# SARAJI EAST MINING LEASE PROJECT

Environmental Impact Statement

## Chapter 2
Project Alternatives and Justification

BHP Mitsubishi Alliance

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# 2.0 Project Justification and Alternatives

## 2.1 Introduction

BM Alliance Coal Operations Pty Ltd (BMA) is seeking approval to develop the Saraji East Mining Lease Project (the Project) involving a single-seam underground mine and supporting infrastructure on Mining Lease Application (MLA) 70383 and MLA 70459 adjacent to, and accessed through, the existing open cut mine void within Mining Lease (ML) 1775.

This chapter of the Environmental Impact Statement (EIS) demonstrates alternatives considered and outlines justification for development of the Project as described in **Chapter 3 Project Description**.

## 2.2 Project justification

### 2.2.1 Project need

Population growth, rising living standards and associated infrastructure development will continue to increase demand for high quality coal products in India, China and other international markets (McKay, 2021) particularly for steel manufacturing. This represents an opportunity for BMA to grow metallurgical coal production within an existing mining precinct in the Bowen Basin. Extending from the existing Saraji open cut mine in the Bowen Basin, the Project will develop an underground mine to access metallurgical coal resources for export of high quality coking coal and pulverised coal injection (PCI) coal products. The Project will produce up to 11 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal to meet current and future market demands for steel production over an anticipated 20-year life of mine.

Forecasting organisations such as Wood Mackenzie expect considerable growth in Australian seaborne metallurgical exports in coming decades. The Wood Mackenzie (2021) analysis led to the conclusion: “We expect Australian seaborne metallurgical exports to grow from 170 Mt in 2021 to 271 Mt by 2050. A 52% growth in total trade is substantial and is principally attributable to India’s persistent expansion through the period”. Given the characteristics of Australian metallurgical coal reserves, Wood Mackenzie (2021) expect “the country’s dominance within the metallurgical coal sector will continue, despite the near-term effect of the November 2020 import ban imposed by China. Australia is in prime position to benefit once the ban is lifted given its high quality and competitive delivered costs”. According to Wood Mackenzie (2021), in addition to growing demand, projected ongoing reserve exhaustion for hard coking coals, particularly after 2030, will drive the need for new projects. China’s import ban on Australian coal imports was lifted early 2023. Imports of Australian metallurgical coal into China as of 13 March 2023 was at 1.35 million tonnes marking an increase from the previous month of 0.82 million tonnes. However, imports are still considerably lower than prior to the ban, for example, in February 2020, 3.9 million tonnes of coking coal was imported to China from Australia. Trade relations between Australia and China are predicted to continue to improve into 2023, thus furthering the potential for coal exports to China (Interesse, 2023).

As the energy and economic transition unfolds, steel is expected to remain a key building block of global infrastructure with potential for steel demand to double over the next 30 years. The target high quality coals of the Bowen Basin will continue to be needed and will become increasingly valuable in optimisation of steel making while undergoing progressive decarbonisation of the global steel value chain to net zero greenhouse gas emissions by 2050. Different regions will progress decarbonisation at different paces in response to future growth in policy support and demand for affordable steel. Progress towards net zero will vary because of availability of low carbon raw material feedstocks, adoption of incremental and transformative technologies such as hydrogen-based direct reduced iron (DRI) or electrolysis, access to affordable renewable energy widespread commercial scale low or zero carbon alternative fuels (like hydrogen or biofuels) and supporting infrastructure. Under decarbonisation scenarios, even where hydrogen supplements energy requirements, only coke produced from metallurgical coal can provide the structural support required for efficient blast furnace operation to remove oxygen and other impurities from iron ore to yield metallic iron (BHP, 2021).

Coal is Queensland’s largest export commodity with the Queensland Government benefiting significantly from royalties paid by the mining industry each year. In the 2022 financial year (FY2022), the total royalties and taxes paid to the Queensland Government by BMA was AU$3.6 billion (BHP, 2022). The Project will add to the royalties derived from mining activities in each year of operation. In addition to these economic benefits, the Project will support regional prosperity through direct and indirect employment opportunities and investment in strategic infrastructure and service needs in the region. Through its existing operations, BMA demonstrates the benefits of providing employment and training opportunities, supporting local services and community development, education, health, social and recreational programs.

As detailed in the following sections, the Project provides a net production benefit and improvement in economic efficiency to justify the Project when considered in context of the residual environmental, social and cultural impacts of the Project assessed in this EIS.

