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Terms and Abbreviations

AUD	Australian Dollar
CHPP	Coal Handling and Preparation Plant
CQC	Central Queensland Coal
EIS	Environmental Impact Statement
EPC	Exploration Permit for Coal
ESA	Environmentally Sensitive Area
ESD	Ecologically Sustainable Development
FEL	front-end loaders
GQAL	Good Quality Agricultural Land
GWh	Gigawatt hour
ha	Hectares
JORC	Joint Ore Reserves Committee
Km	Kilometres
kV	Kilovolts
kVa	Kilo-volt-amperes
m	Metres
MDL	Mineral Development Licence
MIA	Mine Infrastructure Area
ML	Mining Lease Application
ML	Megalitres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
Mt	Million tonnes
Mtpa	Million tonnes per annum
MW	Megawatt
RE	Regional Ecosystem
ROM	Run of Mine
SCL	Strategic Cropping Land
SEIS	Supplementary Environmental Impact Assessment
SEVT	Semi-evergreen Vine Thicket
SSCC	Semi-soft coking coal

TEC	Threatened Ecological Community
the Project	Central Queensland Coal Project
TLF	Train Load-out Facility
ToR	Terms of Reference
V	Volt
WTP	Water Treatment Plant

1 Appendix 2 - Project Alternatives Considered

1.1 Introduction

This Appendix has been prepared to address the requirement of the Central Queensland Coal (CQC) Project (the Project) Terms of Reference (ToR) to present the alternatives that were considered in terms of locality, equipment and mining processes. This information was contained in the former Supplementary Environmental Impact Assessment (SEIS v2) in Chapter 2 and has been updated to include recent changes to the Project that have occurred in response to agency comments on SEIS v2.

The terms of reference addressed in this appendix are shown in Table 1.

Table 1: ToR cross reference

Terms of Reference
7.4 Feasible alternatives
Present feasible alternatives of the project's configuration (including conceptual, technological and locality alternatives to the project and individual elements) that may improve environmental outcomes.
Summarise the comparative environmental, social and economic impacts of each alternative, with particular regard to the principles of ecologically sustainable development.
Discuss alternatives in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action while rejecting others.
Discuss the consequences of not proceeding with the project.

1.2 Project Alternatives

During the initial Project design process, a number of alternative scenarios were considered to evaluate the relative social, economic and environmental advantages and disadvantages of different Project alternatives. Results from this analysis were used to select the final Project scope in the context of fixed locations for the coal resource and Mining Lease Application (ML) areas. This process ensures the Project design has been underpinned by relevant environmental, social and economic drivers.

The analysis included consideration of a range of factors such as:

- the location and stripping ratio of the coal resource
- the location of sensitive receptors
- protected or declared environmental areas
- mapped areas of biodiversity significance
- the presence of Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) including, but not limited to, remnant vegetation, wetlands and fauna habitat
- the location of surface water features and
- maximising the use of existing infrastructure such as power supply, telecommunications infrastructure and transportation options, including proximity of mine site to existing ports.

Throughout the Environmental Impact Statement (EIS)/SEIS process, as potential impacts have been revealed through the impact assessment process, the Project layout has continued to be refined to avoid and minimise these impacts as much as possible. These refinements are considered herein as alternatives to the previous project locations, equipment and processes.

Alternative scenarios considered were those that are practicable, feasible and available to CQC. These included locality, technological and conceptual alternatives. The scenarios assessed as part of the EIS included the following alternative actions:

- no development scenario
- locality alternatives of
  - mine
  - coal transport to port and
  - port selection
- mine layout changes made during EIS and SEIS, minimising project impacts
  - open cut pit
  - open cut pit waste rock stock piles
  - mine infrastructure area (MIA) and Coal Handling and Preparation Plant (CHPP)
  - haul roads
  - train load-out facilities and rail loop
  - dams
  - new catchment diversion drains
  - overland conveyors
  - overhead power line connections and
  - mine access road
- technological alternatives
  - mining methods
  - rejects and tailings management and
  - train wagon loading options
- conceptual alternatives
  - open cut configurations
  - water supply
  - energy supply and
  - alternative accommodation during the construction and operational phases.

