2 PROJECT NEED AND ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the need for the proposed southern coal seam methane (CSM) water supply pipeline (the proposed pipeline) and the alternatives considered by the Wandoan Joint Venture (WJV), in terms of:

- an outline of the alternative water supply options considered
- alternative water supply delivery options and technologies
- alternative pipeline routes

2.2 PROPOSED PIPELINE NEED

During mining operations, the Wandoan Coal Project (the Project) will include on-site coal processing plant (CPP). It is anticipated that the Project's raw water demand will be approximately 9,100 ML/a at peak demand in Year 18 (assumed as 2029), with 80% of that demand expected to be required for the CPP.

Project raw water demand may increase to 11,400 ML/a if the mine was to expand in future.

Other critical uses of operational raw water include fire fighting services, site dust control, light and heavy vehicle washdowns, and for haul road dust suppression.

During operations, raw water will therefore need to be reticulated to the following locations within the mining lease application (MLA) areas:

- the CPP and overland conveyor systems (OLC)
- mine infrastructure area (MIA)
- raw coal dump stations

Regardless of which raw water supply option is eventually chosen by the WJV, raw water will be delivered to a raw water storage dam on the mine site with a capacity of 400 ML. The raw water storage dam will be located adjacent to the CPP area, and from there reticulated to the CPP, MIA, and dump stations.

The proposed pipeline alignment is an alternative water supply option and a component of the environmental impact statement (EIS) for the Project.

2.3 PROPOSED SUPPLY ALTERNATIVES

2.3.1 DO NOTHING

If the proposed pipeline did not proceed, and in the absence of other feasible bulk raw water supply alternatives, the mining project is unlikely to proceed, given the critical requirement for a long term and reliable water supply for mine operations. If the mine did not proceed, there is potential for the global demand for thermal coal to be lost to an international competitor, with losses of export revenue, losses in potential coal royalties, losses in local, regional and state employment and ancillary business opportunities.

2.3.2 ALTERNATIVE RAW WATER SUPPLY SOURCES

Three separate potential water supply alternatives have been identified for the Project:

- CSM Water from south of the MLA areas (this Volume 2)
- CSM Water from west of the MLA areas (see Volume 3)
- Glebe Option (see Volume 4).

The WJV will source its water supply on the basis of a comparative analysis of environmental and social impacts, reliability of supply, water quality and cost.

The WJV is committed to setting and meeting a range of sustainable development targets, including measures to reduce its total potable and raw water usage. Measures to reduce raw water use have included the current strategy for recycled water to be used in the CPP (with water captured and pumped back to the CPP from the Project's tailings disposal dams), and use of surface water collected on site for haul road dust suppression and/or for use in the CPP.

The WJV is committed to investigate further measures to reduce its overall water consumption, including further measures to maximise CPP water re-use (through the potential use of belt-press filters), non-water dust suppressants for haul roads and raw coal dump stations, and the potential use of evaporation covers over the raw water storage dam, if such methods can be demonstrated to be practicable and feasible.

2.4 WATER SUPPLY DELIVERY OPTIONS AND TECHNOLOGIES

2.4.1 WATER QUALITY

An analysis of the quality of CSM by-product water, in particular for use in the CHPP and its application for haul road and dump station dust suppression, has been undertaken. Preliminary analysis indicates that the quality of this water, in particular the generally low levels of salinity, would not be a prohibiting factor in either its transport to, and use on site, with some treatment to reduce total dissolved solids (TDS) levels. Generally, treatment of water to TDS concentrations of around 4,000 mg/L or less will be suitable for use across the mine.

However, costs associated with some CSM by-product water treatment and/or additional corrosion proofing of plant will need to be taken into account in the decision making process for the various bulk raw water supply options under consideration. If required, any treatment of CSM by-product water will be undertaken by the CSM by-product water provider prior to intake into the pipeline, to a specification agreed with the WJV.

2.4.2 DESIGN BASIS

A preliminary hydraulic design and cost estimate was prepared for the purpose of route selection for each of the four proposed pipeline routes.

The initial elevation at Condamine Power Station is 360 m Australian Height Datum (AHD). The maximum elevation on all pipeline routes was of the order of 400 m, and occurs at the summit of the pass along the Leichhardt Highway. Surface elevations fluctuate moderately, with minimum elevation being in the order of 300 m AHD. The outlet elevation at the raw water storage dam is approximately 250 m AHD.

