the northern portion of Option 2, the preferred alignment traversed a number of private properties to the north-east of Cherwondah State Forest, generally between Giligulgul township in the south-east to Peakes Road in the north-west. Following public and landholder consultations, alternative alignments for this section of the proposed water supply pipeline have been investigated and are the subject of this addendum report. The study area is shown in Figure 1-1.

1.1 Purpose of this report

The purpose of this report is to investigate potential route alignment options for a section of the proposed southern CSM water supply pipeline generally located between the township of Giligulgul and the southern boundary of MLA 50230. Specifically the purpose of this report is to:

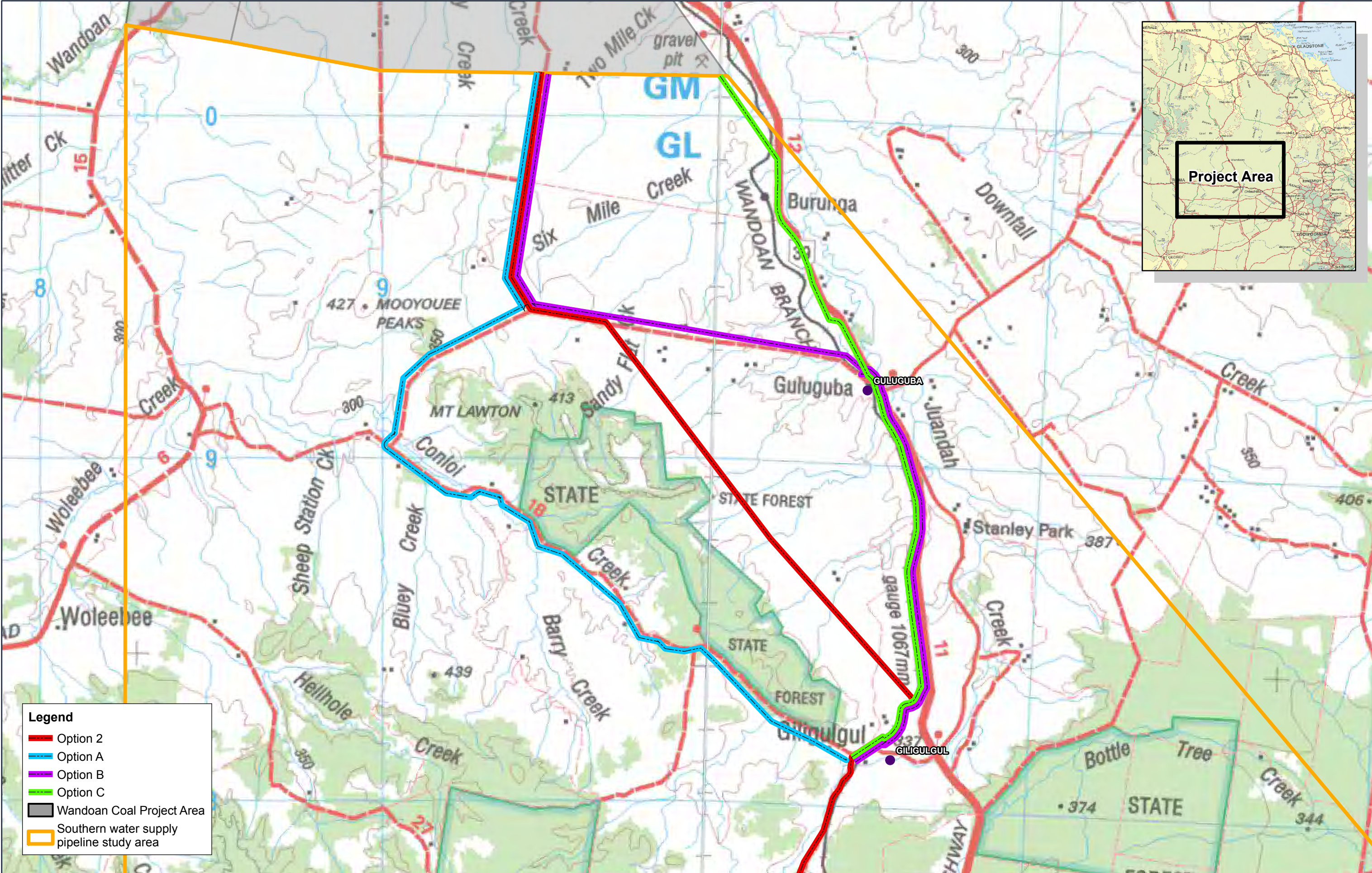
- assess potential alternative pipeline route options in the study area based on key selection criteria
- comparatively assess and analyse the alternative route options
- identify the preferred pipeline route alignment within this study area for further detailed studies based on agreed assessment criteria.

1.2 Route assessment methodology

The same route assessment methodology has been utilised in this addendum as was utilised in the previous route selection investigation which was reported in the 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB. This report is available in the EIS for the Wandoan Coal Project as Appendix 2-1-V2.4 Southern CSM Water Supply Pipeline Route Selection Report.

1.3 Legislative framework

The legislative framework applicable to this route selection exercise is the same as that which was applicable for the previous route selection investigation which was reported in the 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB. All relevant Commonwealth and State legislation has been considered as well as other regional body and/or government frameworks (e.g. regional plans and planning schemes).



2. Route option evaluation

2.1 Information sources

Information sources used in researching the constraints and opportunities for each of the proposed pipeline options are the same as those utilised in the 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB.

2.2 Selection of assessment criteria

Assessment criteria for this route option assessment can be broken into regulatory, planning, environmental, social and economic categories. The assessment criteria utilised in this route selection exercise are listed below.

Regulatory criteria

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

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 (including good quality agricultural land).
- Watercourses and wetlands.
- Fire risk.
- Vegetation and habitat values.

Social, culture and heritage 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 length and cost.

Sections 2-3 to 2-6 (inclusive) describe how these assessment criteria were considered in developing the performance measures, against which each alternative alignment option has been measured. A summary of the selection criteria and relevance to the proposed Project is provided in Table 2-1.

2.3 Planning assessment criteria

2.3.1 Land use and tenure

Land use and tenure is consistent across the study area with the majority of land use being for rural (livestock grazing) purposes (refer Figure 2-1). The Cherwondah State Forest is located within the central-southern portion of the study area. Option A runs adjacent to Cherwondah State Forest however, is proposed to be located within Giligulgul and Hansens road reserves and therefore, will not impact on state forest tenure or use. Options B and C pass through the township of Guluguba. Option C is the only proposed route option which is proposed to traverse freehold land (Lot 3 FT695). As at 27 March 2009, this allotment is owned by the WJV.

Given that all pipeline route options being considered are proposed to be predominantly located within road reserves and will traverse areas relatively consistent in land use and tenure, this assessment criterion is not considered to be a determining criterion and will not be considered in the comparative assessment of options undertaken in Section 4.