### 2.2.2 Commercial viability

BMA owns and manages seven coal mines within Central Queensland. The Project has been assessed as commercially viable and beneficial through BMA's business planning processes, and the development of coal resources within MLA 70383 has been identified as a priority within BMA's large portfolio of development options.

### 2.2.3 Compatibility with policy and regulatory frameworks

This EIS demonstrates how BMA will address the requirements of key Commonwealth, State and local policy, legislative and regulatory documentation relevant to the Project as outlined in **Chapter 1 Introduction**. The Project is compatible and compliant with applicable legislation and is consistent with the strategic policy and planning framework in place for the Isaac Regional Council (IRC).

As demonstrated by regulatory information published online (visit BHP Regulatory Information), BMA is committed to regularly reviewing environmental performance and publicly reporting on progress.

### 2.2.4 Economic and social benefits

BMA's operations provide significant benefits to the local communities in which it operates, the broader Central Queensland region and to the Queensland economy. As the largest employer in the Central Queensland region and playing a key role in its economic development, the substantial economic contribution in Financial Year (FY) 2022 is demonstrated by:

- AU$1.1 billion in total contribution to Governments (including corporate income taxes, fringe benefits tax and other payments) related to BMA's mine operations
- AU$3.6 billion in total contribution to the Queensland Government (including royalties, state taxes and other payments) related to BMA mine operations
- AU$38 million in total contribution to regional areas including the Central Highlands, Isaac and Mackay Regional Councils
- AU$6.8 billion in payments to suppliers
- AU$16.5 million spent on goods and services from Indigenous businesses (BHP, 2022).

In addition, BMA employs approximately 6,800 people directly (including contractors) in Central Queensland. The Project will create up to 1,000 jobs during peak construction and up to 500 jobs during peak operational phase, as well as indirect employment effects in Project related services locally and state-wide.

BHP's approach to working with its communities is guided by a commitment to creating enduring social, environmental and economic value. BHP's Community Development Management Plans (CDMPs) guide partnerships and shared value initiatives with its communities.

**Social investment framework**

In FY2022, BHP's voluntary social investment totalled US$186.4 million including US$99.4 million in direct community development and environment projects and donations. Other components related to, for example, donations to the BHP Foundation and expenditure under a Matched Giving Program and on administrative support for the BHP foundation and to facilitate direct social investment activities (BHP, 2022).

In FY2022 BMA's voluntary social investment contribution to community organisations was $13.72 million (BHP, 2022).

Social and economic impacts are described and assessed in **Chapter 17 Social** and **Chapter 18 Economics**, respectively. It is envisaged that the Project will add to the prosperity of local and regional communities.

## 2.3 Project Alternatives

### 2.3.1 'Do Nothing' alternative

The 'Do Nothing' alternative, where the Project is not progressed, will result in:

- loss of economic benefit
- less local, state and nationwide job opportunities
- reduced demand and income for support industries and service suppliers
- resources will not be available to supply high quality coal products to export markets
- missed opportunity for employee opportunities, apprenticeship programs, support of local businesses and financial donations to community groups and local projects
- State royalty payments and Commonwealth tax revenue from the coal resources foregone.

In relation to the Project area, the potential impacts described throughout this EIS, both adverse and beneficial, will not occur and impacts to ecological habitat, land and water resources and contribution to greenhouse gas (GHG) emissions will be avoided. The demand for metallurgical coal will likely be sourced from another coal mine in either Australia or globally. This would have both adverse and beneficial impacts and contribute to GHG emissions. The associated land can continue to be used for grazing and the land tenure overlying the resource will remain for future development subject to relevant policy and regulatory approvals in place at the time of application.

### 2.3.2 Alternative location

The physical location of the Project aims to optimise the underground mining process to access most of the target resource with the smallest footprint minimising impacts to land, environment, heritage and community values.

The Project is located within an existing mining precinct in the Bowen Basin, surrounded by operational and proposed resource projects targeting high-quality coal resources of the Bowen Basin, including coal mines operated by BMA and others. Nearby communities of Dysart, 30 km to the south, and Moranbah, 60 km to the north, support the mining industry through skilled workforce and established local services, including workforce accommodation options in the vicinity of the Project.

The Project's target resource is located predominantly in mining lease application (MLA) 70383 which is contiguous with leases currently held by BMA for the existing Saraji Mine. The Project location has been identified to enable an opportunity for strategic growth, as the extent and nature of the resource is well understood due to extensive exploration and historic mining in the area. BMA can bring this project into production reasonably quickly compared to less well-known resources.

