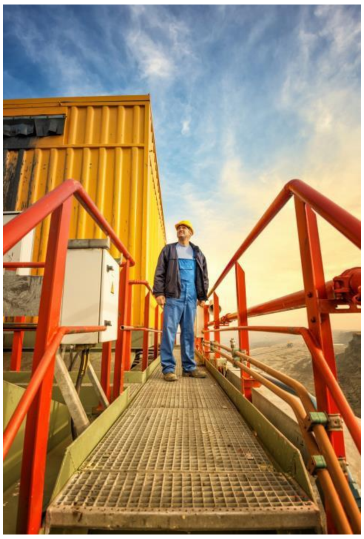

Taroborah Coal Project

Environmental Impact Statement

Section 2 – Project Needs and Alternatives

Prepared for:

Shenhuo International Group Pty Ltd

Chapter 2

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2.0 PROJECT NEEDS AND ALTERNATIVES

2.1 PROJECT JUSTIFICATION

Thermal coal currently generates approximately 42% of the world's electricity, supplies approximately 30% of global primary energy needs and represents the fastest growing form of non-renewable energy in 2011 (World Coal Association 2013). China has now become the largest coal importer in the world and currently, Indonesia is the largest exporter. US thermal coal production is projected to fall, whilst India's coal consumption is expected to rise. Even though the demand for coal is slowing, coal's contribution to global energy supplies is increasing and by 2017 is projected to be close to exceeding oil as the world's top energy resource (IEA 2012).

Thermal coal represents Australia's second largest export commodity (projected to be 162 Mt in 2012 and worth approximately US$16.2 billion) (Australian Coal Association 2012). The export of Australian thermal coal is anticipated to reach 356 million tonnes coal equivalent by 2017, which would make Australia the largest coal exporter globally (IEA 2012).

Queensland is one of the world's largest producers of seaborne traded coal, producing 202 Mt of saleable product in 2010. Therefore, the coal industry is a major contributor to Queensland's economy via the industry's purchase of goods and services, provision of employment and payment of State and Federal taxes and charges. The International Energy Agency (IEA) predicts that world coal demand will grow by an average annual rate of 1.9% between 2007 and 2030 and the demand for thermal coal to produce electricity will grow by an average annual rate of 2.7% over this period (Geosciences Australia & ABARE 2010). In less developed countries, these consumption rates are anticipated to be higher.

Queensland's recoverable black coal resources have been identified to be approximately 35 billion tonnes (*in situ* economic raw coal) and, with efficient rail and port infrastructure, is strategically placed to capitalise on the rising demand for thermal coal (Geoscience Australia 2011).

The Project is located in the Bowen Basin, 22 km west of Emerald and within the Central Highlands Regional Council local authority area. The Bowen Basin represents the largest coal reserve in Australia with 47 operating coal mines extracting over 180 Mtpa in 2009 – 2010, representing 87% of the states total output (DNRM 2011).

The main industries in the Central Highlands region (coal mining, sheep, cattle and grain farming, school education and food retail trade) employ 6,419 people. The total number of people employed in the Central Highlands region in 2011 was 11,198 from a total population of 29,662. For the Emerald region (with a total 2011 population of 13,218 people) 2,376 people were employed in coal mining, school education, food retail trade and accommodation from a total full-time working population of 5,277 people (ABS 2011).

The Taroborah Project will contribute towards thermal coal production in the Bowen Basin (and satisfying an increasing international demand for this product), with an estimated resource of approximately 202 Mt and maximum product-coal production rate of 5.73 Mtpa over a period of approximately 21 years.

Product coal will be transported from the Project site to the proposed Port of Gladstone Wiggins Island Coal Export Terminal (WICET) located at Golding Point (west of the existing RG Tanna and Barney Point Terminals). This terminal will provide an additional coal export capacity for the port of 80

Mtpa.

Two rail networks will be used to transport product coal from the Project site to the Port of Gladstone for export, as follows:

- Central West rail system - Taroborah to Nogoa Junction (25 km); and
- Blackwater rail system – Nogoa Junction to Gladstone (372 km).