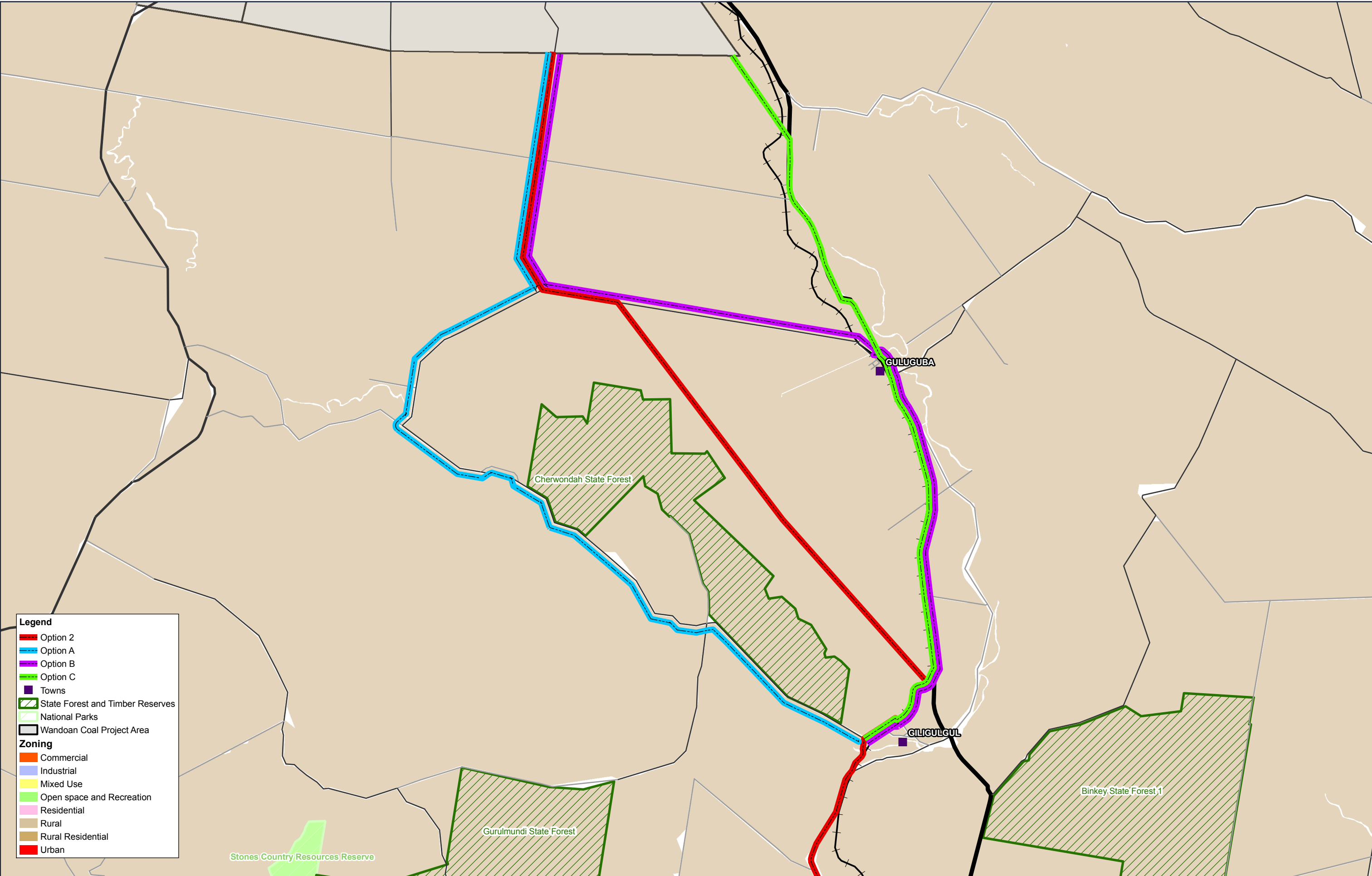
2.3.2 Mining and petroleum leases

Minerals and mining

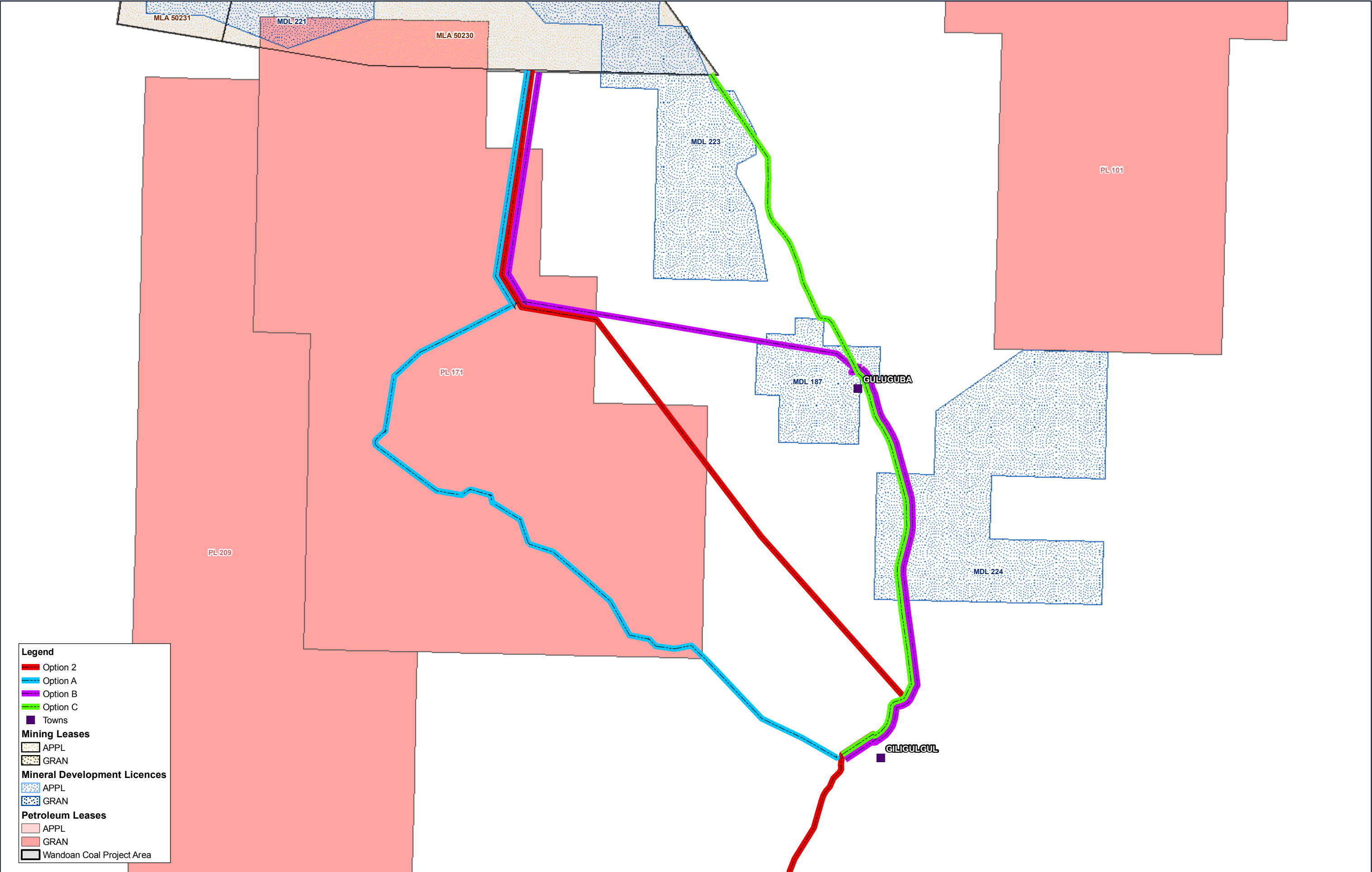
As noted in Table 2-1 and shown on Figure 2-2, Options B and C traverse existing mineral development licenses (MDL) including MDL 187 held by Cockatoo Coal, MDL 223 held by Xstrata Coal Queensland Pty Ltd and MDL 224 held by Xstrata Coal Queensland Pty Ltd, ICRA Wandoan Pty Ltd, and Sumisho Coal Australia Pty Limited.

Table 2-1: Length of Options B and C within existing MDLs

	MDL holder	Length within MDL (km)
Option B		
MDL 187	Cockatoo Coal	3.22
MDL 224	Xstrata Coal Queensland Pty Ltd, ICRA Wandoan Pty Ltd, and Sumisho Coal Australia Pty Limited	3.77
	Total	6.99
Option C		
MDL 187	Cockatoo Coal	0.91
MDL 223	Xstrata Coal Queensland Pty Ltd	1.78
MDL 224	Xstrata Coal Queensland Pty Ltd, ICRA Wandoan Pty Ltd, and Sumisho Coal Australia Pty Limited	3.77
	Total	6.46



Landuse within the study area



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It should also be noted that Cockatoo Coal has made an application for a mining lease (ML) over MDL 187. The application number is ML 50247. Option A does not traverse any MLs or MDLs.

Petroleum

As shown on Figure 2-2, both Options A and B traverse Petroleum Lease (PL) 171 which is located to the west of the townships of Giligulgul and Guluguba. PL 171 is held by Roma Petroleum NL. The length of Option A and Option B within the PL differ and are provided in Table 2-2. Option C does not traverse any PLs.

Table 2-2: Length of pipeline options within PL 171

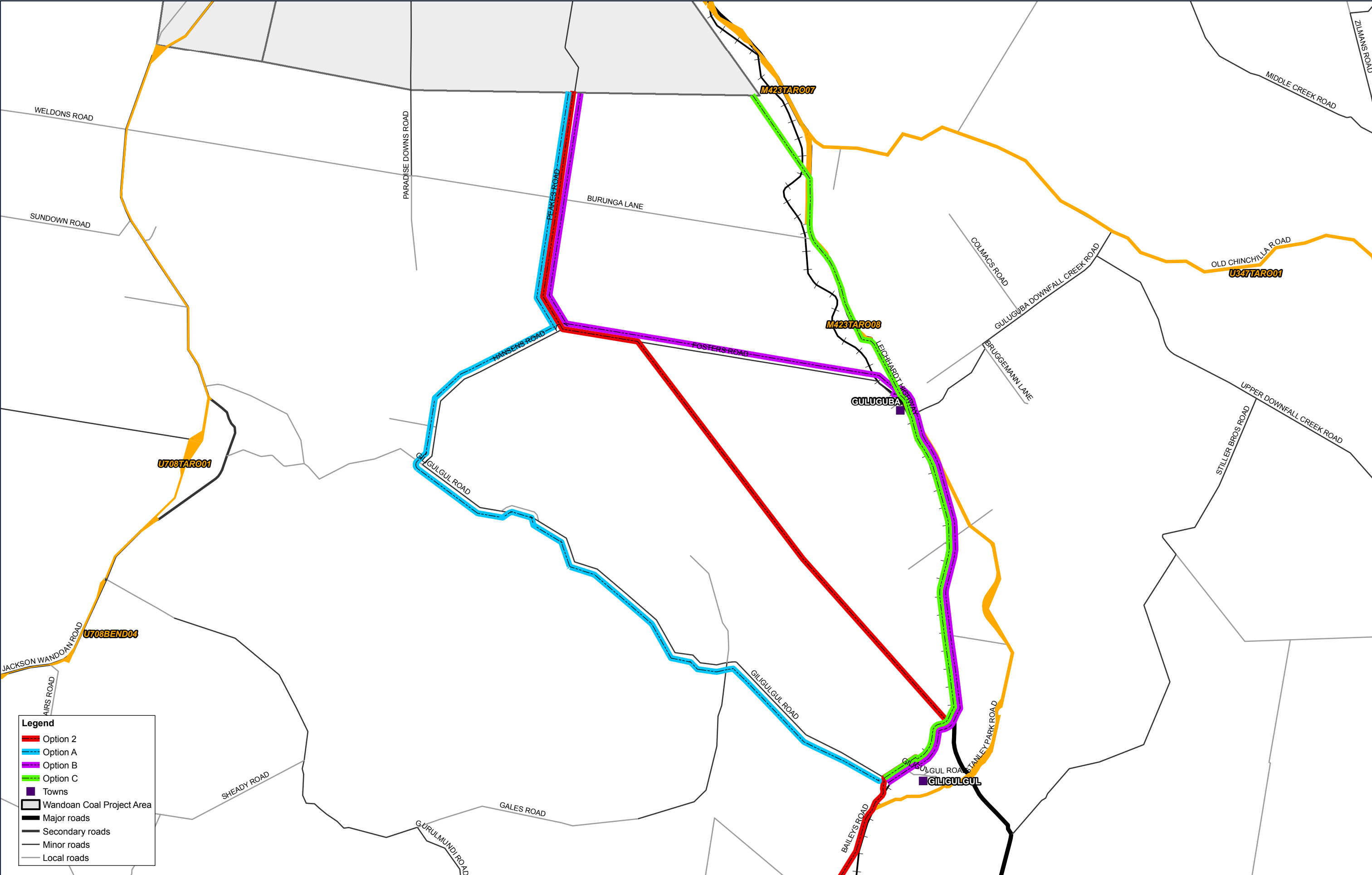
Route option	Length within PL 171 (km)
Option A	23
Option B	7
Option C	0