The Project location will benefit from access to the highest quality coals in the down dip coal seam through the existing Saraji Mine open cut highwall. Access to the underground workings will be through a portal developed in the existing open cut highwall on the far eastern side of the existing open cut mining area. This reduces the portal complexity, length and quantity of spoil materials generated compared to an above ground configuration. Locating the portal in the existing open cut also allows for shorter above ground conveyor configuration between the underground mine and coal handling and processing plant (CHPP). Use of the existing open cut pit for mine access minimises potential environmental impacts, costs, time and risks involved in construction of a new mine portal from above ground level.

Proposed Project location will also realise benefits of reduced capital expenditure, minimal disturbance and increased operational efficiency through shared infrastructure, water and waste management systems. The Project configuration within the chosen location was developed based on the following:

- utilising existing mine infrastructure, haul roads and previously disturbed areas associated with the Saraji Mine, where feasible
- access to the down dip coal seam through the existing Saraji open cut mine
- proximity of the proposed rail loop and loading infrastructure to the existing rail line
- sufficient sizing and practical location of the CHPP to enable efficient coal transportation between the underground mine and the rail load out facility
- locating proposed infrastructure outside of areas with potential for future mining
- minimising disturbance of environmentally sensitive areas.

At the proposed location, the Project will intersect Hughes Creek and Boomerang Creek already subject to diversions and impacts of mining upstream, with the benefit of being able to avoid introducing mining impacts to Phillips Creek, Spring Creek and One Mile Creek to the south. An alternate location will result in new impacts and increased disturbance to land and sensitive environmental values as well as key infrastructure being further away from existing infrastructure and mining operations leading to production inefficiencies, increased disturbance as well as higher development and operational costs in accessing and processing the resource. There is no advantage in locating mining operations at an alternate location as the proposed mine plan benefits from access off the existing open pit highwall, shared infrastructure and existing knowledge of the area.

### 2.3.3 Target resource

The Dysart Lower Seam was selected as the target mining seam in preference to the Harrow Creek Upper Seam as it is generally a thicker seam with maximum opportunity to extract high quality coals. The target resource extends beyond the existing open cut mining operations of the adjacent Saraji Mine. The proposed underground mine plan (Section 2.3.4) and underground mining method (Section 2.3.5) will be designed to provide a generally consistent coal quality and production output from the target resource which is otherwise considered too deep for open cut mining.

The coal reserves in the targeted area present a generally higher proportion of higher quality coal with surrounding areas within the Dysart seam progressively splitting into thinner plies to the northeast and southwest of the proposed mining area and the seam becomes deeper to the east. As it progresses the coal type transition into semi-hard coking coal to semi-soft coking coal and then low volatile pulverised coal injection (PCI) type coals. PCI type coals are used as a supplementary fuel source in the production of coke, as opposed to hard coking coal (HCC) necessary for production of strong coke due to its superior quality (Minerals Council of Australia, 2018).

At this location, the target resource exhibits optimal seam thickness for longwall mining, a combination which is conducive of high quality coal extraction and maximising economic viability of the Project.