The following subsections discuss each of the aforementioned alternative scenarios.

1.2.1 No Development Scenario

The no development scenario predicts the future scenario which would exist in the absence of any Project. The no development scenario would avoid the potential impacts of the Project on the existing environment and cattle grazing would likely continue to be the primary land use. Under this scenario:

- The Great Barrier Reef Marine park would not see the reduction in sediment loads leaving the Project site that will result from the Project, compared to the current practice of cattle grazing (refer to Chapter 9 – Surface Water).
- Compared to the current practice of cattle grazing (refer to Chapter 14 – Terrestrial Ecology), the proposed development proceeding will cause the protection and enhancement of vegetated areas, as environmental offsets and via the revegetation of creek banks.
- Both vegetated areas and creek banks are currently subjected to cattle grazing, cattle access and the resultant eutrophication and weeds, and this would continue should the proposed project not proceed or otherwise having a no development scenario.

It is noted that groundwater drawdown as a result of the Project is predicted to have impacts on riparian areas and, in turn, the resident species. However, due to the provision of offsets and the commitment to enhance riparian zones adjacent to the Project, there is likely to be a net benefit in terms of biodiversity as a result of the Project.

The no development scenario would also have a significant impact socially and economically in terms of employment and supply chain, community growth and community support service opportunities not realised. The region will not benefit from flow on business, employment skills and training programs, or receive local business support. With the significant reduction in the resource industry workforce within central Queensland the broader region will continue to experience social and economic stress.

In economic terms, the no development scenario would result in a loss to the Queensland Government of between $703.3 million (AUD) and $766.0 (AUD) over the life of the Project in royalties alone.

1.2.2 Locality Alternatives

1.2.2.1 Mine Location and Layout

1.2.2.1.1 Mine Location

The mine location was determined by the targeted coal deposit that lies within Exploration Permit for Coal (EPC) 1029 and Mineral Development Licence (MDL) 468, and later, within ML 80187.

The proposed mining lease boundaries are defined by existing geological conditions which are suitable for mining based on the results of exploration studies undertaken within the ML. As such alternative mine locations are not available to CQC. The existing location is suitable for development of a mine as the proposed location:

- is in the Styx Coal Basin which has previously supported coal mining
- the disturbance footprint of the Project does not lie within any Environmentally Sensitive Areas (ESA)
- the Project does lie over some areas mapped as Strategic Cropping Land (SCL) on the SCL trigger map, however, this has been ground-truthed as not SCL (see Chapter 5 – Land) and
- is within close proximity to the existing infrastructure able to service the mine readily such as the Bruce Highway, Electricity, Telecommunication and Queensland Rail North Coast Rail line.

1.2.2.1.2 Mine Layout

Coal mineralisation within the ML has been calculated by Xenith in accordance with the Australian Guidelines for the Estimation and Classification of Coal Resources (Guideline Review Committee 2014). The findings are presented in a Coal Resources Joint Ore Reserves Committee (JORC) report (Xenith 2017) which records coal resources of 206 Mt. The reported coal resources of 206 Mt is fairly consistent in quality throughout its occurrence, however, the resource differs economically in terms of its distribution, with the middle portion of the ML having better mine stripping ratios, making this area attractive economically and a good starting point for operations.

The 206 Mt of JORC Resource Estimate lays within the property bounds of Bar H in the north, Mamelon in the middle and Brussels in the south, the majority of low stripping ratio resources being held within Mamelon property, making Mamelon property the preferred area to commence mine operations.