Infrastructure upgrades for both the rail and port systems will be required in order to facilitate the transport and export of Taroborah thermal coal. These rail upgrades represent one of a number of positive benefits that the Project will contribute to the local area. It is expected that Shenhuo will contribute towards the necessary rail upgrades between Taroborah and Burngrove in order to accommodate the proposed increased rail tonnages and axel loads.

The Project will provide positive flow-on effects to the local and regional economy and community as a result of the extraction and processing of thermal coal. Commencing in Q4 2017 (pending approvals), the Project will directly employ up to 150 people for the 12 month construction period and then approximately 100 to 350 employees for mine operations during the main production period. The mine life will be 21 years, followed by a decommissioning period of approximately 15 months. In addition, many more people will be employed in support industries and will be required for periodic maintenance tasks and special projects. Since the local population will likely not be able to supply all of the skills and experience that will be required for the Project, Shenhuo will also recruit staff from across the Central Highlands, central Queensland and if required, further afield.

An Economic Impact Assessment for the Project has estimated that construction of the mine facilities and associated infrastructure will add $852 million to Gross State Product (GSP), whilst mine operations will add $3,826.5 million to the annual GSP.

Factor income (direct and indirect wages, profits and dividends) will increase by $595.4 million during the construction phase and $2,778.3 million during the operational phase.

Over the 21 year production period, the annual average impacts include a gross output/turnover of $323.61 million, net additions to Gross Regional Product (GRP) of $182.21 million, factor income increases of $132.3 million and 1,082 Full-time Equivalent (FTE) jobs supported.

An assessment of the social, environmental and economic benefits of the Project has been conducted and the present, net financial-value of these benefits estimated at $1,903 million (refer to Section 4.12. for details).

For the rights to mine State resources (i.e. the proposed Taroborah Coal Mine Project), Shenhuo will pay royalties to the Queensland Government, as well as payroll tax and charges for services provided by the State. Taroborah Project income will also be used to pay Commonwealth Government corporate tax, carbon tax, goods and services tax and possibly the Minerals Resource Rent Tax (under repeal as of November 2013 and is currently under consideration by the Senate).

In terms of current dollar-value revenue, it is anticipated that the Commonwealth Government will receive in excess of $535 million from the Project over its estimated production life of 21 years, whilst the State Government will receive in excess of $335 million.

In addition to the above benefits, current land uses of cattle grazing and dryland broadacre cropping can continue over most of the Project site while mining is undertaken, with only marginal reduction in

the benefits these land uses currently provide. This is discussed further in the next section.

2.2 ALTERNATIVES TO THE PROJECT

2.2.1 Consequences of not Proceeding with the Project

The Project is located on the western edge of the Bowen Basin and, based upon current market prices and a continuing global demand for coal, can deliver significant financial returns for both the State and Federal Governments in addition to significant local benefits as well.

Should the Project not proceed, a significant coal resource would remain undeveloped and the projected increase in global demand for coal potentially filled by an international competitor. The decision not to proceed with this Project would also result in a loss of revenue, royalties, economic development and business opportunities at both State and Federal levels.

The local benefits for the nearest town of Emerald that are expected to arise as a result of the Project would also not transpire. In addition, the proposed rail system modifications between Taroborah and Burngrove would not eventuate.

If the Project remained as a future development option, the proceeds and benefits associated with the Project would be deferred.

By not undertaking the Project, the temporary disturbance of approximately 433 ha of Class 3 and Class 4 grazing land and permanent disturbance of 63 ha of Class 4 grazing land and 3 ha of endangered brigalow woodland will be avoided.

2.2.2 Alternative Land Uses for the Project

The Central Highlands region is traditionally utilised for agricultural activities, as is much of inland central QLD. Current land use on the Project site is typical of such activities, with a blend of broadacre cropping and low-intensity beef cattle grazing.