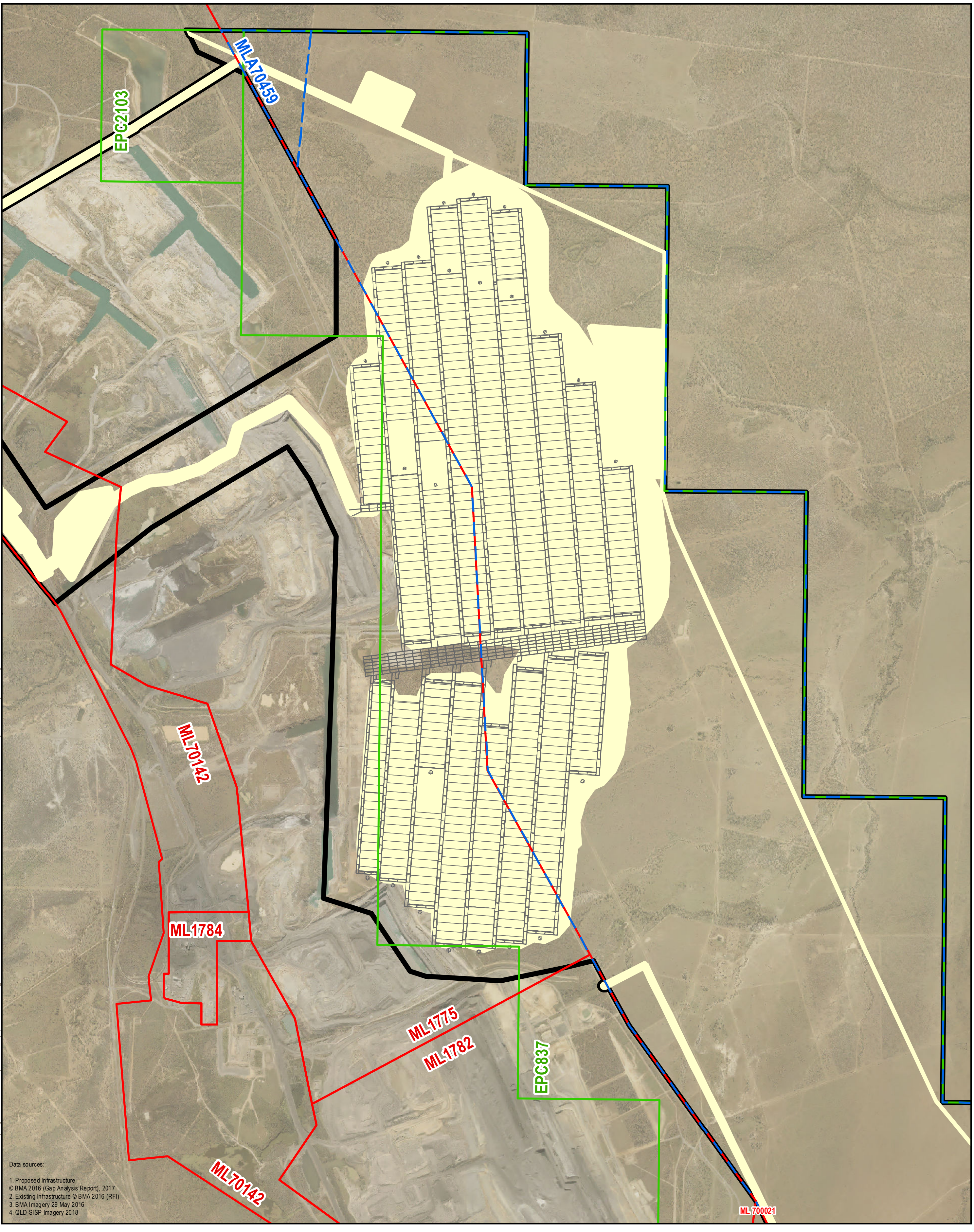
### 2.3.4 Mine plan

The Project will adopt an optimised underground mine plan for the Project to integrate with existing Saraji Mine open cut mine and supporting infrastructure, access dipping coal seams and minimise environmental impacts. The optimised mine plan was considered the preferred option for this Project as it provides the most effective use of the coal resource and best meets the objectives of the Project outlined in Section 1.2 of **Chapter 1 Introduction**.

An optimised mine plan option, illustrated in Figure 2-1, comprising 17 longwalls accessed via the existing open cut will maximise mining of the available coal resource within the mining tenure. The optimised mine plan provides ideal capacity to mine high quality coal within the Project Site with consideration of well understood resource geology and quality, production rates, site constraints and potential environmental impacts. Accessed via the existing open cut high wall, the Project ensures mining commences in a low gas environment. The access point has been chosen as it is also structurally benign, avoiding faults and is suitably separated from productive mining operations in Saraji Mine's open cut 'pits' (Ebony, Grevillea and Hakea) to the south.

A larger (maximised) underground mining footprint was considered and determined that it would result in greater surface disturbance, particularly subsidence impacts on overlying waterways and surface water flow. As a result of greater environmental impacts and capital costs, this option was not considered the most effective use of the coal resource when considering the Project objectives outlined in Section 1.2 of **Chapter 1 Introduction**. As such the maximised mine plan was not selected for the Project and is not discussed further in the EIS.

The Project as described in accordance with the optimised underground mine plan proposed for approval is detailed in **Chapter 3 Project Description.**




**LEGEND**

- Project Site
- Project Footprint
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Underground Mine Plan

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**Figure 2-1**
**Optimised underground layout**

**Environmental Impact Statement**
**Saraji East Mining Lease Project**

0 0.25 0.5 1
Kilometres

Scale: 1:60,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BMA
BHP Mitsubishi Alliance

DATE: 16/02/2023 VERSION: 4



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### 2.3.5 Mining methods

The selection of a mining method considers a range of factors including resource recovery, production rates and quality targets, and site constraints including social, community and environmental considerations. In addition, the selected mining methods will seek to facilitate:

- incremental continued eastward extension of coal operations in the resource currently being mined by the existing open cut mining operation at Saraji mine
- commencement of high productivity underground mining within the Dysart Lower Seam
- targeted production of hard coking coal to maintain current market specifications.

