2 PROJECT NEED AND ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the need for the Wandoan Coal Project, including the current market demands that the Project will fulfil, as well as the economic and social benefits that the Project will provide to the local, state and national economies.

The chapter also outlines the Project alternatives considered by the WJV, in terms of:

- Project need
- mining methodology
- alternative coal mining and coal handling technologies
- mine support infrastructure options considered
- coal transport options considered.

2.2 PROJECT NEED

Coal is Queensland's most important export commodity, providing significant benefits to the State through strong financial returns, and increasing employment opportunities. Coal mining is a significant contributor to regional economic development in Central Queensland.

Queensland's coal production reached a record 183 million tonnes (Mt) of coal in 2006/07. During this period, exports of coal to 33 countries worldwide totalled 153 Mt ($16.3b in export receipts), a growth of 7.3% from the 2005/06 export total of 143 million tonnes. The majority of these exports were in metallurgical coal (around 110 Mt). According to the Department of Mines and Energy (DME, 2007), thermal coal, similar to that proposed to be mined at Wandoan, accounted for around 43 million tonnes of Queensland's 2006/07 coal exports.

The International Energy Agency (IEA) projects that the world's primary energy demand will increase by 45% between now and 2030. In its World Energy Outlook 2008, the IEA says demand for coal will rise more than any fuel in absolute terms, accounting for over one third of the increase in energy use (International Energy Agency, press release, *World Energy Outlook 2008).*

According to the IEA, China and India account for over half of the increase in primary energy demand.

Worldwide, fossil fuels — oil, gas and coal — continue to dominate the fuel mix. Among these fuels, coal is set to grow most rapidly, driven largely by the demand from the global power generation sector.

Both DME and the Australian Bureau of Agricultural and Resource Economics (ABARE), forecast that the Queensland coal industry will continue to expand over coming decades to meet this increasing global demand, with Queensland coal exports expected to exceed 200 Mt by 2011 (DME, 2007, ABARE, 2008). While metallurgical coal exports will continue

to dominate the share of Queensland coal exports, trade in thermal coal is forecast by ABARE to remain strong for the near future.

Thus, on-going and higher demand for good quality coal is forecast to continue, and Queensland coal producers, with access to significant coal reserves and availability of efficient rail and port infrastructure, are well placed to service the increasing global demand for coal. Queensland has approximately 33 billion tonnes of raw coal in situ identified through exploration drilling. The Surat Basin, where the Project is located, contains more than 4 billion tonnes of thermal coal reserves located in the Walloon Coal Measures.

The Surat Basin resources are suitable for open-cut mining but, with the exception of a small number of mines to the south, are largely undeveloped. According to DME (2007), the Surat coals are volatile, reactive and clean burning, and typically used in domestic power stations and exported for power generation and industrial use. This makes the thermal coals from the Wandoan Coal Project ideal to meet the expanding demands of the global power industry.

Chapter 14 Greenhouse Gases and Climate Change describes the coal seam methane gas content of coal from the test bore holes in the MLA areas as significantly lower than standard concentrations assumed by published guidelines (International Panel on Climate Change Guidelines and National Gas Inventory) with consequential lower fugitive emissions from standard guidelines.

Forecasts by ABARE (2006) indicate that worldwide demand for thermal coal is forecast to grow at around 2% per annum, and with continued strong global demand, the prospects for continued growth in the Queensland coal export industry remains positive. Development of the Wandoan coal deposits will provide a timely boost in world thermal coal supply to meet global demand that may otherwise be met by Queensland's coal market competitors, such as Indonesia.

While ideal for meeting the energy requirements of the world's coal-fired power stations, the Surat Basin coals are also well suited for gasification and for conversion to liquid fuels by direct hydrogenation–liquefaction processes. Coals from the Surat Basin are not suitable for metallurgical coke making.

The economic assessment under for this Project (refer Chapter 22 Economics) estimates that the Project will provide significant economic net benefits to the region and rest of Australia, during both construction and mine operations. During construction, the Project is estimated to have the following flow on benefits:

- Regional: on average, the total flow-on affect is expected to contribute between $10 million and $14 million per annum in revenues associated with goods and services produced. This is expected to support between 159 and 212 jobs per annum
- State: on average, the total flow-on affect is expected to contribute between $193 million and $241 million per annum in revenues associated with goods and services produced. This is expected to support approximately 884 and 1,178 jobs per annum

- National: on average, the total flow-on affect is expected to contribute between $63 million and $79 million per annum in revenues associated with goods and services produced. This is expected to support between 290 and 385 jobs per annum.

During operations, the Project is estimated to have the following flow on benefits:

- Regional: on average, the total flow-on affect is expected to contribute between $13 million and $16 million per annum in revenues associated with goods and services produced. This is expected to support between 151 and 202 jobs per annum
- State: on average, the total flow-on affect is expected to contribute between $269 million and $336 million per annum in revenues associated with goods and services produced. This is expected to support approximately 1,266 and 1,704 jobs per annum
- National: on average, the total flow-on affect is expected to contribute between $31 million and $39 million per annum in revenues associated with goods and services produced. This is expected to support between 142 and 192 jobs per annum.

The Project will also provide a strong stimulus for investment in port and rail development within the region, including the Surat Basin Rail Project and the Wiggins Island Coal Terminal development at Gladstone.

2.3 PROJECT DESCRIPTION

In terms of Volume 1, the Project comprises an open-cut coal mine, producing approximately 30 Mt/a run of mine (ROM) coal over mining lease application (MLA) areas MLA 50229, MLA 50230 and MLA 50231. The deposits contain in excess of 1,200 million tonnes (Mt) of which approximately 500 Mt is less than a 3:1 strip ratio. The mine life is projected to be in excess of 30 years.

The mine comprises a series of open-cut pits, varying in area and depth that will be mined using dragline, and truck and excavator equipment. The coal will be crushed, processed and blended on site before being transported by rail to Gladstone for export.