Within the ML, Project infrastructure has been preferentially sited to avoid impacts on threatened ecological communities, sensitive areas, wildlife corridors and mapped wetlands, and to minimise impacts to regulated and riparian vegetation. Existing disturbed areas (such as farm access tracks or clearings) have been used to site infrastructure and reduce impacts to MNES and MSES to the greatest extent possible. Of the total Disturbance Area (1,372.50 ha) approximately 90% is located within non-remnant vegetation which has been previously cleared for cattle grazing (1,231.13 ha).

As part of Project refinements to improve environmental outcomes undertaken during SEIS v3, 349 ha has been excised from the southern extent of ML 80187 to reduce the overall size of the Project Site.

1.2.2.2 Mine Infrastructure Area

Two options were considered for the location of the MIA and CHPP. The original concept was for a single MIA and CHPP servicing both open cut pits. This concept was optimised to allow for the future extraction of Semi-soft coking coal (SSCC). Further assessment of the mine operability resulted in a decision to move towards two smaller MIA and CHPPs.

One MIA and CHPP will be located on the western side of the Bruce Highway and will service Open Cut 1. The second MIA and CHPP will be located on the eastern side of the Bruce Highway servicing Open Cut 2.

The use and development of two MIAs and CHPPs concept was adopted, as a balance between the long term haulage of Run of Mine (ROM) coal, reject material and product coal while allowing for the economic extremities of the mine area. A further key reason for having two MIAs and CHPPs was to significantly reduce the volume of trucks crossing the Bruce Highway moving to and from the single MIA / CHPP as originally proposed. As part of additional works to address agency comments on SEIS v2, MIA 2 and CHPP 2 were moved away from Deep Creek, to a new location out of the floodplain along the eastern side of Open Cut 2 high-wall.

The location of MIA 1 and CHPP 1 has not changed.

1.2.2.3 Open Cut layouts

The location of the Open Cuts is dictated by the targeted resource. However, as part of Project refinements to improve environmental outcomes undertaken during SEIS v3, it was found that the Open Cut 2 original design lay close to a small patch of Endangered Regional Ecosystem (RE) 11.3.11 - Semi-evergreen Vine Thicket (SEVT). To mitigate potential impacts of the mine on this area, it was

Figure 1-3: Water storage infrastructure changes between SEIS v2 and SEIS v3

1.2.2.6.1 Dams

As can be seen from Figure 1-3, the water storage system for the site has been refined substantially and a number of former dams (Dams 2 and 3, Environmental Dams 1A, 2B, 2C) no longer exist (Environmental Dam 1B was relocated to Waste Rock Stockpile 1).

Dam 1

Dam 1 has increased in size substantially since SEIS v2. The new dam wall also serve as a separation bund between mining activities conducted within Open Cut 2 and Tooloombah Creek, extending south towards the Bruce Highway (refer to Levees, below).

Environmental Dam 1A

from Waste Rock Stockpile 1A, however as Waste Rock Stockpile 1A no longer exists, this dam is no longer required. The former location of this Dam now contains a catchment diversion drain.

Environmental Dam 1B

The former SEIS v2 Dam 1B has been removed as the location was within what is now Waste Rock Stockpile 2 and Dam 1. A new ED 1B captures runoff from Waste Rock Stockpile 1.

Environmental Dam 1C

Dam 1C remains as per original design and serves as an environmental dam for MIA 1 and CHPP 1.

Environmental Dam 2B and 2C

SEIS v2 Environmental Dams 2B and 2C have been removed. The purpose of Dam 2B was to capture runoff from Waste Rock Stockpile 2, and for 2C was to act an environmental dam to capture run-off from MIA/CHPP 2. However, with the expansion of Dam 1 and the movement of the MIA/CHPP 2 next to Dam 1, neither of these dams are required as drainage can be directed into Dam 1 directly.