Location of infrastructure within mineral and petroleum leases may have implications for resource sterilisation and would also require consultation with lease and license holders. Therefore, given the magnitude of difference in length between the two options, this criterion will be utilised in the comparative assessment.

2.3.3 Local governments and planning schemes

The proposed pipeline would be developed on land within the Dalby Regional Council area. Dalby Regional Council was formed on 17 March 2008 and will continue to operate under the current *Integrated Planning Act 1997* (IPA) compliant planning schemes relevant to the previous local government areas. The planning scheme applicable to the study area is the Planning Scheme for Taroom Shire 2006 (Taroom Planning Scheme).

It should be noted that Schedule 4 of the Land Protection (Pest and Stock Route Management) Regulation 2003 identifies the (former) Taroom local government area as being required to prepare a stock route network management plan. The plan prepared for the (former) Taroom Shire indicates that Options B and C may cross stock routes which are adjacent and parallel to the Leichhardt Highway (Stock Routes M423TARO08, M423TARO07) (refer Figure 2-3). Given that the pipeline will be developed as an underground structure, it is not expected to restrict future use or function of the stock route system. However, impacts or restriction of use may be evident during the construction period. Given the proposed trench and backfill construction method any impacts or restriction of use is expected to be localised and associated only with the area in which construction works are directly occurring at any one time.



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Level of assessment

A review of the Taroom Planning Scheme identified the water pipeline would 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.

Notwithstanding this, where the associated works (i.e. pump stations) are to be developed aboveground, a building works approval may 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 Planning Scheme is not deemed necessary. As such, this criterion has not been utilised as a defining factor in the comparative assessment of options.

2.3.4 Existing infrastructure

Roads

A number of local government roads are located within the study area (refer Figure 2-4) and are proposed to be utilised by the water supply pipeline including:

- Option A: Giligulgul Road and Hansens Road
- Option B: Baileys Road and Fosters Road
- Option C: Baileys Road.

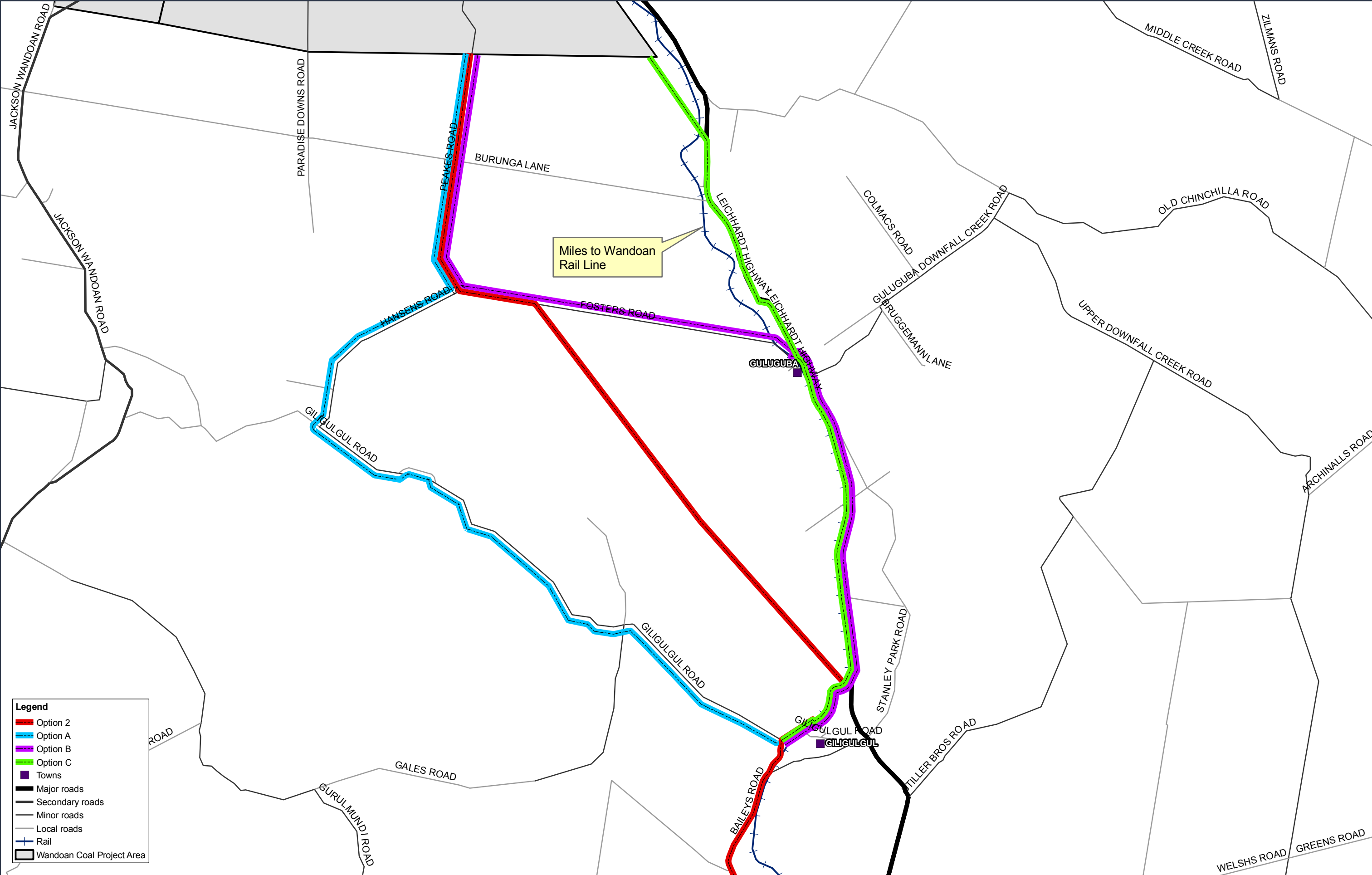
Additionally, portions of Options B and C are proposed to be located within the road reserve of the Leichhardt Highway which is a State controlled road.

The length of pipeline within road reserves may have implications in terms of:

- remnant vegetation within the road reserve which is required to be cleared to facilitate construction of the pipeline
- negotiating with local government and State 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:

- co-location with existing infrastructure
- reducing or limiting the number of affected landowners and associated acquisition processes which will need to be conducted



- retaining the ability of landowners to utilise land for rural and agricultural purposes (e.g. cropping may be limited due to pipe depth and easement)
- reducing or limiting potential sterilisation of resources within established MLs, MDLs and PLs by utilising existing road reserve through these areas.

Given that all route options being considered are proposed to be predominantly located within road reserve or land owned by the WJV (as is the case for Option C), this criterion has not been utilised as a defining factor in the comparative assessment of options.

Rail infrastructure

Reference to Queensland Rail network mapping indicates that a single track rail line operates between Miles and Wandoan and runs adjacent to the Leichhardt Highway for the majority of its length (refer Figure 2-4). Option A is located to the west of the Leichhardt Highway and does not intersect or cross any existing rail infrastructure. Portions of Options B and C are proposed to be located within the Leichhardt Highway road reserve which runs adjacent to the existing Miles-Wandoan rail line. It is not expected that the pipeline alignment will cross the rail line, however this can only be determined at the detailed design stage. Nevertheless, use or crossing of rail reserve for establishment of the pipeline will require approval/agreement with Queensland Rail. Given that no impact to existing rail reserves is expected to occur at this stage as a result of any of the options, this criterion has not been considered further in the comparative assessment.