If the Project site continues to be used only for agricultural cropping and beef cattle grazing, the significant coal resource which underlies the site would remain undeveloped, and both the State and Federal economies would incur a significant opportunity cost (as discussed in Section 2.1).

Although the proposed opencut coal mine in the southern sector of the Project site will result in some areas of permanent disturbance, these will not be significant in local terms. Zones of temporary disturbance will be returned to beef cattle grazing at the end of the mine’s life. No agricultural cropping land is expected to be disturbed in the opencut area. The land rehabilitation strategy for the Project is discussed in Section 3.7.

In contrast, underground mining will be undertaken in the northern sector of the Project site, which involves some disturbance to agricultural cropping and significantly less disturbance to beef cattle grazing land than the opencut. During underground mining operations, access may be temporarily restricted to portions of the mining lease since the overburden in the northern sector is expected to experience periods of controlled subsidence as a result of underground longwall mining activities. However, the subsidence will leave the existing environment largely intact, limiting the time of suspension of existing agricultural activities to a matter of months, limiting any long term social and economic impacts, and providing future generations with increased opportunities with respect to the

potential land use capabilities of the land.

2.2.3 Alternatives Within the Project

A number of mine layout, equipment, process and transport alternatives have been considered for the Project in order to minimise its environmental, social and economic impacts and maximise its benefits. The concept of Ecologically Sustainable Development (ESD) played an integral role in this review process. The principals of ESD have been summarised in the following section.

The Australian concept of ESD is described in the *National Strategy for Ecologically Sustainable Development* (ESDSC 1992), which defines ESD as the process of:

> *"Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased"*

The cluster of sustainable elements or principles which constitute ESD have been identified by Preston (2006) as follows:

- Principle of sustainable use;
- Principle of integration;
- Precautionary Principle;
- Inter-generational and intra-generational equity;
- Conservation of biological diversity and ecological integrity; and
- Internalisation of environmental costs.

The State of the Environment Queensland 2011 (DEHP 2012) report is produced every four years and outlines Queensland's progress towards achieving ESD by reporting on the state of Queensland's air, land, water and heritage.

Queensland's agriculture, forestry, fisheries, mining, manufacturing, construction and tourism industries rely heavily on the environment for their resources and output. A key challenge outlined within the report (DEHP 2012) is the accelerated use of Queensland's natural resources. Shenhuo International Group believes that a sustainable approach needs to be adopted in undertaking all resource activities.

To address these challenges, the Project has incorporated several key features from the *National Strategy for Ecologically Sustainable Development* (ESDSC 1992) into both Project planning and design phases. These features include:

- Consideration, in an integrated way, of the wider economic, social and environmental implications of Project development; and
- A long-term, rather than short-term, view when considering Project development decisions and actions.

ESD principles have also been adopted during the assessment of Project impacts and development

of proposed impact mitigation and management measures.

ESD principles were incorporated into mine planning and design elements of the Project including the location of water storage dams, spoil dumps, surface water management, power supply and workforce accommodation. ESD principles have also been adopted during the assessment of Project impacts and development of proposed impact mitigation and management measures.

2.2.4 Mining and Processing

2.2.4.1 Extraction

Depending upon the quality of a coal resource and relevant proximity of this resource to the surface, most coal mines in Queensland are either underground or opencut coal operations. However, for this Project it is anticipated that the deposit will be developed via a combination of both opencut and underground mining due to the variable quality and depth of coal present in the seams across the Project Site.

The economically viable Taroborah coal seams can be categorised into two different classes, the A seam and B seam tops, which require washing due to elevated sulphur concentrations, and the B seam bottoms, which does not require washing. Since the A seam is generally thin (<1.5 metre (m) thick) and of poor quality, it is not amenable to underground mining and therefore underground mining will focus upon the B seam, as most of the B seam can be mined and exported without washing. In contrast, opencut mining operations (in the southern sector of the Project site) will by necessity mine both of the coal seams.