Environmental Dams 2C and 2D (Haul Road)

Environmental Dam 2D (Haul Road) was located in vegetation mapped as Of Concern RE 11.3.4 and has been relocated to avoid this impact. In addition, the dam has been split into two to better manage runoff from the west (in the direction of the MIA/CHPP 2) and the east (in the direction of the TLF), with the new dams labelled Environmental Dam 2D1 and 2D2. The size has not changed however the effectiveness is expected to have increased by better matching the topography.

Dam 2

Dams 2 and 3 (SEISv2) were located west of the former MIA / CHPP 2 location, with their walls forming part of the light vehicle access road, connecting the MIA 2 to Dam 1. With the expansion and consolidation of Dams into Dam 1, and removal of the Dam 1 access road in this location, these dams were no longer required, and removal of Dam 2 in particular, allows for the retention of flood storage in this location, that followed the contours of the previous dam extent. Dam 2 also impacted upon remnant vegetation types RE 11.3.27, RE 11.3.35 and RE 11.4.2.

MIA / CHPP 2 Turkeys Nest Dam

This dam, located previously on the north side of the SEIS v2 MIA/CHPP 2 location (where run-off waters would report from the MIA/CHPP 2) is no longer required, as with the movement of MIA/CHPP 2 adjacent to Dam 1, runoff can flow directly into Dam 1.

Dam 4 – Train Load-out Facility

Dam 4 remains as previously described, to capture run-off surface waters from train loadout facilities. The shape has changed slightly to accommodate the haul road realignment and to better align to natural contours.

1.2.2.6.2 New Catchment Diversion Drains

As part of the new mine site water management system, two new catchment diversion drains have been designed to divert clean surface run-off waters from western and southern upslope catchments around mining activities, and into Deep Creek, there-by maintaining environmental flows and minimising the amount of clean catchment runoff water required to be managed within the mine water system (and therefore reducing the risk of discharges). There are two diversion drains, a southern diversion drain diverting waters around Open Cut 1 into Deep Creek, and a northern diversion drain, diverting waters around Open Cut 2, into Deep Creek. The northern drain will be installed first. Prior to mining beginning in Open Cut 1, the southern diversion drain will then be installed, and the northern drain gradually retired and rehabilitated as it is mined out when Open Cut 2 reaches the end of its life.

1.2.2.6.3 Levee

In the SEIS v2, levee structures were proposed around both open cuts, with a diversion drain / bund constructed along the upslope side (south for Open Cut 1, south-east for Open Cut 2) ends to direct upslope drainage into Deep Creek. With the expansion of Dam 1 and movement of MIA / CHPP 2, and sufficient height along the access road, the Dam 1 wall was extended on its western side to near the Bruce Highway to provide flood immunity to the entire northern pit and infrastructure area. While smaller drainage structures will be required to direct internal runoff around the site and away from the pits, this levee coupled with the catchment diversion drains mean that substantial levee structures directly around each pit are no longer required.

1.2.2.7 Overland Conveyors

The conveyors have been located to provide for the most efficient passage between mine infrastructure whist minimising environmental impact as much as is practicable.

However, a change of overland conveyor alignment from the previous EIS and SEISs has arisen due to the relocation of MIA 2 and CHPP 2. The overland conveyor alignment from CHPP 1 to the Bruce Highway remains as per previous studies, however the alignment from Bruce Highway conveyor underpass to MIA 2 and CHPP 2 now aligns to be parallel with the southern end wall of Open Cut 2 and the Open Cut 2 high wall.

1.2.2.8 Electricity

A change of the alignment of the location of the 22 Kilovolts (kV) overhead power alignment from that depicted in SEIS v2 has arisen, due to the relocation of MIA 2 and CHPP 2. The overhead power alignment start point at the Bruce Highway remains as per previous studies, however the alignment from Bruce Highway start point to MIA 2 and CHPP 2 now aligns to be parallel with the southern end wall of Open Cut 2 and the Open Cut 2 high wall.