2.3.5 Good quality agricultural land

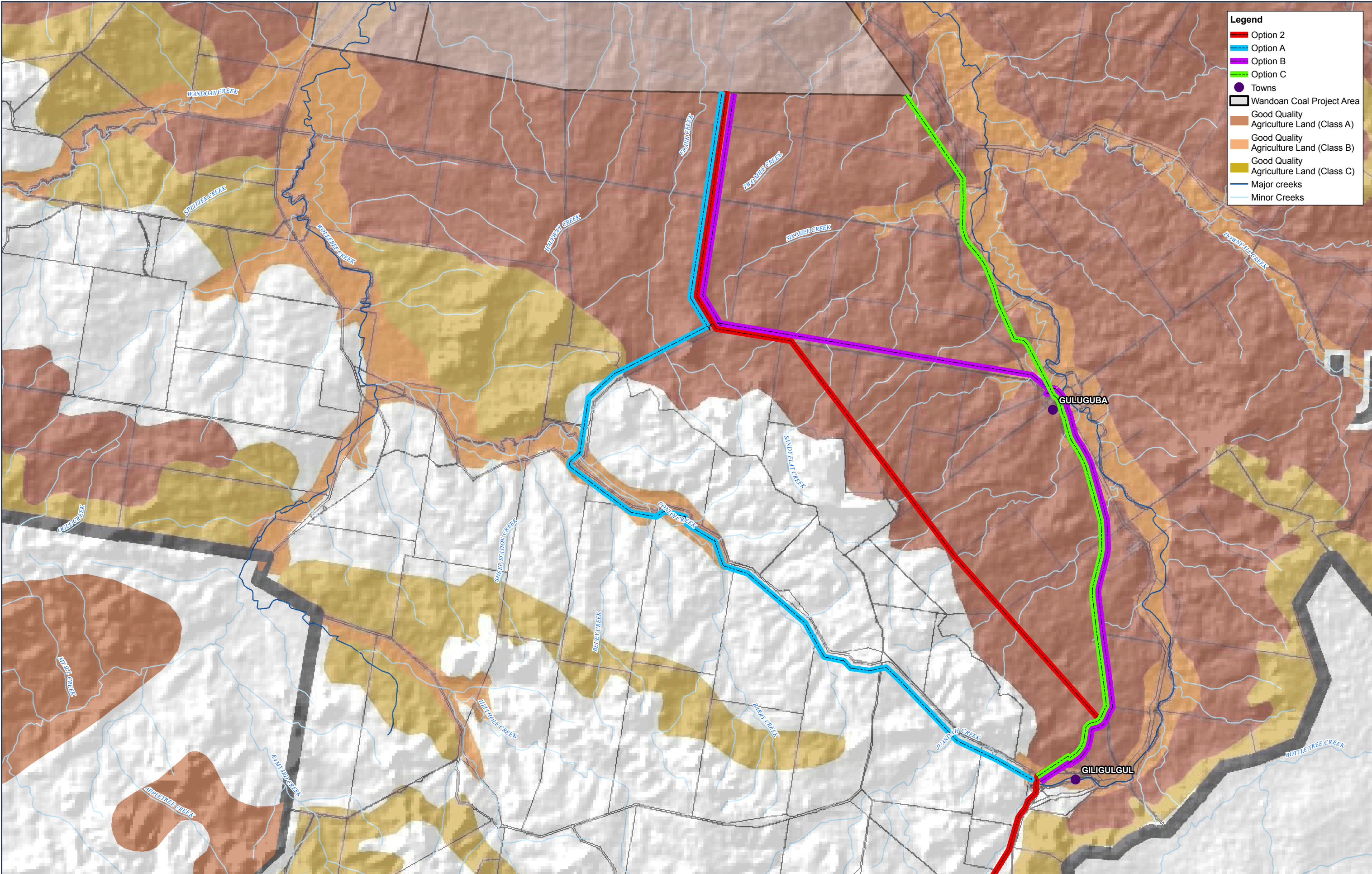
Good quality agricultural land (GQAL) is located within the study area (refer Figure 2-5). Class B GQAL is located along the northern section of Giligulgul Road, forming small alluvial plains to Conloi Creek and also to the east of the Leichhardt Highway, forming alluvial plains to Juandah Creek. Class A GQAL is predominantly located within the central and north-eastern portions of the study area.

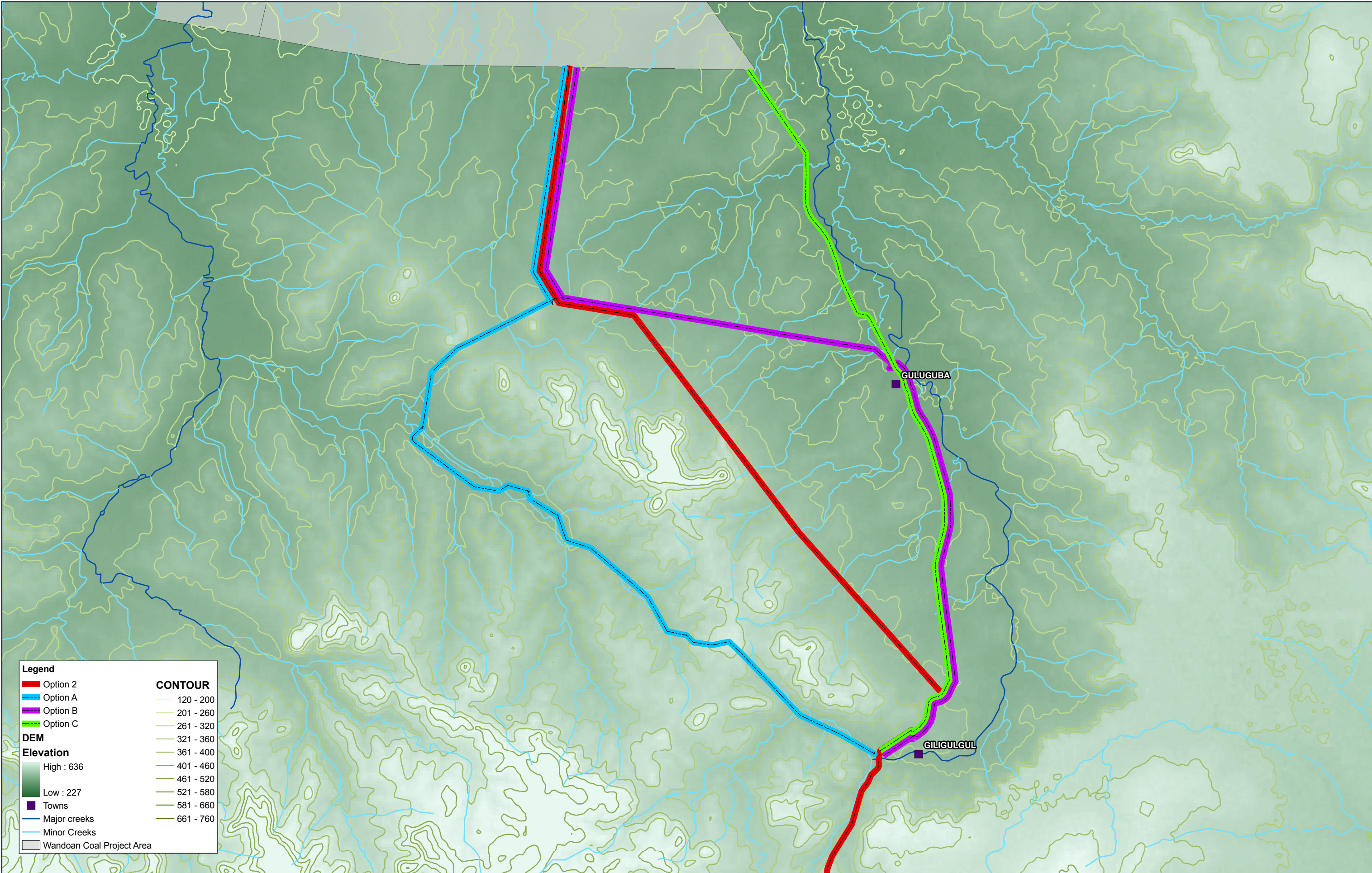
Options A and B are proposed to be located wholly within existing State and local road reserves and therefore, these pipeline options will not impact on any mapped GQAL. Whilst the majority of Option C is proposed to also be located within existing road reserves, this option traverses Class A GQAL prior to entry to MLA 50230. Based on a 50 m wide easement corridor, approximately 13 ha of Class A GQAL will be impacted by Option C. Given the difference in potential GQAL impact between the proposed pipeline options, this assessment criterion will be utilised in the comparative assessment of options.

2.4 Environmental assessment criteria

2.4.1 Topography

The area of highest elevation within the study area is located centrally and within the Cherwondah State Forest (refer Figure 2-6). The alignment of Option A is at lower elevation and follows the headwater streams of Conloi Creek and is located on the floodplain of this waterway. Consequently, portions of Giligulgul Road are floodprone. Whilst this will have no direct impact on the engineering feasibility of the pipeline, construction of a pipeline in this locality may be more susceptible to wet-weather construction delays and maintenance access may be more difficult following heavy rain.





The alignment of Option B is also at lower elevation and, whilst not being aligned adjacent to any watercourses, crosses a number of these features (refer Section 2.4.4). Therefore, whilst some sections of Option B may still be susceptible to flooding and hence, construction and access issues, the length of potential affliction is likely to be less than that of Option A.

Option C is proposed to predominantly be located within the road reserve of Baileys Road and the Leichhardt Highway, which is located adjacent to Juandah Creek. Option C also traverses a number of watercourses (refer Section 2.4.4) and therefore, may also be subject to flooding at times.

Essentially, topographical features across all options are relatively consistent and this criterion has not been further utilised in the comparative assessment of options. Potential issues relating to watercourse crossings and flooding are detailed in Section 2.4.4.