Volume 1, Chapter 5 Project Construction, outlines the proposed phasing of works to establish the mine, including all mine related infrastructure. Volume 1, Chapter 6 Project Operations, provides details on proposed mining operations, including mine layout plan, mining equipment to be used, and related infrastructure (potable and raw water sources, reticulation and treatment, sewerage reticulation and treatment, mine and local road works, and energy supply and reticulation to meet Project requirements).

To assist with mine and infrastructure planning, photogrammetric aerial survey of the MLA areas was undertaken for aerial photo acquisition and digital terrain model (DTM) generation. The orthorectified aerial images of the mining lease and surrounding areas provided up to date data for the Project's environmental assessment and management, a visual record of the MLA areas and an overview of the site layout and private and public infrastructure adjacent to the mine site.

The DTM has been used for hydrology modelling, air and noise modelling, earthworks volume calculation and terrain profiling.

The specification for survey accuracy varies according to data utilisation, with the area contained within the MLAs (and adjacent floodplains) prescribed within a spatial accuracy

of +/-150 mm, and a 5 km area offset from the MLA boundary at a spatial accuracy of +/- 1 m.

2.4 PROJECT ALTERNATIVES

2.4.1 DO NOTHING

If the Project did not proceed, there is potential for the on-going global demand for thermal coal to be lost to an international competitor, with losses of export revenue, potential State coal royalties, in local, regional and state employment and ancillary business opportunities. In current economic terms, this would translate into a loss of over $2 billion in export revenue per year, based on annual sales of approximately 22 million tonnes of Wandoan thermal coal. Approximately $3.7 billion of potential State coal royalties would also be lost over the 30 year operation of the Project, as well as approximately $500 million in annual port and rail charges, and loss of rate contributions to local government.

2.5 MINING METHODOLOGY

2.5.1 OVERBURDEN REMOVAL

As a relatively shallow deposit (strip ratio of 3:1 for a large section of the resource), the Project will operate as an open-cut mine, yielding of 846 million tonnes of coal over 30 years of operations. The geology is not suitable for development by underground mining methods.

Several methods of open-cut coal exposure were initially identified as being potentially suitable for this deposit. In order to assess the merits of each method, the WJV undertook an analysis on each potential coal exposure option. The options considered were:

- Option 1: Large draglines with dozer assist
- Option 2: Bucket wheel excavator
- Option 3: Trucks and face shovel
- Option 4: Trucks and excavator
- Option 5: Scrapers.

These options were considered on the basis of cost and practicality, taking into account the WJV's experience at its other mining operations. The environmental impact of each option was assessed as being comparatively similar.

Of these five options considered, the benefits provided through Option 1 (Large Draglines) significantly exceeded the benefits of the alternatives. Overall main strengths of this option included:

- the resource configuration is well suited to this style of overburden removal
- the use of draglines allows progressive rehabilitation of the mine pit given its high productivity and cost effectiveness
- expertise is available within the Proponent's operations and regionally to operate and maintain equipment, as there are similar operations in other Central Queensland mines, and ready access to specialist contract maintenance teams.

2.5.2 LOCATION OF MINE INFRASTRUCTURE AREA AND COAL HANDLING AND PREPARATION PLANT

The WJV considered a number of options for the location of the Mine Infrastructure Area (MIA) and Coal Handling and Preparation Plant (CHPP), taking into account a range of social, economic, topographical, environmental and mine operations factors, including on-site and off-site transport accessibility.

Following a progressive review of site options, and taking the above factors into account, the most suitable central location for mining operations over the 30 year life, is shown on Figures 6-26-V1.3 to 6-30-V1.3. During Project feasibility and detailed design, further optimisation may be possible to minimise impacts further and to improve site access.

The location of the MIA and CHPP was selected as it is:

- central to the mining lease application areas and mine pits (Austinvale, Leichhardt, Frank Creek, Woleebee, Mud Creek, Summer Hill and Turkey Hill)
- offered the most effective access point for the rail spur from the proposed Surat Basin Rail
- the area required was unlikely to sterilise access to economically recoverable coal resources
- of sufficient distance from the town of Wandoan and other sensitive receptors to minimise impact from mining activities, principally noise and air.

The WJV considered that no other location across the MLA areas could effectively meet the above parameters as the site shown on Figures 6-26-V1.3 to 6-30-V1.3. Note that figures with numbering ending in V1.3 refer to figures contained in Volume 1, Book 3 of the EIS.

The overall layout of the proposed mine is provided in Figures 6-3-V1.3, and 6-26-V1.3 to 6-30-V1.3 as part of Chapter 6 Project Operations. These show the various pit locations and scheduling of each of the pits, dump stations, conveyors, coal preparation plant, the MIA, HV and LV power reticulation, water and sewerage reticulation, the internal and external road network, and other key features of the Project.

2.5.3 MINING SCHEDULE

The Project's mining schedule has been developed to provide an optimum mix of coal recovery and economic feasibility over the life of the mine. The WJV has considered a number of potential mine layouts and mining methodologies, based on the economic recoverability of good quality thermal coal to meet market expectations.

In development of those mining layouts, the WJV has also sought to ensure that there is an appropriate balance between the economic returns needed to justify the development of the Project and the mitigation and control measures required to minimise impact on the environment and the surrounding communities.

Measures that have been taken into account include the quality and quantity of economically recoverable coal; the effective use and number of draglines that need to operate so as mine commercial targets and objectives are met; and the optimum rail capacity, including coal load out facilities, number of trains and rolling stock.

The timing to commence mining operations will also coincide with the development and ramp up of port (Wiggins Island) and rail infrastructure (SBR) expansions. These inter-related projects are the subject of other assessment and approval processes, but their development is critical to the operation of the Wandoan Coal Project.

Chapter 6 Project Operations provides details on mine operations scheduling.