Two coal extraction scenarios (or cases) were originally developed for the Project's Pre-Feasibility Study (PFS) (Thomas *et al* 2009), based upon geological modelling conducted in April 2009. These scenarios were then further classified into three options (a, b and c) utilising various combinations of underground and opencut extraction techniques. Case 1 utilises a combination of opencut and underground longwall mining techniques, whilst Case 2 is based upon opencut and underground bord and pillar mining. The main elements of each mining option have been summarised as follows:

- Case 1a: opencut mining beginning in Year 1 and continuing for 12 years, with a ROM production rate of up to 2.3 Mtpa. Underground longwall mining would then commence in Year 6 and continue for 17 years, at a ROM production rate of up to 5.1 Mtpa;
- Case 1b: Opencut mining beginning in Year 1 and continuing for seven years, with a ROM production rate of up to 2.2Mtpa. Underground longwall mining beginning in Year 6 and continuing for 16 years at a ROM production rate of up to 5.1Mtpa;
- Case 1c: underground longwall mining only, beginning in Year 1 and continuing for 16 years, at a ROM production rate of up to 5.1 Mtpa;
- Case 2a: opencut mining commencing in Year 1 and continuing for 12 years at a ROM production rate of up to 2.3 Mtpa. Underground bord and pillar mining would commence in Year 7 and continue for 27 years with a maximum ROM production rate of 1.9 Mtpa;
- Case 2b: opencut mining beginning in Year 1 and continuing for seven years at a ROM production rate of up to 2.3 Mtpa, together with underground bord and pillar mining beginning in Year 7 and continuing for 27 years at a ROM production rate of up to 1.9 Mtpa; and
- Case 2c: underground bord and pillar mining only, commencing in Year 1 and continuing for

27 years at a ROM coal production rate of up to 1.9 Mtpa.

Bord and pillar mining involves cutting a network of rooms or panels into the coal seam and leaving behind pillars of coal to support the roof of the mine, reducing coal recoveries to as little as 50%. In comparison, longwall mining involves self-advancing, hydraulic-powered supports which temporarily hold up the roof while the coal is being extracted, recovering up to 75% of the resource.

With consideration to the principles of ESD, to responsibly extract the resource in as an efficient manner as possible, the preferred scenario was based on Case 1b with slight modifications applied to further harness the resource available in the Taroborah area. The mine layout developed for the EIS has been based upon the following revised Case 1b scenario:

- Opencut mining commencing in Year 1, continuing for seven years with a maximum ROM production rate of approximately 2.3 Mtpa. Whilst underground longwall mining would commence in Year 5 and continue for 17 years, with a maximum ROM production rate of 5.75 Mtpa.

The preferred option for the Taroborah Project utilises the underground longwall technique as opposed to the bord and pillar process. This will effectively maximise coal production, minimise the economically-marginal opencut operations and streamline coal extraction, processing and handling procedures.

Two options were considered for the opencut operation which will take place south of the Capricorn Highway, including traditional truck and shovel methods using conventional hydraulic excavators loading 190t capacity rear-dump trucks and larger drag line extraction methods.

Upon deliberation, truck and shovel methods were selected as the most appropriate coal extraction technique as opposed to drag line operations, as the capital costs and constraints elsewhere in the operation far outweighed the operating cost advantages.

2.2.4.2 Coal Preparation

Coal processing technology has developed over many years influencing a plant specification selection process rather than an option-review approach for this component of the mine plan. Three specialist subcontractors provided quotes and engineering details for the pre-feasibility stage CHPP, which encompassed various design, build and delivery options.

The following key elements that were employed for the CHPP design have been summarised as follows:

- Separate ROM stockpiles for the opencut and underground feed types;
- Flexibility to bypass B seam bottoms from opencut to product;
- Capacity to wash all A and B seam tops production;
- Capacity to bypass all underground production;
- Functionality to measure bypass product quality;
- Flexibility to divert non-conforming ROM coal to the CPP;

- Capacity to wash additional non-conforming bypass;
- Functionality to measure washed product quality; and
- Functionality to stockpile single or dual product type and quarantine non-conforming product.