1.2.2.9 Mine Access Road

The Mine will be accessed from the Bruce Highway via two new turn out lanes. Various options were assessed regarding the location of the entry turnout locations; however, at this point in time the current locations were considered the most appropriate given the locations of Open Cut 1 and Open Cut 2 (see Chapter 6 – Traffic and Transport).

Mine access road into MIA 2 and CHPP 2 is similar to overhead 22kV power line, aligning to be parallel with the southern end wall of Open Cut 2 and the Open Cut 2 high wall.

1.2.3 Transport Alternatives

1.2.3.1 Port Selection

The selection of port was made based on the proximity of the port site to the mine site, logistics of getting to the port and port capacity being available. Essentially there are four operating port sites suitable to handle the export of the coal generated by the Project. All four ports are considered to have spare port capacity available (during August 2020 all four port sites had 4.0 to 10.0Mtpa spare capacity) and all are at similar cost rates. As such, the selection of a port site was made on the basis of proximity to the Project, and the advantages and disadvantages of travelling to those ports.

These port sites and their relative distance (via rail) from the Project site are:

- Dalrymple Bay Coal Terminal (Mackay) – 179km north of Project.
- Wiggins Island Coal Export Terminal (Gladstone) – 250km south of Project.
- RG Tanna Coal Terminal (Gladstone) – 255km south of Project.
- Abbot Point Coal Terminal (Bowen) – 450km north of Project.

The preferred port site became Dalrymple Bay based on having the shortest haulage distance of 179 km and avoiding the need to travel through the city of Rockhampton with coal trains.

1.2.3.2 Coal Transport to Port

The transportation of coal via rail from the Project to the nominated port site is to be carried out by a credible accredited third party operator for both below and above rail operations. As such the carrying out of coal transport activities will be conducted under licenses and permit approvals previously gained by accredited third party above rail operators (RSO - rolling stock operator) for the train haulage operations, and by an accredited third party below rail operator for the rail infrastructure manager (RIM) responsibilities for the constructed rail siding and balloon loop.

1.2.4 Technological Alternatives

The technology used in processes can greatly influence the level of environmental impact of an activity. Advancements in technology allow us to conduct operations far more efficiently than historically. This efficiency can translate to a smaller footprint (the amount of surface area disturbed), less waste generated, cleaner and safer operations, and greater compatibility with the environment. Various technologies were considered for transferring coal from the south pit to the MIA and reject and tailings management during concept development of the mine. These considerations are discussed in the following sections.

1.2.4.1 Assessment of Alternative Mining Methodologies

A conceptual study to determine the most appropriate mining methodologies was carried out by CQC. The study examined key mine design parameters to the application of various mining technologies. Those considered included:

- open cut mining and
- underground longwall mining.

The key mine design parameters included: percentage recovery, annual production volumes, value per tonne of ROM and the mining design limitations of each mining method. These were compared using a margin ranking process to identify the most suitable method for the site.

The Project mining operation will target up to 10 seams of coal in a relatively shallow environment, necessitating the use of an open cut mining method to an economical cut-off depth. The open cuts will utilise a truck and shovel operation to extract both overburden and coal in a strip / terrace mine configuration. Small voids were to be retained under the original plan; however, after discussions with DES, no voids will be retained.

Underground mining was not considered to be an economical option due to the requirement to simultaneously target multiple seams for extraction.

1.2.4.2 Assessment of Alternative Rejects and Tailings Management Technologies

Rejects consist of both coarse and fine waste rock particles produced after the coal has been processed in the CHPP. The coarse rejects will be deposited by truck, initially in the voids between the waste rock stockpiles. The waste rock stockpile peaks will then be dozed to cover the coarse rejects, and subsequently overlain by topsoil as part of rehabilitation.

Two main options were assessed for the management of the reject fines from the CHPP. The use of tailings (fines suspended in waste water) storage dams and the avoidance of tailings storages through the implementation of paste thickeners and filter pressing technology. Plate press technology, another common technique used in developing countries, was also initially considered but discounted due the high labour costs involved if implemented within Australia.