#### 2.3.5.1 Open-cut and underground mining

The Project will target the deep dipping coal seams extending to the east of the existing Saraji Mine open cut. The target resource at depths greater than 150 metres (m) and seam thickness varying between 4.9 m and 7 m is conducive to underground mining methods (Minserve, 2022).

While open cut mining methods can be safer and achieve high resource recovery, underground mining limits surface activity and disturbance area, and associated dust, lighting and noise impacts, as well as blasting and generation of spoil to be managed.

Modern longwall mining techniques and equipment have made significant improvements in production efficiency as well as safety; it is the main method of underground mining is Australia, as it is safe and more efficient (IESC, 2014).

#### 2.3.5.2 Longwall mining

The depths of the Dysart Lower Seam vary between approximately 120 m and 450 m (below ground level) across the Project (Minserve, 2022); at such depths, longwall mining is an operational necessity.

Longwall coal mining is the most common underground coal extraction method in Australia because of its relatively low cost, strong safety record and efficiency in removing coal from deep seams (Commonwealth of Australia, 2015); within the Dysart Seam, longwall mining will efficiently maximise production of the highest quality coal.

Conventional longwall mining targets large panels of coal, removing the coal and allowing the roof and overlying rock to collapse into the void left behind. Long rectangular blocks of coal (approximately 150-400 m wide and 1-4 km long) defined during development are mined progressively along the narrow dimension by a shearer that shaves off slices of coal up to 1 m thick, under protection of self-advancing hydraulic supports, until the panel is fully extracted.

There are variations in longwall mining methods available, such as longwall top coal caving (LTCC), which was one method considered for the Project. Similar to the conventional longwall mining method, the LTCC methodology supports mining of thicker seams greater than 4.5 m and maximises production of high quality coal resources. Typical extracted seam thicknesses range from 2-4.5 m, although with the availability of coal caving techniques (i.e. natural collapse of the upper seam) even thicker coal seams of up to 9 m could be mined in one pass (Mills 2009; Holla & Barclay 2000).

Another underground mining method, bord and pillar mining was considered as an alternative option. Bord and pillar involves cutting parallel tunnels into the coal seam which forms a series of self-supporting rooms or ‘bords’ and leaves behind a grid of pillars (the supporting blocks of coal left behind between the bords). As the coal seam depth increases, the economic feasibility of bord and pillar mining lessens; it is generally considered uneconomic to use bord and pillar as the primary production method at depths of 200 m or greater (IESC 2014). For Project resources at depths greater than 150 m, the width of the pillars must increase to support the extra weight of the overburden, resulting in less coal being recovered and sterilising a significant proportion of the coal resource following extraction.

Every underground mining method has the potential to cause subsidence. As mining progresses, the mined out void becomes too wide to be self-supporting, causing the roof of the void to sag with caving extending horizontally and vertically propagating upwards towards the surface. The actual amount of downward movement in the overlying roof strata for a deep longwall mine depends on factors such as the depth of cover and the panel sizes (Holla and Barclay, 2000). In Queensland, coal seams tend to be shallower and the seams tend to be thicker – typically 3 m or more compared to about 2 m in New

South Wales (Nicholls, 2001). Lucas et al. (2009) study of longwall mining related subsidence near the Isaac River near Moranbah observed subsidence values up to about 3.6 m following longwall mining.

Increased panel heights and extraction volumes of LTCC generally have greater impacts at the surface. By contrast, bord and pillar techniques can result in pothole subsidence; however, where the pillars are at sufficient depth and designed to be stable, subsidence is typically less than 20 mm (MSEC, 2007).

The Project's optimised underground mine plan will maintain an average extracted seam thickness of 3.6 m having positive implications in terms of reducing surface subsidence. In combination with the greater depths of the Dysart Lower Seam, the extent of vertical displacement from the proposed longwall mining is not expected to exceed the ranges typical of a deep longwall mine.

Subsidence from longwall mining can be readily predicted, occurring within a short timeframe (weeks) following the longwall mining phase of the cycle and consolidated within one to two years of adjacent panel extraction allowing rehabilitation to progress. By contrast, subsidence from bord and pillar methods can occur decades after the closure of operations due to the collapse of shallow and unstable pillar remnants; consequently, surface rehabilitation of areas subject to bord and pillar workings can be more problematic.