Prefeasibility studies indicate it is economically viable to source coal from the underground and open-cut mining operations in two different streams, consisting of the A seam and B seam tops as well as the bypass (non-conforming) product from the B seam bottoms.

2.2.5 Product Transport

The product transport options available to the Project are limited and have been the subject of detailed and careful consideration by the Proponents.

Use of the road network for product coal transport between Taroborah and the Port of Gladstone was discounted at an early stage of Project design due to social impact concerns relating to road safety and traffic nuisance with potential congestion a main concern within the Town of Emerald. In addition, potential dust and noise nuisance impacts that may have been experienced at sensitive locations from large road trains were a major concern.

Discounting road haulage of product coal as a viable option has also obviated the imposition of associated costs to local and state governments in road maintenance and upgrades. In addition, the social and environmental impacts from potential hydrocarbon (diesel) contamination have been prevented.

In consideration of economic, social and environmental obligations, coal transport via the local Central West and Blackwater rail systems was determined as the preferred transport option. This transport option will support much needed rail infrastructure upgrades along the Central West line from the Taroborah mine to Nogoa Junction. Additional upgrades will be provided for the Blackwater System line from Nogoa Junction to Burngrove. This will benefit other common users, whilst simultaneously limiting potential environmental and social impacts from dust and noise.

A variety of coal train configurations have been considered in light of rail track upgrades, signalling systems and service provider agreements. Coal train configurations assessed during the prefeasibility studies for the Project included:

- Option 1: Light short trains (15.75 tonnes per axle load (TAL)) – requiring minor infrastructure upgrade and capital costs but only allowing a low payload and poor Queensland Rail National Pty Ltd (QRN) path and WICET train unloading utilisation;
- Option 2: Light long trains (15.75 TAL)– incremental, payload, crew and access benefits, however, low payload and poor Queensland Rail National Pty Ltd (QRN) path and WICET train unloading utilisation;
- Option 3: Minvera train (20 TAL) - A compromise train carrying a heavier payload and using current generation locomotives, but requires a limited upgrade of western infrastructure between Nogoa and Taroborah to achieve 20 TAL. This train configuration is currently being used for the Minerva mine south of Emerald; and
- Option 4: Blackwater train (26.5 TAL) - Blackwater System standard train configuration requiring full upgrade of the western infrastructure between Burngrove and Taroborah to

Blackwater System standards.

The low capital cost, low axle load (15.75 TAL) options involve low payload trains, increased train traffic and high train operating costs. These options (Options 1 and 2) have the potential to impact on the already constrained Blackwater rail system and will likely incur a cost surcharge from QRN for this non-standard train, adding pressure on the Project.

The Option 4 train configuration, with its 26.5 TAL configuration, would require extensive upgrades to both the Nogoa River and Comet River bridges as well as the track between Nogoa Junction and Burngrove. While providing the lowest operating costs, the high capital cost of track upgrades outweigh the operating cost savings, and Option 4 was deemed non-optimal.

The Option 3 train configuration is currently operated by QRN for Minerva mine, comprising 3 x 4000 Class current generation diesel locomotives and 90 x 80 tonne wagons, operating with 20 TAL and a nominal train payload of 5,580 tonnes. This option provides the optimum compromise solution due to the different track standards and conditions east and west of Burngrove. It also minimises the number of train movements per day, which is considered advantageous to local communities along the line.

Upgrades to the Central West and Blackwater rail systems, required to support the Project, are described in detail in Section 4.3.2.6 of this EIS.

2.2.5.1 Rail Infrastructure

In order to transport product coal from the Project site to the Port of Gladstone via rail, a train load out (TLO) station and rail loop will be constructed in the southern sector of the Project site adjacent to the CHPP. The rail loop will connect to the Queensland Rail Central West rail system and coal will be transported for 25 km on this line, until it links up with the Aurizon Blackwater rail system at Nogoa Junction for an additional 372 km to the Port of Gladstone.