Reviews were undertaken for a number of different pipeline diameters and materials (i.e. ductile iron with cement mortar lining (DICL), mild steel with cement mortar lining (MSCL) and polyethylene (PE)). While the use of PE pipe was considered, high heads (pressure) at the pump station require very thick walled pipe. As a result PE pipe is not cost effective compared to DICL or MSCL.

The main assumptions made in preparing the design parameters included:

- pipe and pump size is based on a flow rate of a maximum 11,400 ML/a (to allow for increased demand, if required)
- pumps operating 20 hours per day
- electric motors will be used to directly drive a set of pumps
- full duty/standby arrangement
- a 0.75 % pump efficiency
- a 30 year life.

2.4.3 DESIGN CONSTRAINTS

There are no substantial electrical power sources along the proposed pipeline routes, and so allowance has been made for a single pump station at the intake point adjacent to Condamine Power Station to provide sufficient head to drive the water to the Project's raw water storage dam.

The preferred design seeks to minimise the pipe diameter as much as possible to maintain cost effectiveness. As pipe diameters are reduced, friction within the pipe increases, and the pump head required to drive the water through the pipeline increases, consequently increasing costs.

Maximum pressure in the pipe is limited to 350 m of head to accommodate the use of DICL pipeline. Allowance has been made for a single pipe diameter for the length of the route. Further optimisation of pipeline material and diameters will be undertaken during detailed design. Water hammer analysis will also be performed in detailed design and incorporated into pipeline design and material selection.

2.4.4 ACCOMMODATION

The WJV estimates that a workforce of up to 50 may be required to construct the proposed pipeline. During the site preparation and construction phases, the workforce will potentially stay in local caravan parks, motels, or the Project accommodation facility for the duration of the pipeline construction. Personnel will be transported to site from these locations by shuttle buses prior to and at the end of each shift. The WJV may also consider the development of temporary construction facilities to accommodate the workforce during pipeline construction. There is potential for such temporary facilities to be shifted to another site as construction progresses. The WJV will consult with local property owners and the Dalby Regional Council before any decision is made in relation to accommodation arrangements.

2.5 ROUTE SELECTION OPTIONS

2.5.1 METHODOLOGY FOR PIPELINE ROUTE SELECTION

The main supply objectives of the proposed pipeline are to:

- connect to a constant and reliable raw water supply
- provide the Project with the expected peak demand 9,100 ML/a bulk raw water requirements for mine operations.

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. Appendix 2-1-V2.4 contains the Route Selection Report for the proposed pipeline. Note that figures with numbering ending in V2.4 refer to figures contained in Volume 2, Book 4 of the EIS.

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 relevant issues that are specific to the Project and also regularly addressed in the pipeline route selection and environmental assessment.

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 route 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 route 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' provided 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 was used to provide a comparative measure of how each option meets the relative performance measures. The issues typically addressed in environmental impact assessments were also

relevant to the comparison of alternatives in a route evaluation, and were used to develop suitable criteria for selecting a preferred route. The criteria can be broken into regulatory, planning, environmental, social and economic categories. These criteria consisted of:

Regulatory criteria

- provisions of relevant Commonwealth legislation (including consideration of relevant matters of national environmental significance – refer Chapter 17 Ecology)
- provisions of relevant state legislation and policies.

Regulatory provisions, as they relate to this proposed pipeline, are generally associated with the use, development or potential impact to environmental, planning, social and economic criteria.

Planning assessment criteria

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

Environmental assessment criteria

- topography
- geology and soils
- watercourses and wetlands
- fire risk
- flora communities and species
- 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.

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

- transport of CSM by-product water to the Project area
- has capacity for delivery of up to 11,400 ML/a
- delivery of the water direct to a 400 ML raw water storage dam on the MLA areas
- 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 easement establishment negotiations.

Based on the issues outlined above, four potential pipeline route alignments were identified, to which the selection criteria above were applied and a comparative assessment undertaken (see Section 2.5.3). Additionally, a pipeline route aligned with a section of the Miles to Wandoan railway was identified as an alternative alignment to utilising the Leichhardt Highway road reserve. A comparative assessment of the pipeline route along rail as opposed to road infrastructure was undertaken for this section (Miles to Gurulmundi) of the overall pipeline length.