2.6 ALTERNATIVES CONSIDERED FOR COAL PREPARATION PLANT

The WJV's experience suggested that the capital and operating benefits of a single, centrally located coal preparation plant (CPP) would overshadow any potential benefits from two smaller satellite facilities. The beneficial aspects of a single facility include the minimisation of land disturbance, plant, equipment, manning and general infrastructure, all of which align with Xstrata's Sustainable Development Policy. As a result, the options explored by the WJV focused on the development of a single coal preparation plant.

The opportunity to bypass run of mine (ROM) coal around the coal preparation plant was investigated and preliminary coal quality analysis estimated that possibly up to 10% of the ROM coal feed may be suitable for bypass (requiring the development of additional infrastructure around the CHPP to the product coal stockpile).

On the basis that only a small percentage of coal was likely to be suitable for bypass, the WJV decided that washing all of the ROM coal would be more appropriate and cost-effective than selectively by-passing a small percentage, thus guaranteeing a consistent washed product coal quality.

During prefeasibility, the WJV reviewed a number of options and configuration to process ROM coal.

The coal processing concept was based on a dense medium cyclone and spirals process. Alternate processing concepts, such as the use of a jig for coarse coal processing, were considered. However, from Xstrata Coal's experience and existing Surat Basin mines, the dense medium cyclone and spirals configuration was selected to be the most effective on Wandoan coal.

During the initial concept options analysis, it was identified that a 1,000 t/h coal preparation plant (CPP) module concept design would be used as the starting point on which detailed design of the CPP would be based. Four modules were found to be likely to be required for 30 Mt/a ROM coal.

Subsequently, an alternative CPP concept was devised and adopted as the base case. This revised concept was based on a 1,400 t/h CPP module, similar to the 1,000 t/h layout but utilising larger process equipment. The 1,400 t/h module allowed the number of CPP modules to be reduced, with only three such modules required for 30 Mt/a ROM coal.

2.7 ROM COAL HANDLING ALTERNATIVES

A number of alternatives were considered for the ROM coal handling, as outlined in the following sections. For each of these cases, it was assumed that coal preparation plant would be direct fed at the 'coaling rate' as a means to obtain full utilisation of the coal preparation plant and to limit rehandling on ROM coal stockpiles.

2.7.1 SURGE CAPACITY

The CHPP capacity will be matched as closely as possible to the mining rate to minimise rehandling of ROM coal. An emergency ROM coal stockpile was explored as an option but dismissed on the basis of the additional costs of re-handling.

Three 300,000 tonne ROM stockpiles and three 500 tonne truck dump station bins will be utilised in combination with two 1,500 tonne plant feed bins at the CHPP to balance the flows from mining and provide raw coal surge capacity prior to distribution into the coal preparation plant.

2.7.2 PUMP FEEDING VERSUS CONVEYING

Two alternative means of feeding raw coal into the coal preparation plant were explored by the WJV. Initially a conveyor fed coal preparation plant system was laid out and costed. An alternative pump fed system option was also developed for consideration; and chosen as the preferred option due to potential overall yield and efficiency increases, and a reduced environmental footprint at minimum additional capital cost.

2.7.3 OVERLAND CONVEYING

The WJV undertook an optimisation analysis on the number of ROM receival areas, their capacities and the capacities and lengths of the overland conveyors transporting ROM coal to the coal preparation plant. The optimisation considered the capital and operating cost impacts of the conveying system against the truck haulage alternative. The results of that analysis clearly indicated the overland conveyor system was the most efficient and cost effective reducing excessive truck haulage.

The individual conveyor corridors were chosen on the basis of minimising impact on recoverable coal; site topography; minimising impacts on haul roads and other infrastructure; and the ease of access to the operating mine's three dump stations. Figures 6-26-V1.3 to 6-30-V1.3 show the location of the overland conveyor system and dump stations.

2.8 PRODUCT COAL HANDLING AND TRAIN LOAD OUT OPTIONS

Two options were considered for coal product handling:

- an automated bucketwheel stacker-reclaimer based system
- fixed stackers in combination with dozer push and a tunnel under the stockpile for product reclamation.

While the automated bucketwheel system requires a greater capital outlay than the fixed stacker system, WJV determined that the bucketwheel arrangement justified the additional capital outlay on the basis that the bucketwheel arrangement:

- provided improved safety conditions over the fixed stackers
- required a reduced environmental footprint area when compared with the fixed stackers
- provided operating cost savings over the fixed stackers.

Initially, two train load-out bins were considered necessary to obtain the annual train loading requirement. Following conceptual simulation work, a single train load out bin was found to be sufficient to manage loading for approximately 22 Mt/a of product coal (based on 30 Mt/a ROM production).

The product handling and train load out concept is such that a second train load-out bin can be included at a later date if the single train load-out bin proves to be inadequate or if the operation is expanded.

2.9 PRODUCT COAL TRANSPORTATION

A rail spur is proposed to connect to the proposed Surat Basin Rail main line, to facilitate the transport of coal to ports in the Gladstone area for export. Given the quantity of product coal to be transported annually (estimated 22 Mt/a), there are no other feasible or practicable alternatives to the coal being transported by rail. The only potential option to rail would be road transport. However, the impact of transporting 22 Mt/a of product coal by road using B-triples, road trains, or equivalent from the mine to Gladstone would result in significant road pavement impacts and unacceptable safety risks.

The location of the spur was fixed to the eastern section of the MLA areas, given the likely location of the Surat Basin Rail main line. The intersection with SBR was decided on the basis of:

- the spur and main line intersection point being close to existing natural surface level
- enabling development of the spur to include a balloon loop that enables reversal of train direction without shunting
- minimise embankment and cutting design.

The first stage of the rail spur development will provide sufficient capacity for 22 Mt/a of product coal. The WJV has allowed provision for expansion of the rail spur capacity involving an allowance for minor track reconfiguration and a second load-out facility, enabling expansion of the mine or to minimise risks associated with reliance on a single load-out system.