This particular rail route was selected for the following reasons:

- the Central West rail system already exists and bisects the Project Site in an west-east direction;
- minimal rail infrastructure would have to be constructed in order to connect the Project to the Central West rail system and no off-lease rail corridors are required;
- new WICET terminal at Gladstone the closest port for exporting the coal whilst also providing for required capacity; and
- Blackwater System already adequate for accepting required train sizes with very minimal upgrades.

2.2.5.2 Port Facilities

The following rail-system / port facility options were considered for the Project with consideration to sustainable development initiatives:

- Barney Point Coal Terminal (6 Mtpa coal handling capacity in 2011 / 2012) – located in Gladstone and connected to the Aurizon Blackwater rail system (approximately 397 km from Taroborah). However, this facility is limited in expansion capacity and has unsuitable

serviceable-vessel size limits and may in fact be closed;

- Hay Point Coal Terminal (32 Mtpa coal handling capacity in 2011 / 2012) - connected to the Bowen Basin via the Aurizon Goonyella rail system, however, this rail route (approximately 467 km from Taroborah) is longer than that of the Port of Gladstone option (approximately 397 km) and the port offers limited coal handling capacity;

- Dalrymple Bay Coal Terminal (51 Mtpa for 2011 / 2012) – also connected via the Aurizon Goonyella rail system to the Bowen Basin. Offers limited coal handling capacity and increased rail haul distance of (approximately 467 km from Taroborah) compared with that of the Gladstone option (approximately 397 km from Taroborah); and

- Abbot Point (14 Mtpa for 2011 / 2012) – since this port is not currently linked to the Goonyella or Blackwater rail systems (via the Newlands System) this option was not considered in further detail. Abbot Point is also further north than the Hay Point and Dalrymple Bay ports (approximately 658 km from Taroborah).

Following deliberation, with the aim of minimising any potential environmental, economic and social impacts, the preferred option to service the needs of the Project is the:

- Wiggins Island Coal Export Terminal (27 Mtpa Stage 1 coal handling capacity estimated for 2014, with a total, projected capacity of 80 Mtpa) – located at Golding Point, Gladstone and connected to the Aurizon Blackwater rail system (approximately 397 km from Taroborah).

The WICET export opportunity is the preferred port option due to its geographical location, availability of port capacity and connection to a rail infrastructure that is capable of servicing its transport requirements.

The preferred WICET port option is being developed in Gladstone by a Queensland consortium of existing and potential coal exporters, to provide an increased long-term coal export capacity for both the Bowen and Surat coal basins. At full capacity, WICET will duplicate the existing capacity of the Port of Gladstone's RG Tanna Coal Terminal and provide the level of throughput required to meet customer coal export demands from 2014.

2.2.6 Mine Infrastructure Area Layout

Certain criteria were assessed in relation to the optimal placing of the MIA. These criteria included:

- Avoiding sterilisation, optimising resource availability;

- Proximity to the opencut pit – economically beneficial;

- Limit environmental impacts – air, noise etc; and

- Avoid potential infrastructure subsidence during underground mining.

Respecting the principles of sustainable development, the most suitable and economically viable location for the MIA was determined to be in the southern sector of the Project site, avoiding areas that exhibit economically-viable expanses of coal and thereby minimising resource sterilisation.

In addition, the opencut pit, associated spoil dumps, CHPP, conveyors, water management system, TLO and rail loop have been located as close as possible to the underground mine and local transport

systems. These aspects of the mine were devised in consideration to:

- Reducing haul distances – reducing hydrocarbon consumption;
- Reducing environmental impacts such as noise and air pollutants;
- Minimising vegetation clearance;
- Minimising visual impacts to sensitive receivers; and
- Minimising impacts to surface water flow paths.