2.4.2 Geology and soils

Geology

Geology within the study area differs between north and south and is approximately delineated by the Cherwondah State Forest. As shown in Figure 2-7, Option A will traverse the following geological formations:

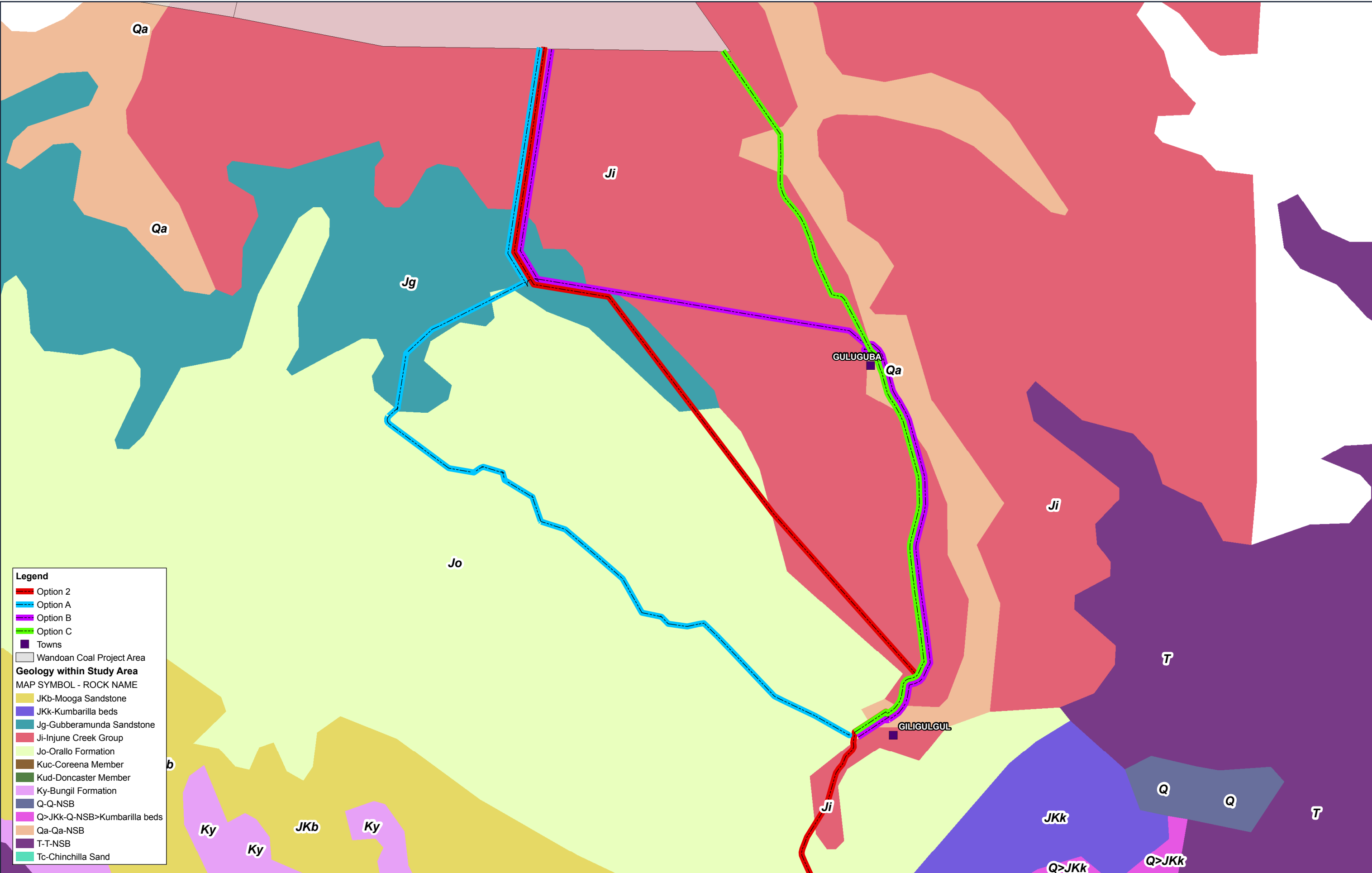
- the Orallo geological formation (sedimentary rock) comprising sandstone, siltstone, mudstone, conglomerate and coal
- the Gubberamunda Sandstone formation (arenite) comprising sandstone, minor conglomerate and siltstone
- the Injune Creek Group (sedimentary rock) comprising calcareous lithic sandstone, siltstone, mudstone, coal, conglomerate.

Option B will pass through the following geological units:

- the Injune Creek Group (as above)
- flood plain alluvium comprising clay, silt, sand and gravel
- the Orallo formation (as above)
- the Gubberamunda Sandstone formation (as above).

Option C will pass through the following geological units:

- the Injune Creek Group (as above)
- flood plain alluvium (as above)
- the Orallo formation (as above).



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Geological Units of the study area



Soils

All proposed pipeline options will pass through different mapped soils units (refer Figure 2-8). Option A will pass through the following soil units:

- CB3: 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
- Rq1: 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 floodplains with loamy soils.

Option B will pass through the following soil units:

- SI4: small stream floodplains 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
- CB3: description as above.

Option C will pass through the following soil units:

- Rq1: description as above
- SI4: description as above.

Whilst geological and soils unit characteristics differ between the options, none of the noted characteristics are expected to have significant impacts or implications for pipeline construction and operation. Therefore, these assessment criterion are not considered to be a determining criterion and will not be considered in the comparative assessment of options.

Soil conservation plans

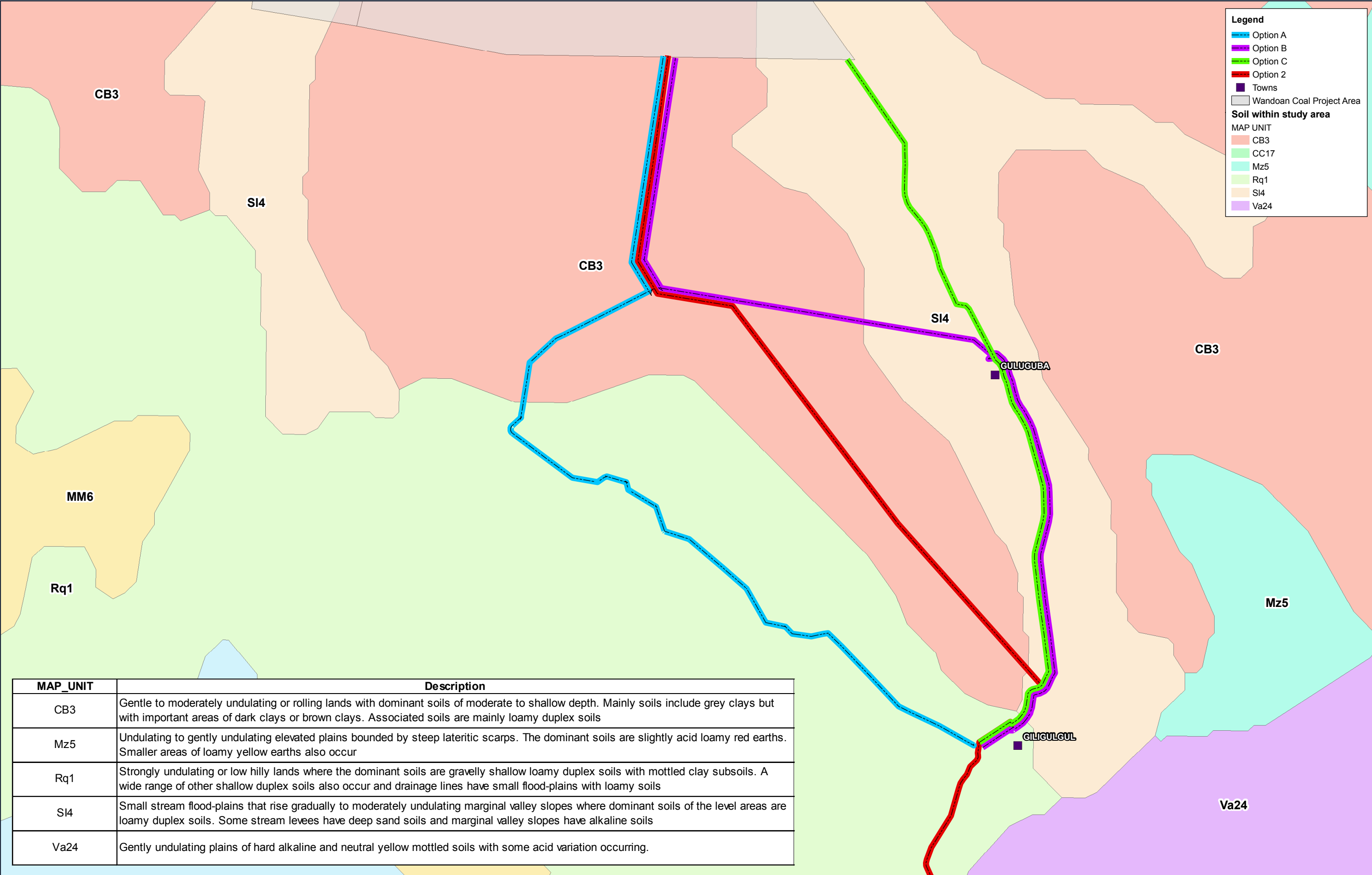
No properties in the study area are subject to approved soil conservation plans approved under the *Soil Conservation Act 1986*.

2.4.3 Climate

Given the relatively small size of the study area, 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.

2.4.4 Watercourses

For water resource planning purposes, the study area is located in the greater Dawson River catchment. As shown in Figure 2-9, all proposed pipeline options traverse a number of watercourses and drainage features. The total number of crossings for each proposed option is provided in Table 2-3.