The transport by rail will be in conjunction with the development of the Surat Basin Rail (SBR) Project, which is currently the subject of a separate EIS and approvals process.

2.10 OPTIONS FOR REJECTS, TAILINGS AND GENERAL WASTE DISPOSAL

The WJV has investigated a number of options for disposal of mine generated waste (regulated and non-regulated). In accordance with Xstrata's Sustainable Development Policy and the *Environmental Protection (Waste Management) Policy 2000* (EPP (Waste)), the Project will follow the waste hierarchy strategy of avoid, substitute, reuse, recycle and dispose. Mine site waste streams include rejects and tailings, overburden, general municipal, green wastes, regulated wastes, and sewage. Rejects and tailings management and disposal are further described within Chapter 6 Project Operations. Chapter 9 Geology, Mineral Resources, Overburden and Soils discusses overburden management. Chapter 18 Waste Management discussed management of general, green and regulated waste streams, while Chapter 11 Water Supply and Management discusses sewage.

2.10.1 REJECTS AND TAILINGS

Waste produced by coal processing comprises both coarse rejects and fine rejects material (tailings). Coarse rejects will be disposed of in voids created by mined-out pits.

Several rejects disposal options were explored. Initially co-disposal and paste thickening options were considered, but were discarded in favour of a trucked coarse and pumped tailings rejects disposal system. Paste thickening was discarded largely due it being new technology and unproven in coal processing. Co-disposal was discarded due to the large power, water and emplacement area demands.

Tailings storage requirements for the 30-year life of the mine are 124 million cubic metres of coarse reject and 41 million cubic metres of tailings. Coarse rejects are planned to be progressively dumped on the Austinvale Pit footprint to a maximum height of around 25 m above natural surface. However, the WJV will investigate measures which may reduce this maximum height. Tailings are planned for disposal in three storage locations comprising the Tailings Starter Dam, Austinvale North, and Austinvale pit voids, as discussed further in Chapter 6 Project Operations.

2.10.2 GENERAL MUNICIPAL WASTE

All Project generated domestic and general municipal wastes are proposed to be disposed of by licensed contractors, most likely to a Council operated facility. Waste generated would, generally, be from the MIA and accommodation facilities.

Given the size and longevity of the Project, consideration is being given to assist Dalby Regional Council with the potential development of a new municipal waste and recycling facility at a suitable location adjacent to the mine site for disposal of unregulated general and domestic waste. Subject to agreement with Dalby Regional Council, the WJV will assist in the development of a new multi-user municipal waste and recycling facility for the Wandoan area to be owned, managed and operated by the Council. A portion of land, to be used as a waste and recycling facility, would be removed from the MLA areas if proposed on land within the current MLA areas. The WJV is currently consulting with Dalby Regional Council in relation to the potential new facility. Volume 1, Chapter 6 Project Operations describes the municipal waste and recycling facility requirements for the Project.

Alternative locations for a waste and recycling facility will be determined as part of a site selection study, based on a range of regulatory, environmental, social and economic criteria. Subject to the agreement of the Dalby Regional Council and obtaining all necessary approvals, the WJV will assist Council to develop a public municipal waste and recycling facility.

2.10.3 GREEN WASTE

The main options for the management of cleared vegetation are:

- selective mulching for use in rehabilitation
- as an option of last resort, burning under an approved permit

Further details are provided in Chapter 18 Waste Management. The WJV proposes that suitable green waste will be chipped or selectively mulched for utilisation in rehabilitation works, where practicable and feasible to do so.

2.10.4 SEWAGE

Mine site sewage is proposed to be treated at the existing Wastewater Treatment Plant (WWTP) in Wandoan township. Sewage from the mine site, collected from the accommodation facilities, MIA and CHPP, will be pumped via a rising main to the WWTP. Elements of the existing WWTP at Wandoan will need to be upgraded to meet the requirements of the mine development.

The WJV considered two options for sewage disposal, being to utilise the existing Wandoan Town facilities, or the development and operation of its own wastewater treatment plant, either on the MIA and/or at the accommodation facilities. The existing town wastewater treatment plant was found to have excess capacity to potentially meet peak Project requirements; however, an upgrade would be required to ensure the plant's compliance with design guidelines.

On balance, given the existing excess capacity at the Wandoan plant, the proximity of that plant to the mine and accommodation facilities, and the additional resources required to develop, operate and maintain its own facilities, the WJV considered it to be more practical to upgrade, as required, and to utilise the existing Wandoan town facility under an appropriate commercial arrangement with the Dalby Regional Council.

Therefore, subject to agreement with the Dalby Regional Council, the WJV will upgrade the Wandoan town wastewater treatment facility as set out above. Further details on Project sewerage treatment requirements are provided in Chapter 11 Water Supply and Management.

2.11 ROADS

The mine site access road is located approximately 6 km to the north of Wandoan township. The location of this access point to the mine provides the best option that allows ease of access from the Leichhardt Highway (minimising impacts on local roads); minimise impact on mining operations adjacent to the Leichhardt Highway; and of sufficient distance from Wandoan to minimise potential traffic impacts on the township.

The proposed coal pit locations will result in a requirement for a number of relocations and/or closures of state controlled and local roads. Given the scale and timing of mine operations, there are no options other than temporary closure and/or realignment of these roads.

The WJV has considered a number of options to minimise the travel impact on local residents, including delaying road closures/re-alignments until mining operations commence in certain areas. Consideration was also given to construction of a new north-south alignment through the mining tenement between Booral Road to the north of the MLAs and the realigned Jackson Wandoan Road to minimise local traffic inconvenience.

However, while it may be possible to delay some road closures in MLA 50229 until around Year 5 and 8 of operations, a temporary or permanent road re-alignment through the operational mine would not be consistent with mine and community safety principles, given the high potential for interaction between light passenger vehicles and the mine's heavy truck fleet, overland conveyors, draglines and high voltage power lines. The road realignments as proposed will provide only a minimal interference with local traffic thoroughfare from north to south of the mining tenement.