The Project was also designed to avoid major subsidence impacts from underground mining on the Central West rail system and Capricorn Highway. By developing underground longwall mining only to the north of, and parallel to, these transport systems, in consideration to assessed geological constraints, significant subsidence impacts shall be avoided. Prior to underground mining, a Subsidence Management Plan will be developed to monitor and mitigate subsidence of the infrastructure and elsewhere, and a compensation agreement will be developed with the DTMR to ensure the impacts are not a burden on the State or the public.

Further information on how subsidence will affect the Project can be found in Section 4.2.2.3 of this EIS and within Appendix 10.

2.2.7 Spoil Dumps

Overburden / interburden spoil dumps have been located in close proximity to the CHPP and opencut pit in order to minimise the length of haul roads and subsequent exposure of contaminants to the environment.

The location of the Project's out-of-pit spoil dumps and haul roads were selected in order to minimise haulage route distances and avoid the Taroborah Creek, conserving habitat for a range of riparian species. Depending on pit-floor stability and dip, which is assessed as the mine progresses, two design options are available for the in-pit spoil dumping process.

In the first two years of mine operations, spoil dumping will be conducted exclusively outside the main opencut pit area. However, in-pit dumping will begin in Year 3, when the void created by previous mining operations becomes large enough to store the overburden and interburden generated.

Several benefits are associated with in-pit dumping such as minimising the size of the residual void at the end of mine life and subsequently minimising the shear extent of out-of-pit spoil dumps, reducing visual impacts, vegetation disturbance and maintenance of dumps.

In-pit dumping will also help to minimise depressions in the final landform, thereby reducing the size of the final void and potential flooding and environmental impacts associated with changes in local topography. In-pit waste management also provides more land to establish grazing fodder, encouraging cattle grazing following rehabilitation of the dumps. In line with ESD, enabling a larger proportion of the Project site to be returned to its agreed post-mine land use will benefit future generations who wish to undertake agriculture on the land, supporting local prospects and the economy.

2.2.8 Rejects Disposal

Two options for the disposal of coarse and fine rejects were considered for the Project. Initially, the confinement of rejects via a purpose built rejects storage facility was considered. However, a second co-disposal option was determined to be more viable in terms of construction and operational costs, sustainability principals and environmental protection; placement of coarse and fine rejects within spoil dumps.

This is undertaken by partially dewatering fine and coarse rejects prior to co-disposal, where rejects are combined with the overburden and interburden generated during mining. Combing rejects material and spoil within purpose built engineered-cells, enhances the use of existing spoil dumps and reduces potential groundwater impacts from rejects seepage.

Opting not to employ a rejects storage facility also eliminates the risks associated with extreme rain events which can lead to dam break and flooding, associated with all regulated dams.

In meeting with sustainable principles, disposal via spoil dumps effectively limits social, economic and environmental impacts by removing the need for wide vegetation clearances, extensive maintenance and land contamination concerns.

2.2.9 Workforce and Accommodation

A number of construction and operations workforce transport and accommodation options have been reviewed for the Project. While the Proponent has a commitment to maximising the benefits of the project to the local community, it is recognised that local labour may not be able to supply all of the Project's skills and experience requirements. This would mean construction and operational staff would need to be sourced both regionally and from across the State, if they cannot be found locally

These workforce and accommodation options have been considered for the Project and summarised as follows:

Construction workforce

The following construction workforce procurement options have been considered for the Project:

- Procured from other Regional and State areas, with Fly-In-Fly-Out (FIFO) or Drive-In-Drive-Out (DIDO) staff employed;
- Local staff housed in Emerald, utilising a DIDO transport solution;
- Locally sourced employees housed in Emerald and travel to site via a Bus-In-Bus-Out (BIBO) option;
- A combination of the above options; or
- On-site construction camp which will be serviced either by a bus or own transport.

The preferred construction staff procurement option is a combination of FIFO / DIDO and locally based contractors housed in Emerald and using BIBO as much as possible between Emerald and the mine site.

The Project will employ the following construction staff:

- Opencut construction – 100 staff in 2017 and 150 staff in 2018; and
- Underground mine construction - 100 staff in 2022.