Tailings dams are used to manage the waste water containing suspended fine particles from the CHPP. This process decants the water for reuse into the CHPP and allows the fine sediments to settle at the bottom of the dam. The fines can periodically be removed. This option of tailings management requires a large area for the storage pond, greater evaporative losses of water from the mine site, ongoing monitoring of water levels to reduce the risk of uncontrolled discharges and presents some risk of dam wall failures as well as more costly rehabilitation.

Thickeners and filter press technology allows process water to be directly recycled back to the mineral processing plant (approximately 60%), reducing water losses, process chemical losses, seepage and reducing processing plant water demand. The solid fines rejects are then discarded in pit with the coarse rejects.

The comparative environmental, social and economic impacts of each alternative, with regard to the principles of ESD are provided in Table 3.

Table 3: ESD decision framework for tailings management

Impacts	Thickeners and filter press technology	Wet tailings storage
Environmental	Eliminates the need for a surface tailings storage facility. Reduces risk of overtopping, seepage and evaporative losses. Increased water efficiency and return to the CHPP. Reduced footprint for storage area. Thickening allows accelerated access for rehabilitation. No standing water to be accessed by listed fauna species. Minimise disturbance area.	Increased rehabilitation requirements and greater liability post-closure. Increased risk of seepage and or failure. Reduced water recovery for reuse. Sterilises potentially large areas of the mine site from future beneficial uses. Increased annual monitoring and management requirements. Higher increased risk of access by wildlife to wet tailings.
Social	No legacy environmental problems after mine closure.	Downstream risk in event of seepage or containment failure.
Economic	High capital and operational costs. High maintenance and labour intensive.	Low capital cost and operating cost. High closure cost for rehabilitation.

The preferred method is to truck all coarse reject and dewatered fine reject material to in-pit and (in the first few years of the Project) out of pit waste rock stockpiles. Filter pressing of fine rejects is an accepted process in coal preparation plants throughout Australia. The process is most in line with ESD principles identified in cleaner production, including water reclamation, maximising density of tailings, avoiding storages and reusing for mine backfill thereby eliminating the risks of failures (Edraki et al. 2014).

1.2.4.3 Assessment of Alternative Haul Trucks

The EIS and earlier SEIS's proposed to use Caterpillar equipment (CAT 793D, CAT 785 and CAT 789 trucks). As part of the SEIS v3 the noise modelling was revised from that presented in the previous EIS/SEIS to ensure that changes as a result of moving the mine infrastructure to improve environmental outcomes would not impact adversely on sensitive receptors. Noise levels for operation were predicted to exceed the noise criteria at the nearest receptors in the period of peak operations (which last for one year) and thus noise mitigation was investigated. Noise minimisation using quieter haul trucks were investigated and shown to be effective, hence will be adopted. As such the CAT 793D trucks will be replaced with Hitachi EH4000 AC3 (Level 2 – Exhaust System) haul trucks and the CAT 785 and CAT 789 trucks will be replaced with Hitachi EH3500 AC3 (Level 2 – Exhaust System).

Furthermore, an industry state-of-the-art fleet management system (such as Wenco) is proposed to be installed on the mining (and construction) equipment to restrict the movement of equipment at night.

1.2.4.4 Assessment of Alternative Methods of Loading Coal Wagons

The initial concept of loading the coal product into the coal hopper wagons was to use front-end loaders (FEL), typically 2 FELs loading each train. This operation was considered satisfactory for the initial and start-up volumes of up to 1.6Mtpa of product, however had limitations for increased volumes and is not the preferred method of wagon loading for minimising coal dust and potential loss of parasite coal onto the rail network during transit.

To minimise coal dust and the potential loss of coal during train transit, the decision was made to increase the initial infrastructure capital costs and install an overhead bin and train loading facility from the start of the operations. This would also allow production to seamlessly increase beyond 1.6Mtpa without the need for any changes to the train loadout facility. The current overhead train loadout facility technology completely encloses the coal during the loading operations and significantly minimises the coal dust released to the environment.