Further details on the proposed road realignments and/or closures, and the proposed timing of those activities, is provided within Chapter 6 Project Operations and will be finalised through the EIS process and negotiations with Dalby Regional Council.

2.12 WATER SUPPLY

2.12.1 POTABLE WATER

The potable water demands for the Project have been estimated for the MLA areas based construction and operational requirements, taking into consideration the demand due to the expected population increase in the Wandoan town, including the Project accommodation facilities.

Potable water demand peaks in the second year of construction at approximately 370 ML, which when included with the town's current usage, is within the current allocation from the Great Artesian Basin for the Wandoan Town Water Supply. However, the current capacity of the Town's water supply facilities will require upgrade in order to meet the Project's potable water requirements.

Therefore, subject to agreement on the extent of upgrade to the Town's water supply treatment facilities, and an appropriate commercial supply agreement with Dalby Regional Council, the WJV will upgrade the Wandoan Township's water supply treatment facilities. There should be sufficient potable water to meet the Project's construction and operational demands for potable water.

It may be technically feasible to establish independent water treatment facilities at the mine and mine accommodation facilities. However, delivery of potable water (like sewerage treatment) is not the WJV's core business, and as Dalby Regional Council is well positioned to provide this service, the potable water for use at the site is proposed to be sourced from the existing water treatment plant and storage facilities located in Wandoan Town. These facilities will be upgraded to meet the additional Project-induced water demand, including a new pump station at the treatment plant and a dedicated pipeline to the accommodation facilities and MIA.

It is recognised that additional demands will potentially be placed on the water infrastructure due to other large construction projects in the area (such as construction of the Surat Basin Rail Project). The cumulative impacts will continue to be discussed with Dalby Regional Council, although the likelihood of significant impacts from the Surat Basin Rail Project — which is the only other project known to be under active consideration within the district — will be relatively short term with any impacts on local services dispersed across a much wider area. However, the potential cumulative impact will need to be addressed with Dalby Regional Council.

For the site preparation phases of the construction period (that is, in the period before any significant ramp up in construction workforce), the WJV proposes to cart potable water to site prior to completion of the potable water mains to the mine. The WJV has considered other short term options, including a temporary water treatment plant on the mine site serviced from existing bores on or adjacent to the mine. However, given the short term use of the facility and the waste disposal requirements, on-site treatment was not considered to be a practicable solution.

Project potable water supply is discussed in more detail in Chapter 11 Water Supply and Management.

2.12.2 RAW WATER SUPPLY

During the two-year construction period, construction raw water (excluding potable water treatment plant feed water) will be required for dust suppression, moisture adjustment and concrete mixing.

A number of source options for raw water during construction have been investigated. Options considered:

- use of an existing Hutton Sandstone GAB bore on land owned by the WJV
- existing surface water dams
- existing bores in the coal seams
- use of the Wandoan Town Bores

The adopted raw water supply for construction may involve one or more of these options.

Operational raw water will be required for the CHPP process water, fire fighting services, site dust control, and light vehicle and heavy vehicle washdown averaging 8,400 ML/a for the first 15 years. Peak demand for the mine is estimated to be around 9,100 ML/a in Year 15.

The operational raw water requirement will be delivered via pipeline from:

- either Coal Seam Methane water operations at Spring Gully/Fairview, approximately 91 km to the west of the Project, or
- an alternative from CSM operations south of the new Condamine Power Station, approximately 93 km to the south, or
- a further alternative from the Dawson River from the raising of Glebe Weir located approximately 83 km to the north of the MLA areas.

These options are the subject of separate investigations and impact assessments contained with Volumes 2, 3 and 4 of the EIS.

Notwithstanding the source, raw water for operations will be reticulated around the site from the proposed 400 ML storage dam adjacent to the MIA, for use in the CHPP, dump stations, overland conveyor system and the MIA.

Project water supply is discussed in more detail in Chapter 11 Water Supply and Management.

2.13 POWER SUPPLY AND TELECOMMUNICATIONS

2.13.1 ELECTRICITY SUPPLY

The WJV is considering a number of power supply options for the Project. These options are:

- Option 1: total supply via a new 132 kV or 275 kV electricity transmission line, from a new substation adjacent to the 275 kV Callide to Tarong line, near Auburn River, east of Wandoan, to a substation at or adjacent to the MLAs

- Option 2: total supply via a new 132 kV electricity transmission line from the Columboola Switchyard east of Miles, which is currently under construction, to a substation at or adjacent to the MLAs
- Option 3: total supply from stand-alone on-site power generation, including energy storage devices and static var compensators (SVC)
- Option 4: partial supply from a new 132 kV electricity transmission line, and partial supply from on-site power generation to provide network support.

Options 1 and 2 involve connection to the existing Powerlink 275 kV system at Auburn river (the Auburn River connection) or connection to the existing Ergon 132 kV system at Columboola. Both connections would require significant upgrades to the existing network systems, and will be subject to separate impact assessment and approvals process, as outlined in Chapter 6 Project Operations.

Option 3 involves total site supply from an 80 MW gas-fired duel fuel power station consisting 12 engines, each having 8 MW of electrical output. Ten engines would operate at any one time with two on stand-by. The location of the power station has been based on it providing a cost effective and central location for power distribution across the MLA areas, while maintaining a safe and reasonable distance from the major populated areas (MIA and accommodation facilities).

Option 4 involves partial site supply from a 30 MW gas-fired duel fuel power station consisting of six engines, each having 8MW of electrical output, supporting the primary power supply from the electricity transmission grid. Four gas-fired engines would operate at any one time with two on stand-by. The location would be the same as the 80MW option.

2.13.2 GAS SUPPLY PIPELINE

Options 3 and 4 discussed above need a reliable supply of conventional gas. The closest conventional gas supply is from the Peat Scotia lateral gas pipeline, located to the north east of Wandoan.