MAP_UNIT	Description
CB3	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
Mz5	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
Rq1	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
SI4	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
Va24	Gently undulating plains of hard alkaline and neutral yellow mottled soils with some acid variation occurring.

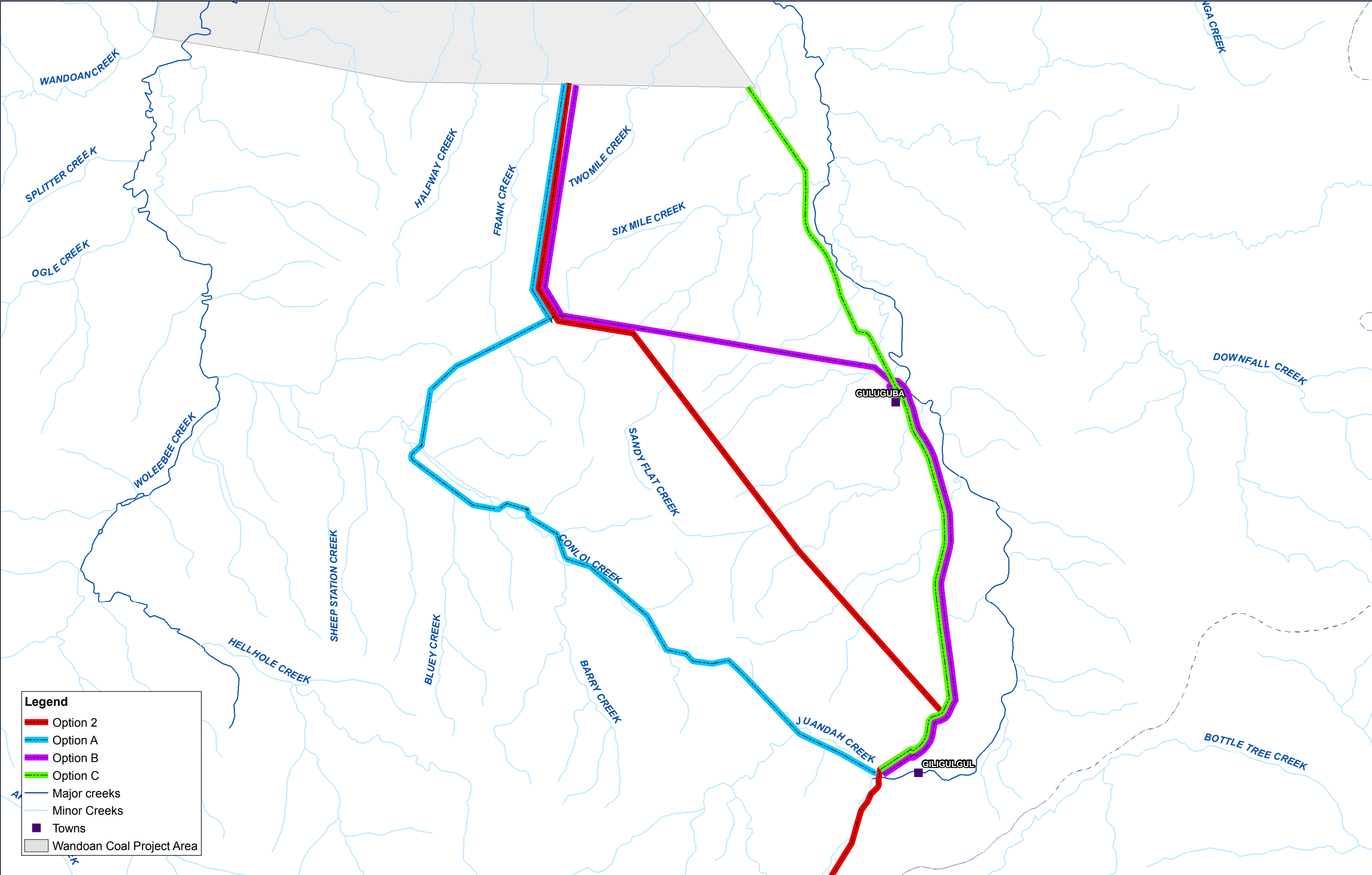


Table 2-3: Number of watercourse crossings for each proposed option

Option A	Option B	Option C
11	7	10

Additionally, as mentioned in Section 2.4.1, the alignment of Option A follows the headwater streams of Conloi Creek and is located on the floodplain of this waterway, potentially having additional implications in terms of frequency and severity of flooding.

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 2008 (Chapter 4 Activity 16 — Extractive and screening activities). 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.

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.

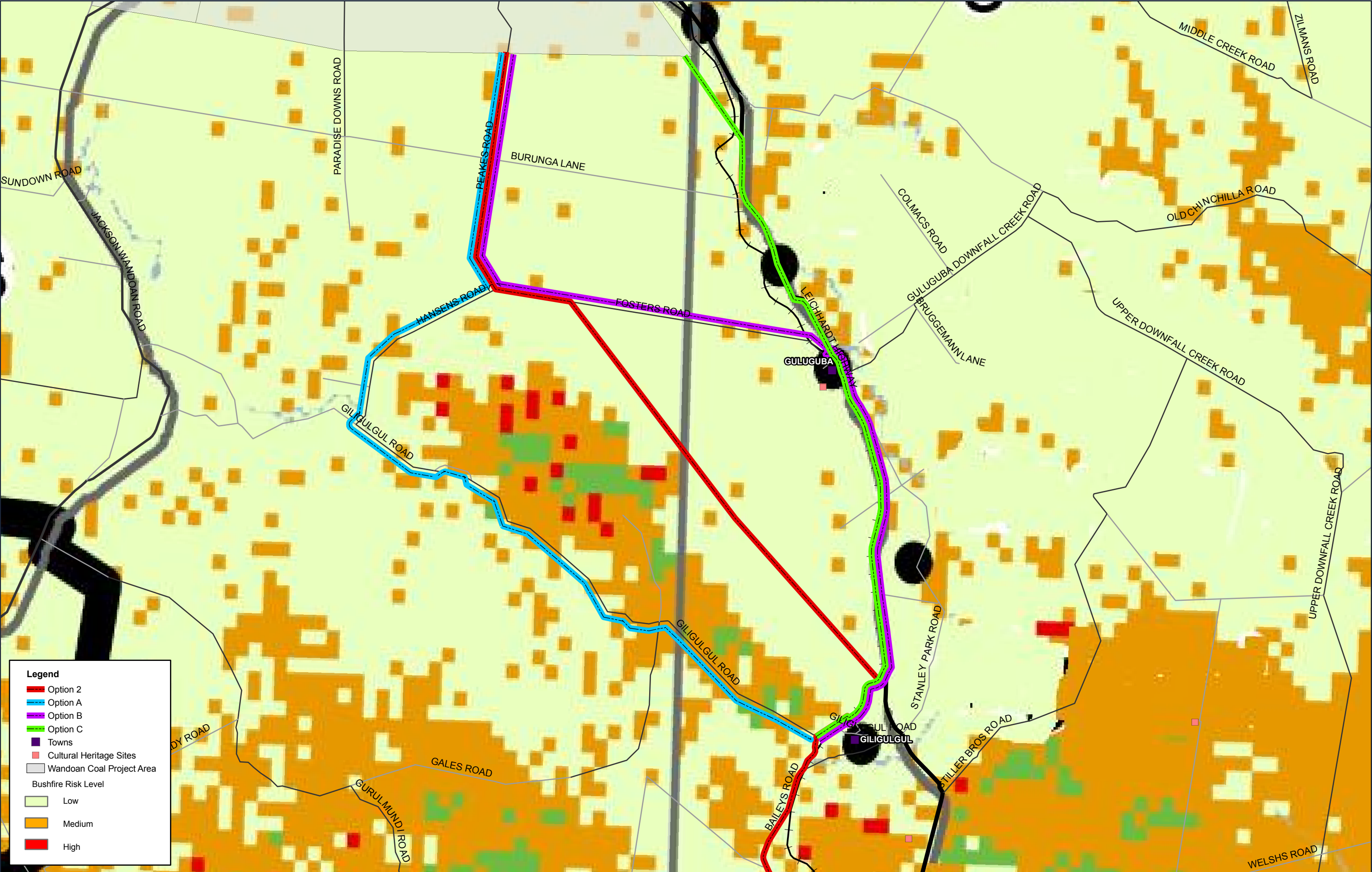
Given the nature of the proposed project, operational acoustic emissions are expected to be minimal. Construction of the proposed pipeline may however cause some temporary nuisance to surrounding noise sensitive receptors.

Potential impacts to the acoustic environment associated with construction and operation of the proposed pipeline are expected to be consistent across the different route options being considered. Therefore, this criterion is not deemed to be a significant determining criterion between the different options and will not be included in the comparative analysis.

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 and is predominantly prescribed as a low hazard (refer Figure 2-10). Bushfire hazard ratings increase with elevation in the Cherwondah State Forest in the central portion of the study area and adjacent to Option A. Cherwondah State Forest is predominantly prescribed a medium hazard with a small number of areas constituting a high bushfire hazard.

Given that the bushfire hazard trend is relatively consistent across the route options being considered, this criterion is not deemed to be a significant determinant between route options and, therefore will not be considered further in the comparative assessment.



2.4.7 Air quality

Limited air quality data is currently available for the study area however, the study area is expected to reflect 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 operational 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 route options being considered and therefore, no further consideration of potential air quality impacts has been included in the comparative analysis.