1.2.5 Conceptual Alternatives

1.2.5.1 Open Cut Configuration and Optimisation

The mining method considered was based on the occurrence of multiple gently dipping thin coal seams and some surface constraints. As a result, a strip / terrace mining method was selected.

The nature of the thin coal seams lends itself to a coal seam aggregation process which was conducted to develop proper coal working sections. The coal working sections were used in the determination of the economic pit limits through a margin ranking process. Alpha Mine Planning 4U conducted a margin ranking exercise and typical industry costs were used (all-inclusive cost – from pit to port).

Various washability data sets were available for the ranking exercise but to deliver the anticipated product coal qualities, a sink float setting of 1.5 was used. The net outcome of the margin rank resulted in various cut-off margins for the associated basal coal seam. These were used to ultimately determine the final pit limits and preferred basal coal seam.

This exercise further identifies the sequence and mining direction of the various pits, which resulted in a generalised direction from south to north. This has since changed to a north to south direction in Open Cut 2 and southeast to northeast direction in Open Cut 1. Further refinement was conducted during this SEISv3 to achieve more appropriate final landforms and to minimise elevated landforms within flood plain areas.

The use of this optimisation process incorporated both the economic and environmental ESD concepts into the decision making criteria to find the optimal pit layout which minimise over burden and waste rock removal.

1.2.5.2 Water Supply

A reliable source of water is required for the construction and operation of the Project. The total water requirement from offsite supplies will vary in relation to water use and the availability of onsite supplies. Water supply options investigated for supplying raw water to the mine have included:

- onsite capture (mine dewatering and rainfall harvesting)
- external supply and
- onsite reuse (see Table 4).

Table 4: ESD decision framework for water supply

Impacts	Onsite capture (dewatering, surface water)	External supply	Reuse
Environmental	Minimal water available from the groundwater or surface water. Large disturbance area for water storages.	Sourced from commercial water supply, and thereby impacting existing storages. Lesser impact than capture and storage onsite.	Potential contamination of reused water / concentrations of chemicals. Reduced demand on water sources.
Social	Reduce yield of landholders' bores and downstream water users.	Competitive demand with surrounding users, including Ogmore township.	Reduces demand on fresh water supplies. Social acceptable water conservation approach.
Economic	No reliable supply. Significant infrastructure requirements to capture and store water for required reliability period.	Low risk, secure option. Water costs from purchasing.	Treatment costs. Cost savings from reduction in water demand and purchasing.

For the SEIS v2, the overall maximum water demand was 2.7 ML (including fire water) per day for the 10 Mtpa ROM coal scenario. The water balance for the Project predicted that the site may experience a small water supply shortfall under some climatic conditions - primarily during extended dry periods and periods of low groundwater inflows. An adaptive management approach was proposed to be used to deal with dry conditions on site to ensure minimal interruptions to operations due to water supply limitations, including sourcing water externally, winding down CHPP production (and therefore water use) by reducing overall throughput, or exporting a high grade thermal coal product, thereby not washing the coal, rather than producing a semi-soft coking coal product.

The mine site water management system, and on-site water demands were revised as part of the work undertaken to support SEIS v3. For the SEIS v3, the overall maximum water demand is 3.1 ML (including fire water) per day for the 10 Mtpa ROM coal scenario. Even though the mine site water capacity has been substantially increased (from 1860 ML to 3004 ML), there is still the possibility of small water supply shortfall under some climatic conditions - primarily during extended dry periods and periods. As per the earlier approach proposed in SEIS v2, an adaptive management approach will be used to deal with dry conditions on site to ensure minimal interruptions to operations due to water supply limitations, by winding down CHPP production (and therefore water use) by reducing overall throughput, or exporting a high grade thermal coal product, thereby not washing the coal, rather than producing a semi-soft coking coal product. Unlike SEIS v2, no sourcing of external water is proposed.