Methodology for Pipeline Route Selection

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-V1.4 contains the Route Selection Report for the gas supply pipeline.

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 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
- 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, 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 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.

Site specific, practicality and constructability issues were also identified for inclusion in pipeline option development. The additional criteria considered included:

- 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, three potential pipeline route alignments were identified, to which the selection criteria above were applied and a comparative assessment undertaken.

Route Options

Three potential pipeline routes were identified and a comparative assessment was undertaken and detailed in a Route Selection Report, as attached in Appendix 2-1-V1.4. The three potential routes are shown in Figure 2-1-V1.3. (Note that figures with numbering ending in V1.3 refer to figures contained in Volume 1, Book 3 of the EIS.)

Route Options Assessment

As outlined within the Route Selection Report in Appendix 2-1-V1.4, of the three options considered, Option 1 has the least impact to mapped regional ecosystems, the least number of waterways to be crossed and affects the least amount of good quality agricultural land. Option 1 is the second longest pipeline option (28.76 km) and therefore the second most costly option. Option 2 is generally similar to Option 1 for a number of the selection criteria. Option 2 would potentially affect the greatest area of mapped regional ecosystems and is also the longest pipeline option (32.47 km) and therefore, has the greatest associated cost. This option however, affects the least amount of private properties yet may potentially affect the second largest area of good quality agricultural land.

Option 3, which is proposed to be co-located with the Surat Basin Rail Project main line, is the shortest pipeline option (24.03 km) , has the least associated (preliminary) costs and may potentially affect the second largest area of regional ecosystems. Co-location of infrastructure is considered to create opportunities to reduce cumulative impacts. For example, co-locating the gas supply pipeline with the Surat Basin Rail main line will not impact on any additional landowners or properties within the study area, will not create

any further land severance issues, will not affect any additional areas of good quality agricultural land, will create opportunity to centralise ancillary infrastructure such as access points and maintenance tracks and will reduce the potential impacts associated with construction such as interference with property accesses and traffic control and delays on local roads.

Based on the desk-top information reviewed, Options 1 and 3 resulted in favourable outcomes against the greatest number of performance measures. However, the opportunities and benefits created by co-location of infrastructure are considered to further support Option 3 over Option 1 and therefore Option 3 is recommended as the preferred option for the gas supply pipeline. However, it should be noted that this recommendation is 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 pipeline
- discussions and agreements associated with indigenous cultural heritage groups
- clarification of any associated Native Title issues.

Following consultation with landowners at the northern end of the preferred gas supply pipeline route (Option 3), the route was further refined to run immediately adjacent to the northern fenceline of Lot 22 on Plan FT801 and Lot 6 on Plan FT801, until meeting the eastern easement of the Surat Basin Rail main line.

2.13.3 SITE POWER

Options for the Project's electrical supply requirements and reticulation have been considered, in terms of the potential mine layout, mine operations such as the use of and number of draglines, and timing of pit development.

It is proposed that the likely final configuration will include:

- construction phase power supply in the form of diesel generators
- 66 kV switchyard
- 66/22 kV substation for the CHPP
- 66/22 kV substation for the accommodation facilities, MIA and dragline workshop
- 66 kV and 22 kV reticulation to substations, draglines, accommodation facilities, MIA, dragline workshop, CHPP, security building
- supply transformers and high voltage reticulation at the accommodation facilities
- low voltage installations at the accommodation facilities, MIA, security building and dragline workshop.

An optimal layout has also been developed based upon discussions with the relevant power authority (Ergon) regarding the relocation of existing infrastructure within the MLA boundaries. There is a combination of 22 kV overhead and SWER lines within the MLA areas. The WJV will work closely with Ergon to ensure that there is minimal disruption to the local community and mine operations power supply as a consequence of the relocation of the 22 kV overhead supply. The SWER lines across the MLA areas are likely to be

supplying properties which will be purchased by the Proponent and decommissioned. The extent of these interruptions will be determined through consultation with Ergon.

Discussions with Ergon, as the main distributor of power within the Project area, have concluded that power requirements during the construction phase of the accommodation facilities are unlikely to be supplied from the existing network infrastructure. Further investigation will be undertaken during detailed design as to the potential for augmentation of the existing network to provide additional power during construction. As a contingency alternative, on-site power generation using diesel generators has been proposed for the two years of construction until the augmented bulk power supply is available before mine operations commence.

Further details on power requirements are provided within Chapter 5 Project Construction and Chapter 6 Project Operations.

2.13.4 TELECOMMUNICATIONS

The WJV has been consulting with telecommunications providers on the establishment of suitable voice and data communications around the MLA areas, for both the short term (construction) and long term (operations).

It is proposed to establish short-term mobile voice and data communications infrastructure; temporary construction area network and phone communications, UHF communications and telemetry communications on the MLA areas.

2.14 ACCOMMODATION

During the first three months of construction, the initial construction workforce is likely to be accommodated in temporary units located on or adjacent to the MLA areas. After this time, the majority of the workforce for the construction phase and operations (and any on-going construction) is proposed to be accommodated in purpose built accommodation facilities adjacent to the MLA areas. The experience gained from the successful development at the Rolleston Mine of permanent accommodation facilities, where personnel work seven days on and seven days off, has provided the WJV with invaluable knowledge on management of the proposed accommodation facilities.

Given the number of workers expected to be required for the peak mine construction workforce (1,375), and the on-going operational workforce (around 844 by Year 4, including maintenance personnel), it was not considered feasible to accommodate the bulk of that workforce within Wandoan township or the adjacent towns of Miles and Taroom. Studies undertaken by the WJV indicated that there was little capacity within these towns to absorb a workforce of this magnitude. Apart from the lack of availability and suitable accommodation within these towns, the desire to minimise transport time for the construction and operations workforce was a major consideration in the decision to develop accommodation facilities on or adjacent to the MLA areas.