While variations in longwall mining such as LTCC may result in greater extraction volumes and subsequently improved economic outcomes for the project, the LTCC methodology was rejected for the purpose of reducing the Project environmental impacts. Conversely, bord and pillar mining methods are operationally impractical considering the geological characteristics of the Dysart Lower Seam. Therefore, conventional longwall mining is the preferred method when considering the economic, environmental and social factors together with project objectives.

### 2.3.6 Coal handling and processing plant

To maintain and expand BMA's high quality export coal, ROM coal produced must be washed to meet market specifications for international and domestic customers. In the absence of the CHPP process, the Project will achieve lower recovery volumes of ROM coal and product coal will be of a lower quality and therefore lower value. Failure to wash the coal allows for the combustion of an inferior coal product increasing the potential for environmental impacts through the production of poorer emissions and increased combustion wastes. CHPPs are the only viable method of washing large volumes of coal efficiently and are in use across all major mining operations in Queensland.

The Project CHPP will maintain rates of production of high quality export coal in the capacity of the existing Saraji Mine CHPP is utilised. The Project anticipates constructing a new CHPP to cater for the increased production of ROM coal. Construction of a CHPP will allow efficient washing of the increased ROM coal output and ensure the quality of coal meets the highest standards for efficient combustion. The CHPP has been designed with a maximum processing capability of 7 Mtpa ROM coal feed (this equates to up to 5 Mtpa of product coal). Where annual production exceeds CHPP capacity, the overflow coal can be processed through the existing Saraji Mine CHPP.

The CHPP is proposed to be constructed on ML 70142 of the existing Saraji Mine. The proposed CHPP is located within this area as it is previously disturbed and will avoid disturbance of previously undisturbed areas. This location also provides sufficient space with a practical connection between the proposed underground layout and rail load out. The Project site is constrained by existing operations and a substantially different layout is not considered feasible.

### 2.3.7 Tailings management

Processing raw coal in the CHPP will produce dewatered tailings and coarse rejects, which will be safely managed in existing Saraji Mine spoil dumps.

Tailings are a combination of the fine, typically silt-sized materials remaining after the coal washing and extraction process and the water used throughout. There are a variety of methods available for the storage and management of tailings depending on factors such as site characteristics, environmental constraints and the physical and chemical nature of the tailings.

The tailings and coarse rejects produced throughout the Project life will be managed via a dry disposal system. Dewatering of the CHPP tailings will be achieved by using belt press filters to maximise yield, reduce costs, and minimise environmental issues associated with traditional tailings dam disposal. Dewatered tailings are inherently safer and reduce process water requirements and environmental risks associated with traditional wet tailing storage facilities. For these reasons a dry tailings disposal system is the preferred method for the Project.

The Project will utilise in-pit spoil dumps at the existing Saraji Mine to distribute and dispose of dry tailings and reject material. The material will be trucked to the existing Saraji Mine spoil dumps for disposal. As a result, the Project will not require new tailings storage facility. The volume of reject and tailings material will not have a significant impact on the size and management of the existing in-pit spoil dumps.

In-pit spoil dumps will continue to be managed under the existing Saraji Mine environmental authority (EA), with appropriate cover of the rejects and tailings material to ensure run-off and leachate is managed. Should reject haulage fall behind, the bin will overflow to the designated bunker. The bunker will provide access for a loader to remove coarse rejects and dewatered tailings material as required.

### 2.3.8 Location of infrastructure

The Project is located adjacent to the existing Saraji Mine. Most above ground infrastructure has been located within previously disturbed areas and close to existing infrastructure, where practical. This includes access to the underground mine, the conveyer system to the CHPP, the new Project CHPP, product stockpiles, ROM pad, raw water dam, rail loading balloon loop and mine infrastructure area (MIA). The locations have been selected for the construction of above ground infrastructure to:

- collocate in proximity to existing infrastructure (i.e. the existing rail line)
- maximise use of previously disturbed areas and minimise new disturbance, particularly vegetation clearing
- minimise construction impacts on surface water, groundwater and visual amenity values
- realise long term operational efficiencies and economic return.