Operations workforce

Having analysed the options for recruiting and maintaining the operations workforce, the Proponents believe that it is viable to commit to using locally based staff rather than a fly-in-fly-out workforce. This is consistent with Shenhuo's long held belief in maximising local benefit from each project it undertakes.

To this end, the Proponent considered the further alternatives of:

- Local employees housed in Emerald, utilising a DIDO transport solution;
- Local staff housed in Emerald and travel to site via BIBO; or
- On-site operations camp will be serviced either by a bus or own transport.

Considering the potential economic benefits and social implications, the preferred operational staff accommodation and transport solution is the use of a BIBO service which will transport staff stationed in local accommodation.

The Project will employ approximately 100 to 350 operational staff (approximately 60 to 130 for the opencut workforce and approximately 95 to 260 for the underground workforce) during the Projects main production period.

The operational life of the mine will extend approximately 21 years in which time staff will be able to integrate comfortably in the surrounding region.

This option provides extensive economic and social benefits for the surrounding communities. Workers will be able to integrate into the existing community through a strong workplace culture initiative which will ensure a positive impact within the existing community structure.

A workforce of 350 strong will increase revenue for local business and encourage long-term investment in the region, fostering opportunities for new enterprise and businesses. . It will also entail a considerable investment in local training and vocational education.

An anticipated surge to the local population will encourage local and State governments to invest in infrastructure developments within the region to ensure social, educational, health and wellbeing initiatives are being met, providing greater facilities for the existing community and further promoting growth as investment is encouraged from the surrounding regions.

2.2.10 Water Supply

Water will be required during the life of the project for various components of operation including dust suppression, coal washing and industrial uses.

The only water supply options available to the Project site involved a network of water storage

structures, off-lease water-supply acquisition or groundwater extraction.

Pre-feasibility data and the Project groundwater modelling that was conducted in 2013 has indicated that water of a suitable volume and acceptable quality is available from necessary groundwater dewatering to permit safe mining operations.

The use of groundwater to supply the Project's water requirements during construction and operations reduces both the mine footprint (no off-lease water-supply network required) and the vegetation / ecosystem disturbance, thereby benefiting the local environment and assisting in social and economic goals.

It is considered likely that some form of dewatering in advance of opencut mining operations will be necessary in order to control inflows into the initial box cut, and these dewatering wells would be installed at the outset of mine construction and used as the supply of water for construction activities.

It is anticipated the initial opencut dewatering wells and the eventual mine water storage dam will be connected via a constructed pipeline to water treatment facilities and a 200 kL water storage tank, located in the MIA, to service the mine during construction and operations, respectively. A modular potable-water treatment facility would also be constructed on site, to provide a supply of drinking and ablution water for mine staff, thereby reducing the impact on the community's town water supply.

In order to prevent the contamination of fresh water supplies, a Process Water Dam will be constructed to provide the means for the CPP to recycle process water following coal washing, helping to achieve sustainable practices on the Project site.

2.2.11 Power Supply

An assessment of the power supply options available to the Project identified a local network, with part infrastructure already in place, reducing the magnitude of potential disturbance associated with introduction of a novel system. It was assessed that the 25 MW power requirements of the opencut and underground mining operations can be supplied via the existing Emerald sub-station after allowing for already planned upgrades to the feeder line from Blackwater.

In order to deliver power to the Project site, a 66 kV power line will need to be constructed from Emerald to the mine site. A logical solution would be to run the new power line approximately 22 km along the existing Capricorn Highway / Central West railway corridor to the mine lease boundary, thereby limiting the amount of land that would need to be resumed. Failing that, a new power line easement would need to be established from Emerald to the lease area. At the MIA adjacent to the railway, a 66 kV / 11 kV, 25 Mva substation will be constructed to service both the CHPP and underground mine.

It was determined the use of the existing, local power network, which requires minimal additional infrastructure to be constructed by the state, offers the most economically and socially beneficial power supply solution, avoiding interference with existing demands associated with the local community.