2.4.8 Vegetation and habitat

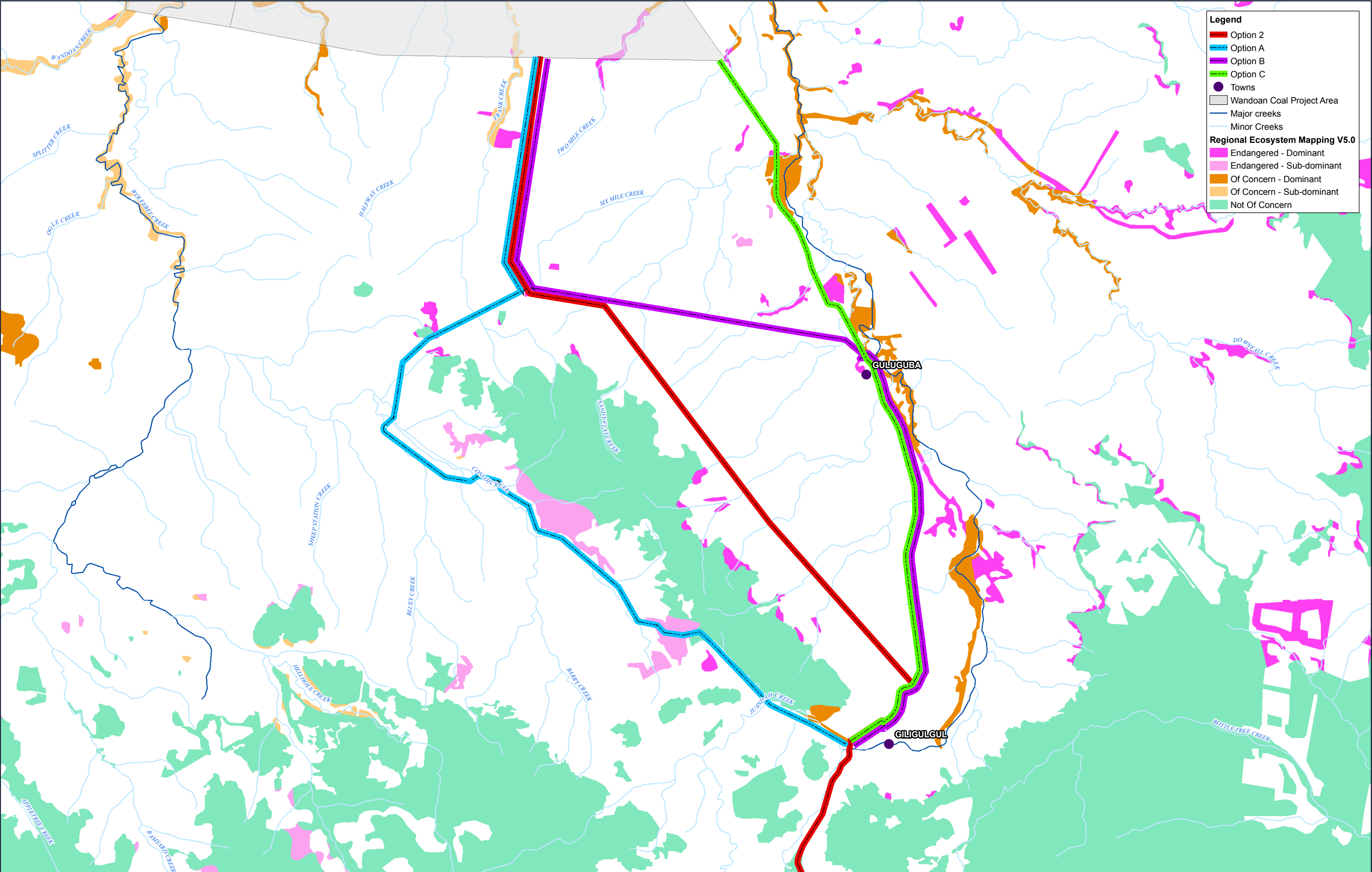
State matters

Historical land use practices within the study area have resulted in significant clearance of endemic native vegetation. Reference to former EPA (now Department of Environment and Resource Management) Regional Ecosystem mapping (Version 5.0) indicates that the majority of remnant vegetation located within the study area is associated with the Cherwondah State Forest and also Juandah Creek (refer Figure 2-11). Remnant vegetation is also located within road reserve areas and will require clearing to facilitate construction of the pipeline (refer Table 2-3).

Table 2-3: Desktop assessment of clearing required of remnant vegetation

Mapped regional ecosystem	VMA status	Area required to be cleared (ha)*
Option A		
11.3.2/11.3.25 (85/15)	dominant of concern	1.56
11.3.2	of concern	4.56
11.5.5/11.9.5 (90/10)	sub-dominant endangered	20.07
11.10.1/11.7.2 (90/10)	not of concern	19.78
11.9.5	endangered	1.64
	Total Option A	47.61
Option B		
11.3.2	of concern	2.19
11.3.2/11.3.25 (85/15)	dominant of concern	0.35
11.9.5	endangered	1.32
	Total Option B	3.86
Option C		
11.3.2	of concern	2.19
11.3.2/11.3.25 (85/15)	dominant of concern	12.32
11.9.5/11.9.5/11.9.6	dominant endangered	0.219
11.9.5	endangered	4.23
	Total Option C	18.95

*Calculations based on 25 m clearance width each side of the pipeline.



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

Given that clearing of remnant vegetation is regulated by the *Vegetation Management Act 1999*, the amount and conservation status category (i.e. endangered, of concern, not of concern) of vegetation which would require clearing is considered to be an important assessment criterion and therefore, has been included in the comparative assessment of options.

Commonwealth matters

Reference to Department of Environment, Water, Heritage and the Arts (DEWHA) Protected Matters Search Tool results indicate that threatened ecological communities and species are known, may or are likely to occur within the study area. Vegetation communities constituting Brigalow (RE 11.9.5), which is listed as 'endangered' under the *Environment Protection and Biodiversity Conservation Act 1999* ((EPBC) Act), are mapped as occurring within the study area. Based on desktop assessment, clearing of this mapped vegetation community would be required for all options however, Option C would require the greatest amount of disturbance to this mapped remnant vegetation (refer Table 2-3). Field validation of the presence, location and extent of all remnant vegetation within the study area is recommended.

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 has 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. A number of homesteads (residences) and associated out-buildings are located within the study area (refer Figure 2-12), however, desktop information indicates that none of these residences are located within 100 m of the pipeline options.

Pipeline options A and B are proposed to be located wholly within local government and State controlled road reserves and therefore, acquisition of land under private ownership will not be required. The majority of pipeline Option C is also proposed to be located within road reserve apart from the northern-most portion of the alignment which traverses Lot 3 FT695. This allotment is already owned by the WJV and therefore, no extraneous property owners will be impacted.

The number of properties which have road reserve frontage to each of the options has also been considered and differs significantly (refer Table 2-4) between the proposed pipeline options. Construction works within road reserve frontage can create property access and traffic management issues if managed poorly.



Table 2-4: Number of properties with frontage to proposed route options

Route option	Number of properties with frontage
Option A	28
Option B	55
Option C	47

Given that the different route options have the potential to affect significantly different numbers of properties, frontages and accesses, this criterion will be utilised in the comparative analysis.

2.5.2 Visual amenity

The pipeline infrastructure is proposed to generally be constructed underground and therefore, is not expected to contribute to on-going visual amenity impacts within the study area. 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 the Department of Environment and Resource Management's (DERM) (formerly the Department of Natural Resources & Water) register of Aboriginal cultural heritage was undertaken for the study area. The search results revealed that one site/place of Aboriginal cultural heritage significance was located within the study area south-west of the township of Guluguba and in closest proximity to Options B and C (refer Figure 2-13).

Review of preliminary desktop information indicates that the proposed pipeline route options will not impact on the identified registered Aboriginal cultural heritage site. Therefore, this criterion has not been not been considered further in the comparative assessment of options.

It is to be noted that the accuracy of the locations of the sites as provided by DERM 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 Wandoan Coal Project.



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Registered Aboriginal cultural heritage sites, places and/or objects within the study area

Non-indigenous cultural heritage

To identify potential presence of non-indigenous cultural heritage sites/places within the study area, searches of the Australian Heritage database and Queensland Heritage database were undertaken. The Australian Heritage database includes information listings from the following sources:

- the World Heritage List
- the National Heritage List
- the Commonwealth Heritage List
- the Register of the National Estate
- the List of Overseas Places of Historic Significance to Australia
- places under consideration, or that may have been considered for, any one of these lists.

The search area utilised for these database searches was the Dalby Regional Council area. As a result of these searches, no places, objects or sites of non-indigenous cultural heritage significance were identified as being 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 majority of the study area is not subject to Native Title Claims. The northern portion of the study area may be within the Native Title claim area of the Iman (#2) People with the associated active Native Title claim QC 97/55. The matter of Native Title will apply to all pipeline route options and is not dependent upon route selection. Therefore, this criterion will not be considered further in the comparative analysis of options undertaken in Section 4.

2.6 Economic criteria

A preliminary and indicative assessment of cost related issues associated with the proposed pipeline options has been undertaken. This assessment has included utilisation of a number of cost parameters including:

- capital cost
- present value (PV) capital cost
- operational cost (per annum).