The surface infrastructure will be located within areas considerably impacted by existing intensive mining activities or historically disturbed by cattle grazing. The chosen location will maximise efficiencies by enabling logical transport of coal from the underground mine in the east towards the processing and rail loading areas to the west of the Project Site while remaining within existing operational areas. In this area, the Project will also have access to existing Saraji Mine infrastructure including the existing CHPP, BMA's existing water pipeline network, telecommunications network, electrical power network, and in-pit spoil dumps (refer to **Chapter 3 Project Description** for details). The utilisation of this infrastructure will reduce the need to construct additional facilities where they are not needed. The reduction in associated construction activity will result in reduced environmental and amenity impacts.

The temporary construction workers accommodation village is located to the far east of the Project Site to mitigate nuisance impacts related to vibration, noise and dust which may occur at alternative locations closer to existing operations.

### 2.3.9 Accommodation

Originally, accommodation options assessed for the Project included:

- accommodation at existing accommodation villages
- accommodation at Coppabella, Dysart or Moranbah
- construction of a new construction accommodation village on the Project Site
- construction of a new operational accommodation village on the Project Site.

Initially, BMA had included an operational accommodation village within the scope of the Project at the commencement of the EIS. The operational accommodation village was proposed to be located south of the proposed construction accommodation village on the eastern boundary of MLA 70383. Following consideration of feedback from the Office of the Coordinator-General (OCG) and IRC during the development of the Project and Social Impact Assessment (SIA), it became evident the proposed operational village did not align with stakeholder expectations. BMA has investigated alternative off site accommodation options and opted to remove the operational accommodation village from the Project. Instead, workers will be accommodated at Coppabella, Dysart or Moranbah in existing BMA accommodation villages or other accommodation in town. As the timing of the Project is subject to further refinement, it is possible there will continue to be sufficient capacity in existing accommodation villages in the Dysart and Moranbah area to accommodate some or all construction personnel. However, existing accommodation capacity may be exceeded in the future when construction of the Project proceeds due to employment growth or economic drivers outside of BMA's control. As a result, BMA will pursue an approval that allows for the use of new construction accommodation on site. Therefore, the proposed construction accommodation village remains part of the Project.

The proposed construction workers accommodation village will have capacity for up to 1,000 workers and will be located along the eastern boundary of MLA 70383. The location of the proposed construction accommodation village was chosen based on the following considerations:

- proximity to development locations and mine with reference to fatigue factors
- land ownership and tenure
- overlapping tenures such as exploration and petroleum leases where future development by other parties may impact on the suitability of the location
- available land area
- proximity to supporting infrastructure of power and water to reduce the cost of providing such services
- mitigating environmental impacts related to vibration, noise and dust which may occur at alternative locations closer to existing operations
- avoidance or minimisation of disturbance to significant vegetation communities or threatened species
- potential future development impacts or demands providing flexibility for expanding the initial development to allow for any future expansion
- safe access points to Saraji Road and Lake Vermont Road.

During construction, there is also the opportunity for workers to commute locally from Dysart, Moranbah and other small towns in the vicinity of the Project Site.

### 2.3.10 Water supply

The Project's raw water supply will be linked to the existing Saraji Mine water management system, which is described in **Chapter 3 Project Description**. This is further elaborated in the mine water balance model that was prepared as part of the EIS and is presented in **Appendix E-2 Mine Water Balance Technical Report**. The mine water balance study was conducted to:

- evaluate strategies for optimum use of water supplies
- establish procedures for limiting site release
- estimate the demand on water treatment plants, holding ponds or evaporation ponds.

An important aspect of the operational strategy for the Project's water management system is to reuse mine water wherever possible as a priority over external pipeline raw water supply. This has sustainability benefits in making the mine as self-sufficient as possible and minimising the mine's reliance on external water supplies. It is also important to manage the storage inventory (total mine water volumes) in the mine water management system so that adequate storage can be made available for the containment during wet seasonal conditions.

Most of the mine's operational water requirements can be met with reused mine water. Some of the water requirements for operations require high quality water sourced from external raw water supply. This raw water demand forms a very small portion of the overall site water use and includes:

- water treated for potable uses (e.g. drinking, washrooms)
- a small quantity of water required for the CHPP. While most of the water demand for the CHPP is met through reused water, a minor component (typically three per cent) of the CHPP water use requires raw water.

A new water pipeline will be required for the transfer of water within the Project Site. A number of alignment options were considered for the water supply pipeline. In general, the alignment was located within proximity to existing infrastructure corridors such as road, rail or power easements in previously disturbed areas.