Accommodation facilities adjacent to the MLA areas are therefore proposed, the configuration of which will be modified between the construction and operational stages of the Project. The accommodation facilities will develop as construction numbers increase and then be modified by demobilisation of construction units and construction of the operational phase units.

The proposed site for the accommodation facilities has been selected as being relatively close to mining facilities and operations, on land to be owned by the WJV, is accessible only through the mine access road, and is sufficiently distant from mine operations to minimise disruption to the facility residents.

The WJV anticipates that there will still be some demand for off-site accommodation during construction and mine operations, with workers most likely to locate at Wandoan, but some also likely to live in either Taroom or Miles.

Further details on the WJV's accommodation strategy are provided in Volume 1, Chapter 5 Project Construction and Chapter 6 Project Operations.

2.15 OPERATIONS WORKFORCE TRANSPORT

The WJV investigated options for the transport of the majority of the operations workforce personnel from Wandoan to South East Queensland, on a shift by shift basis. Comparison has been undertaken between the transport of the operations workforce by air transport and by bus to these destinations.

The main destination by air or bus is assumed to be the Brisbane region, with possible connections to the Gold and Sunshine Coasts. The bus option also includes the potential for drop-offs en route to Toowoomba and Brisbane.

The WJV's preference is to fly rather than transport by bus its operational workforce to and from the Project site. This is based primarily on the time factor (transport from site to Brisbane is approximately one hour by air and approximately six hours by bus). However, at this time, both air and bus transport remain as potential options.

In relation to air transport, the WJV has reviewed the potential use of two local airstrips (Wandoan and Taroom) including the potential for development of a greenfield airstrip in the Wandoan district.

The WJV determined that the airstrip needed to have, or at least have the capacity, to cater for Dash 8 400 series (or equivalent) aircraft. Neither the existing Taroom nor the Wandoan airstrips have that capacity, although it was determined that Taroom Aerodrome was capable of expansion to accommodate Dash 8 aircraft. Due to land constraints, the existing grass airstrip at Wandoan was not capable of the required expansion and so was not considered further.

The WJV is considering the development of a greenfield airstrip on or adjacent to the MLA areas. The new airstrip would also be available to the general public.

While the capital cost to develop a greenfield site at Wandoan would be higher than an upgrade of the Taroom Aerodrome, this cost would be offset against the requirement to transport the workforce by bus to the Taroom Aerdrome (approximately 40 km or around 40–45 minutes to the north of Wandoan) and the associated impacts on the local road network. Development of a publicly available greenfield airstrip in Wandoan would also have substantial economic and social benefits for the local community.

However, the option to upgrade the existing Taroom Aerodrome to meet the equivalent operational requirements outlined above remains an option for the WJV, and if Taroom Aerodrome is the WJV's preferred transport option, discussions will be undertaken with

Banana Shire Council as the owners of that facility on the necessary impact assessment and approvals requirements.

The WJV is also still considering the option for bus in/bus out as an alternative to flying and this option has been assessed in the EIS.

While this EIS has not evaluated the airstrip options in detail, once a decision is made on transport mode, a detailed assessment on a preferred location of an airstrip will be undertaken to meet appropriate regulatory approvals.

2.16 PROJECT JUSTIFICATION

Increases in world demand for coal including demand for quality thermal coal, is expected to continue into the future. The strength of this demand justifies the significant investment proposed by the WJV in development of the Wandoan Coal Project. The strength of that global demand has also resulted in the proposed development of the SBR main line to service thermal coal mines in the Surat Basin region, and the development of the Wiggins Island Coal Terminal at Gladstone. The total value in royalty payments to the Queensland Government from the Project is expected to be $3.7 billion.

The potential impacts of the Project are able to be appropriately avoided, mitigated and managed through the implementation of comprehensive Environmental Management Plans (refer Chapter 27) and mitigation measures (refer Chapter 28).

With high world demand for good quality thermal coal forecast to continue, the Queensland coal industry and specifically coals from the Surat Basin, are well placed to meet the continued export demand. Queensland coal producers, including the WJV, are recognised as being among the world's lowest cost producers, further enhancing the long term market prospects for this Project.

The operation of the Project will make a substantial contribution to the social and economic environment of the region surrounding the Project area by revitalising the local economy and acting as a catalyst to increase and improve available local infrastructure services. Investment in port and rail development in the region, will significantly increase regional and state employment opportunities.

As outlined within Chapter 22 Economics, the investment in the construction and operation of the Project by the WJV is expected to generate significant economic benefits to the region, state and nation in the form of increased economic activity and employment. These benefits, would in turn lead to a steady increase in the region's population and subsequent demand for goods and services. The net effect for the development of the locality would thus involve the encouragement of:

- greater private sector investment in the Wandoan local area and region more generally as new and emerging businesses seek to supply the increase in demand for goods and services resulting from the Project
- an increase in the number and type of businesses across new and existing development areas, reflecting increased demand for goods and services
- competition across new and existing development areas, reflecting growth in business activities, business expansion and new start-ups

- greater profitability across new and existing development areas, reflecting increased commerce and demand for goods and services.

The Project is expected to change the underling economic base and industrial structure of the Wandoan local area by developing businesses and industries that directly and indirectly support the construction and operation of coal mining activities. The key driver of this underlying change relates to the increase in demand for goods and services and population growth resulting from increased employment opportunities.

Specific businesses and industries that are likely to be affected directly include those associated with mining services, non-residential building construction, non-building construction and construction trade services. Indirect businesses and industries that are expected to benefit, to name a few, include electricity supply, gas and water, residential building construction and retail trade.

While there will be some loss of agricultural activity as a result of the Project, the net change resulting from the investment in the Project is expected to improve the overall well-being and standards of living in the region, having the effect of generally improving incomes, employment and demand for goods and services.

The results of the economic analysis are strongly supportive of the Project's development, presenting regional and national economic benefits that could potentially be realised over the life of the Project.