A number of different pipeline diameters and materials were selected for consideration and included ductile iron with cement mortar lining (DICL), mild steel with cement mortar lining (MSCL), polyethylene (PE) and PVC. All routes traverse similar topography, rising to a high point roughly mid pipeline. The hydraulic analysis is dependent on providing sufficient head to lift the water over the high point.

Unit cost estimates for each of the pipeline alignments have not altered since those utilised in the previous 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB. While Option C is approximately 6 km shorter than Options A and B, total pipeline length to the storage facility is similar. Given the minimal variation in pipe length, pipe costs are not expected to vary significantly between the options. Therefore pipe costs have not been included as a criterion in the comparative assessment of options in Section 4.

2.7 Summary of assessment criteria

Table 2-4 indicates how these assessment criteria were considered in developing the performance measures, against which each option will be measured. In some cases it was determined that a particular criterion would not be useful in the assessment process and further analysis of the criterion was not undertaken.

Table 2-4: Assessment of potential selection criteria

Assessment criteria	Relevance	Criteria relevant to options assessment?	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. Presence of sensitive land uses such as schools, community facilities, cemeteries etc.	No	N/a
Land tenure	Land tenure across the study area (e.g. Rural A, Rural B, road reserve).	No	N/a
GQAL	Sterilisation of or impact on productive and intensive agricultural land (e.g. good quality agricultural land should be minimised).	Yes	Approximate area of GQAL to be impacted

Assessment criteria	Relevance	Criteria relevant to options assessment?	Performance measures
Petroleum and mining leases	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
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.	No (all Options proposed to be predominantly co-located with existing road reserves)	N/a
Environment			
Topography	Topography may have implications for engineering design and construction	No	N/a
Geology and soils	Underlying geology may have implications for ease of construction. In-situ soils have implications for trenching, pipe design and construction and erosions and sediment control.	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.	Yes	Number of waterways crossed
Bushfire risk	Bushfire hazard risk may have implications for construction timing and methods and maintenance access.	No	N/a
Vegetation and habitat	Clearing of vegetation (particularly remnant vegetation) is legislatively regulated.	Yes	- Approximate area of mapped regional ecosystems to be cleared - Conservation status of regional ecosystems to be cleared

Assessment criteria	Relevance	Criteria relevant to options assessment?	Performance measures
Social			
Houses and properties	Construction works may impact on property frontages and access.	Yes	■ Number of properties with frontage to proposed route options
Visual amenity	Visual amenity implications of operational infrastructure. Implications of construction including vegetation clearing.	No	N/a
Indigenous cultural heritage values	Known 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 values	Listed 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
Native title	Presence of Native Title Claim(s) within study area	No	N/a
Economic			
Indicative pipeline cost	Length of pipeline, number of pump stations etc are factors which may influence the cost of the proposed pipeline.	No	N/a

3. Option development

As mentioned in Section 1, PB was previously commissioned to undertake a route selection for the proposed southern CSM water supply pipeline between the Wandoan Coal Project MLA areas and the Condamine Power Station. As a result of this route selection exercise, a preferred alignment, Option 2, for the water supply pipeline was recommended.

Within the northern portion of Option 2, the preferred alignment was recommended to traverse a number of privately owned properties to the north-east of Cherwondah State Forest, generally between Giligulgul township in the south-east to Peakes Road in the north-west. Following further public and landholder consultation, alternative alignments for this section of the proposed water supply pipeline have been investigated and are the subject of this addendum report.

Development of alternative pipeline route options for this section of the alignment was based on a number of common requirements for the proposed infrastructure which included:

- minimal impact to surrounding landowners and minimal requirement for acquisition of privately owned land
- co-location of infrastructure to the greatest possible extent
- minimisation of overall route length to reduce the dynamic (friction) head loss and capital cost associated with the pipeline.

Based on the issues outlined above, three potential pipeline route alignments were identified, to which the selection criteria detailed in previous sections have been applied and a comparative assessment undertaken (refer Section 4).

A description of the proposed pipeline alignments follows and the proposed alignments are shown on figures contained in this report.

3.1 Option A

Option A starts at the intersection of Baileys and Giligulgul roads and proceeds in a north-west direction within the road reserve of Giligulgul Road. At the intersection of Giligulgul and Hansens roads, the proposed alignment turns to the north-east, utilising the road reserve of Hansens Road until its intersection with Fosters Road. At this intersection, the proposed alignment reverts to the preferred alignment specified in the 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008) which progresses north into the MLA areas along the Peakes Road reserve.

3.2 Option B

Option B starts at the intersection of Baileys and Giligulgul roads and proceeds in a north-east direction within the road reserve of Baileys Road. Where Baileys Road intersects with the Leichhardt Highway, the alignment turns into the Leichhardt Highway road reserve and progresses in a northerly direction. At the township of Guluguba, it is proposed that the alignment turn in a westerly direction and utilise the road reserve of Fosters Road. As above, at the intersection of Hansens and Fosters roads, the alignment progresses in a northerly direction into the MLA areas along the Peakes Road reserve.

3.3 Option C

This proposed pipeline route is common with Option B from the start point at the intersection of Baileys and Giligulgul roads to the township of Guluguba. At this point, Option C proceeds in a northerly direction within the road reserve of the Leichhardt Highway until the south-eastern corner of Lot 3 FT695. At this point, the proposed alignment traverses this allotment in a northerly direction to enter the MLA areas in the south-east corner. The precise location of entry has not yet been determined and will depend largely on detailed design.

4. Comparative assessment of options

4.1 Comparative assessment

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 three 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 provided in previous sections.

It should be noted that a pipeline corridor width of 25 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. No calculations for stockpiling or laydown areas have been included. 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

Performance measure	Option A	Option B	Option C
Land use and tenure			
Good Quality Agricultural Land	1	1	5
Mining and petroleum leases			
Mineral and mining tenures	1	3	3
Petroleum leases	5	3	1
Environment			
Number of watercourses crossed	2	2	2
Approximate area of mapped regional ecosystems to be cleared	5	1	3
Social, culture and heritage			
Number of properties with frontage to route options	5	2	4

The data in Table 4-1 indicates that Option A offers the least preferable outcome with regard to length of petroleum leases, traversed, approximate area of mapped regional ecosystems to be cleared and the number of properties which have frontage to the proposed pipeline and therefore, may encounter property access disruptions etc. However, Option A reflects the best possible outcome with regard to the potential amount of GQAL which may be affected by construction and also traverses the least length of land subject to mining leases. Despite this, Option A is not considered to achieve the best overall balance across the assessment criteria.

Options B and C are similar in outcome, however, Option C has the potential to affect more GQAL than Option B. With regard to vegetation, Option C may result in clearance of approximately 18.95 ha of mapped remnant vegetation (including 'of concern', 'dominant of concern', 'dominant endangered' and 'endangered' conservation status under the Vegetation Management Act 1999) whilst Option B may potentially result in clearance of approximately 3.86 ha of remnant vegetation (including 'of concern', 'dominant of concern' and 'endangered' conservation status under the Vegetation Management Act 1999). This is considered to be a defining criterion between Options B and C. Therefore, Option B is recommended as the preferred pipeline option.

4.2 Conclusion

Three options were considered for analysis to substitute a section of the preferred alignment for the southern CSM water supply pipeline for the Wandoan Coal Project. Previously, the preferred alignment was recommended to traverse a number of privately owned properties to the north-east of Cherwondah State Forest, generally between Giligulgul township in the south-east to Peakes Road in the north-west. Following public and landholder consultation, alternative alignments for this section of the proposed water supply pipeline have been investigated and which are the subject of this addendum report.

A number of assessment criteria were identified and investigated with regard to the identified route options. In a number of cases, characteristics of these assessment criteria did not differ across the options, and therefore, could not be considered as determining criterion for the purposes of comparative assessment. However, of the criterion which did differ across the options, the comparative assessment indicates that Option B provides the best outcome with regard to the criterion considered.

Further, it should be noted that desktop assessment indicates that Option C will result in clearance of approximately 18.95 ha of mapped remnant vegetation (including 'of concern', 'dominant of concern', 'dominant endangered' and 'endangered' conservation status under the *Vegetation Management Act 1999*). Conversely, desktop assessment indicates that Option B will potentially result in clearance of approximately 3.86 ha of remnant vegetation (including 'of concern', 'dominant of concern' and 'endangered' conservation status under the *Vegetation Management Act 1999*). Further, Option C would require the greatest amount of disturbance to Brigalow vegetation (RE 11.9.5), which is listed as 'endangered' under the EPBC Act. This is considered to be a defining criterion between Options B and C. Therefore, Option B is recommended as the preferred pipeline option.

Unit cost estimates for each of the pipeline alignments have not altered since those utilised in the previous 'Wandoan Coal Project Route Selection Report Southern coal seam methane water supply pipeline' (October, 2008), prepared by PB. While Option C is approximately 6 km shorter than Options A and B, total pipeline length to the storage facility is similar. Given the minimal variation in pipe length, pipe costs are not expected to vary significantly between the options.

It is considered that Option B is the pipeline option which achieves the best overall balance across all of the assessment criteria considered. However, it should be noted that Option B is recommended as the preferred option subject to:

- discussions with infrastructure providers (such as the Department of Transport and Main Roads, Queensland Rail, local councils, and other easement holding parties where relevant)
- field validation of the presence/absence and locality of mapped state and Commonwealth vegetation of conservation significance
- discussions and agreements associated with indigenous cultural heritage groups
- clarification of any associated Native Title issues.