2.5.2 LAND TENURE

The existing land uses within the study area are predominantly agricultural and resource based. The MLA areas are located to the north of the proposed pipeline study area, covering approximately 32,000 ha. The Talinga and Berwyndale South CSM extraction fields are located approximately 100 km to the south of Wandoan, to the south of the Condamine Power Station.

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 in the southern portion of the study area. The balance of the land within the study area is predominantly utilised for agricultural purposes, including grazing and cropping activities and government reserves. The Cherwondah State Forest reserve is located within the northern portion of the study area and the Condamine Power Station is located at the southern end 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 pipeline alignment:

- ecologically significant areas (i.e. Brigalow Belt bio-region and State Forest Reserves)
- extractive industry areas (i.e. 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 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 (that is, gas wells and pipelines, mining tenements and pivot irrigation) have been considered during the route selection process and where identified, avoided if possible. Therefore, there is no variation in the selection criterion across the study area, making differentiation between the merits of route options negligible. Land use and tenure were not utilised as a determining criteria for pipeline route selection and not considered in the comparative assessment of options.

2.5.3 ROUTE OPTIONS

Four potential pipeline routes were identified and a comparative assessment was undertaken and detailed in a Route Selection Report (refer Appendix 2-1-V2.4). A description of the proposed pipeline routes is included in the following sections and shown in Figure 2-1-V2.3. Note that figures/documents with numbering ending in V2.3, for example, refer to figures/documents contained in Volume 2, Book 3 of the EIS.

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, and then the pipeline follows the Leichhardt Highway for the remainder of its length until it meets the eastern boundary of MLA 50230.

The proposed pipeline then travels in a westerly direction to its subsequent termination point at the raw water storage dam. 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 long.

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 proposed pipeline travels along the Leichhardt Highway until the deviation 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 MLA 50230. 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 roads, pit and dump station locations during detailed design.

Option 2 is approximately 93 km in length.

Option 2A

Option 2A is similar to Option 2 described above for the majority of the proposed pipeline route. A deviation between the two route options 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 route intersects the Miles-Wandoan rail line prior to meeting the Leichhardt Highway. From this point on the Leichhardt Highway, Option 2A follows the route of Option 2 until it meets the southern boundary of MLA 50230 and its subsequent termination point at the raw water storage dam on the MLA areas. The route across the MLA area from the MLA boundary to the raw water storage dam has not yet been determined and will depend upon finalisation of a mine layout including haul roads, pit and dump station locations during detailed design.

Option 2A is approximately 100 km in length.

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 Hookswood Road where the alignment turns west and after some distance crosses Pelham Road and the confluence of Punchbowl and Dogwood Creeks. From here, the route 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 MLA 50230 and its subsequent termination point at the raw water storage dam. The route across the MLA area from the boundary to the raw water storage dam has not yet been determined and will depend upon finalisation of a mine layout including haul roads, pit and dump station locations during detailed design.

Option 3 is approximately 108 km in length.

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 reserve 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.

It should be noted that the final pipeline alignment through identified petroleum leases will be subject to future negotiation between the Wandoan Joint Venture and relevant petroleum lease holders. Additionally, the final pipeline alignment through the MLA areas will also be subject to finalisation of the mine layout plan during detailed design. Therefore, the sections of pipeline within the identified petroleum leases and the MLA areas were taken as indicative only and may be altered based on future CSM water supply negotiations and detailed mine planning.

2.5.4 ROUTE OPTIONS ASSESSMENT

The alignment of Option 1 passes directly through the township of Miles and, for the purposes of this study, 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 was considered unacceptable.

Option 2A was also discounted, given the potential impact on the number of properties, 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 also the most uneconomic pipeline option.

Option 2 is the preferred option for the proposed pipeline route. 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 a moderate economic cost, 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 route option which achieves the most successful balance overall and across all of the comparative assessment criteria.

2.6 PROPOSED PIPELINE JUSTIFICATION

Without the development of a feasible raw water supply option to meet long term operational requirements, the Wandoan Coal Project is unlikely to proceed, with the resulting loss in export revenue, employment, associated business opportunities and government royalties.

The proposed pipeline is one of three raw water supply alternatives. The selection of the preferred alternative is subject to a final comparative analysis based on environmental and social impacts, reliability of supply, water quality and cost.

The preferred route option selected for the proposed pipeline is Option 2. This option achieves the most successful balance overall and across all of the comparative assessment criteria.

For further discussion on the overall Project justification, refer to Chapter 2 Project Need and Alternatives, Volume 1.