In terms of infrastructure, the Project will benefit the local and regional community through:

- proposed upgrade of the local potable water treatment facility, subject to agreement with Dalby Regional Council
- proposed upgrade of the local wastewater treatment facility, subject to agreement with Dalby Regional Council
- providing assistance to Dalby Regional Council to develop a new municipal waste landfill
- potential for a new public airstrip near Wandoan, or upgraded aerodrome at Taroom.

Other local and regional socio-economic benefits of the Project, and the WJV's commitments, are discussed in Chapter 20 Cultural Heritage, Chapter 21 Social, Chapter 22 Economic and Chapter 28 Summary of Commitments.

The WJV has demonstrated as provided in this EIS, a responsible long term mining plan that recognises the environmental and social impacts that may potentially be associated with this Project, and has developed appropriate strategies, commitments and mitigation measures to limit those potential impacts to an acceptable level.

2.17 RELATIONSHIP TO OTHER PROJECTS

2.17.1 SURAT BASIN RAIL

The Surat Basin Rail (SBR) Joint Venture proposes to construct a 210 km open access, multi-user rail line from Wandoan to Banana. In July 2007, the Queensland Government announced that it had made unconditional the exclusive mandate of the SBR consortium to

build the rail line. The rail line is proposed to be used to transport coal from the Project to a Port at Gladstone. The WJV is not a member of the SBR Consortium and is not involved in the development of the railway project. A separate subsidiary of XCQ is a member of the consortium. XCQ has guaranteed the obligations of its subsidiary under the mandate.

The SBR consortium made an EPBC referral submission in December 2007, and the Australian Government Minister for the Environment, Heritage and the Arts determined that the rail line was not a controlled action.

The SBR consortium is undergoing its own separate environmental assessment and EIS process. It is possible that the SBR EIS will be lodged within a similar timeframe to the Wandoan Coal Project EIS, with similar timing for the construction phase. For this reason, the WJV has consulted with the SBR consortium to discuss potential cumulative impacts.

The *use* of the Surat Basin Railway Project, if it is constructed, is included in the "action", as given in the Project EPBC Referral 2008/4284.

2.17.2 PORT ALMA COAL TERMINAL PROJECT

XCQ and the Gladstone Port Authority (GPC) are investigating the feasibility of an expansion of Port Alma to export up to approximately 25 Mt/a of coal. The WJV is not involved in these investigations and will not be involved in the development of the expanded Port Alma.

The Port is approximately 50 km to the north of Gladstone, and currently used to export approximately 200,000 tonnes of goods annually. The Port cannot accommodate ships of more than 35,000 tonnes at present, and dredging works would be required to develop the Port to allow vessels required for coal exports.

Whilst related, any development of Port Alma will be a separate project and not undertaken by the WJV. At the time of this EIS, no Initial Advice Statement or referral had been lodged in relation to the Port Alma Coal Project.

2.17.3 WIGGINS ISLAND COAL TERMINAL PROJECT

The GPC and Queensland Rail (QR) propose to develop a coal terminal in the Port of Gladstone with an initial capacity of 25 Mt/a and a capability to upgrade it to a nominal 70 Mt/a in later stages. In parallel, QR proposes to develop rail infrastructure to connect the new terminal with the existing rail infrastructure. The Wiggins Island Coal Termination Project has already been the subject of a separate EPBC referral and EIS, and has been approved under the EPBC Act. The Coordinator-General has decided that the project can proceed subject to certain conditions outlined in the evaluation report.

The *use* of Wiggins Island Coal Terminal Project, if constructed, is included as part of the Project for the purposes of the EPBC referral.

2.17.4 ANGLO COAL — TAROOM AND COLLINGWOOD PROJECTS

Anglo Coal in 2007 acquired Collingwood deposit (MDL 346), located about 30 km north east of Wandoan and has held the Taroom coal deposit (10 km south of Taroom) on MDLs 158 and 275 for many years. These deposits are being assessed for development and no development plans are available.

2.17.5 NORTHERN ENERGY — ELLIMATTA PROJECT

This coal deposit is located approximately 20 km west of the MLA areas. The coal seams are similar to those held by the WJV and exploration and early planning activities are being undertaken.

Based on project EPBC Act referral 2008/3140, the project is proposed to comprise open cut mining and on-site processing to produce 4-5 Mt/a product coal for export. It is understood that the project is proposed to have a total area of disturbance of 2,500 ha for the mining and infrastructure footprint, with a total area of proposed MLAs of 4,054 ha. The project is anticipated to require water supply of 1,500 ML per annum, and the proponent is investigating CSM water. No IAS has been lodged at the time of drafting this EIS.

2.17.6 COCKATOO COAL — GULUGUBA PROJECT

Cockatoo Coal holds MDL 187, 20 km south of the Project which is reported to contain 105 Mt of coal seams similar to those held by the WJV. The Company has undertaken recent exploration and its 2008 Annual Report stated that it was involved in industry discussions on Wiggins Island and discussions with Queensland Rail on the upgrades required for the Moura-Gladstone rail line. No further development plans or timing are available.

2.17.7 POWER STATION

The Project is proposed primarily as an export mine. However domestic coal sales in the future are also possible.

In light of historical interest in a power station at Wandoan, Xstrata Coal has received expressions of interest from potential proponents for a coal fired power station in the vicinity of the mine to use product coal from the mine. Any such power station would potentially supply multiple users.

Any power station would be the subject of a separate environmental impact assessment and approval process.

2.18 REFERENCES

Australian Bureau of Agricultural and Resources Economics, *Australian Commodities, various issues 2007 and 2008.*

Australian Bureau of Agricultural and Resources Economics *Australian Coal Export — Outlook to 2025 and the role of infrastructure, ABARE research Paper No. 06.15, October 2006.*

International Energy Agency press release, *World Energy Outlook 2007.*

Queensland's World Class Coals — Mine Production and Developments, November 2007, Department of Mines and Energy (Qld).