For the SEIS v2, no one option was considered solely suitable for the Project. Water was to be sourced using all available options, onsite and offsite water supplies and onsite reuse of water to have the most sustainable outcome available. As part of revisions for SEIS v3, water will only be sourced onsite from capture (mine dewatering and rainfall harvesting) and onsite reuse.

Potable water will be sourced from groundwater or raw water supplies (Dam 1) and treated in an on-site batch Water Treatment Plant (WTP) to drinking water standards. An annual demand of 6.3 ML/a has been assumed.

1.2.5.3 Alternative Energy Sources

The average expected energy demand for the Project during operations will be in the order of 3 to 5 megawatt (MW) with an estimated annual usage of 35 Gigawatt hour (GWh) based on 365 days, 24 hours per day operation. An assessment was undertaken during the feasibility studies to determine the most cost-effective method for power supply.

Powerlink and Ergon Energy were consulted regarding connections into their existing networks. There is also a regional 275 kV line which crosses the southwest ML boundary. From discussions with Powerlink it is not feasible to connect to this power supply. Currently there is no transformer in the area to step down the high voltage for mine supply. Consequently, this option is no longer under consideration.

The EIS reported an option to connect into the existing 11 kV transmission line maintained by Ergon Energy which provides power to the nearby township of Ogmore is under consideration. It was originally considered that there was limited capacity within this transmission line to support the Project. After discussions with Ergon it was identified that the existing transmission line was 22kV, rather than 11 kV, and that there was some capacity to support the Project. Consequently, Ergon has agreed to terms to provide the Project access to the transmission line. The available capacity is limited and as such, will be used as a power supply to office and administration areas. Generators will still be required for the operations of the two MIAs and CHPPs.

Given the limited capacity, 415 volt (V), three-phase dual fuel generators will also be used to provide power onsite. Conceptually the generator configuration will likely be two 300 (kVA) (or potentially two 350kVA) 415 V dual fuel generator sets mounted in a fully bunded area adjacent to the MIA/CHPP 415 V Switchroom. The CHPP substation will have three 8,000 kVA 415 V dual fuel generator sets mounted in a fully bunded area adjacent to the CHPP 415 V Switchroom.

1.2.5.4 Alternative Accommodation

Accommodation options for workers both during the construction and operation phase have been assessed. As the Project will be commute from local towns, CQC considered offsite accommodation at regional towns (i.e. Ogmore, Marlborough, St Lawrence and Rockhampton) as well as assisting the local Marlborough Caravan Park to re-develop a previously existing accommodation village on the outskirts of Marlborough. The ESD decision considerations when assessing these alternative options are discussed in Table 5.

Table 5: ESD decision making framework for accommodation options

Impacts	Onsite	Offsite Accommodation
Environmental	Increased environmental impact. Additional land disturbance. Reduction in travel requirements and reduced emission and road kill incidents. Located outside mapped SCL.	Existing facilities so no additional land disturbance. Greater vehicle emissions from travel of workers. Increased road kill of fauna due to the travel at dawn and dusk times.
Social	Less travel time impact on workers day. Separation from families and communities for extended periods.	Increased risk of vehicle incident. Closer to township thus greater economic stimulus. Limited separation from families and communities. Reduction in accommodation available to the public.
Economic	Higher cost in camp development and set up. Increased efficiency in workers hours worked (reduced travel).	Minimal development and construction costs. Reduced productivity with increased travel times.

CQC intends to staff the Project predominately as a daily commute operation using a local work force to the greatest extent possible and encouraging personnel to live in the local area. CQC anticipates that all, or nearly all, of the construction and operational workforces can be recruited from the local and regional study areas, including some workers who may relocate.

The workforce travel and accommodation details are described in Chapter 19B – Social.