The existing Eungella Water Pipeline Company (EWPC) Southern Extension Water Pipeline intersects the proposed underground layout. Keeping the EWPC Southern Extension Water Pipeline in the existing position poses the risk of subsidence impacts and potential uncertainty of the continued operations of the pipeline. BMA has committed to forego the option of leaving the EWPC Southern Extension Water Pipeline as-is and to move it to a more suitable location. A high-level constraints analysis was undertaken to assess the suitability of the new location. Constraints considered included:

- lease boundaries
- terrain (hydraulics)
- existing major services (surrounding pipelines & power)
- flora and fauna
- water crossings.

The preferred option involves the relocation and reconnection of the EWPC Southern Extension Water Pipeline into a new infrastructure and transport corridor to the eastern boundary of MLA 70383 and northern boundary of MLA 70459. The relocation will not impact the continuity of water supply to the Lake Vermont Mine. The Project will not obtain water from the EWPC Southern Extension Water Pipeline.

### 2.3.11 Power supply

The Project will share an integrated power supply network with the existing Saraji Mine. The existing 132 kilovolt (kV) powerline will be relocated to the eastern transport and infrastructure corridor. Transformers will be required to step down the voltage to supply other mine infrastructure. Additionally, powerlines currently servicing the existing Saraji Mine will be decommissioned.

Electrical power demand will be supplied via the existing power network supplying the Saraji Mine and the construction of a new 66 kV powerline to Dysart Substation.

The initial power demand increase associated with the Project is in the order of 14 megawatt (MW) and is required by FY2023 under the development scenario being assumed for the Project's EIS. The total power demand for the Project is estimated to be between 11 MW and 14 MW and will be required by FY2025.

By utilising the existing infrastructure, BMA minimises their footprint. The alignment of the eastern transport and infrastructure corridor has been located to minimise potential environmental impacts from clearing while enabling coalignment with road access and the EWPC Southern Extension Water Pipeline. The alignment is located outside of the proposed underground mine footprint.

## 2.4 Standard criteria assessment

The Queensland *Environmental Protection Act 1994* (EP Act) requires environmentally relevant activities (ERAs) to be authorised by an administering authority. The administering authority for the Project is the Department of Environment and Science (DES). Schedule 2 and Schedule 3 of the Environmental Protection Regulation 2019 (EP Regulation) list ERAs required to be licensed. When deciding whether to grant, refuse an application or deciding on the conditions of the EA, DES considers certain matters set out in the EP Act. One of those matters is the 'Standard Criteria'.

To determine the viability of the Project in Queensland, it is important to address the Standard Criteria. The purpose of this Section is to address each of these criteria and to demonstrate how these criteria will be met by the Project. Schedule 4, Section 7 of the EP Act defines the Standard Criteria as:

- the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment:
  - the precautionary principle

- intergenerational equity
- conservation of biological diversity and ecological integrity

- any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development; and
- any relevant environmental impact study, assessment or report
- the character, resilience and values of the receiving environment
- all submissions made by the applicant and submitters
- the best practice environmental management for the activities under, any relevant instrument, or proposed instrument, as follows:
  - an EA
  - a transitional environmental program
  - an environmental protection order
  - a disposal permit
  - a development approval
- the financial implications of the requirements under an instrument, or proposed instrument as they relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument
- the public interest
- any relevant site management plan
- any relevant integrated environmental management system or proposed integrated environmental management system
- any other matter prescribed under a regulation.

An assessment of how the standard criteria are incorporated into the Project is presented in Table 2-1 .

**Table 2-1 Incorporation of standard criteria (Schedule 4 of the EP Act) into Project development**

| Standard criteria | Integration into Project development |
|---|---|
| The principles of ecologically sustainable development as set out in the National Strategy for Ecologically Sustainable Development | Refer to Table 2-2. |
| Any applicable Environmental Protection Policy | Environmental Protection Policies with relevance to the Project include:<br>• *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* refer **Chapter 7 Aquatic Ecology, Chapter 8 Surface Water, Chapter 9 Groundwater**<br>• *Environmental Protection (Air) Policy 2019* refer **Chapter 11 Air Quality and Greenhouse Gas**<br>• *Environmental Protection (Noise) Policy 2019* refer **Chapter 12 Noise and Vibration**. |
| Any applicable Commonwealth or State government plans, standards, agreements or requirements | Commonwealth and State plans, agreements, standards and requirements have been considered in the preparation of this EIS. Applicable legislation is discussed in **Chapter 1 Introduction** and **Appendix A-3 Approvals Framework**. |
| Any applicable Environmental Impact Study, assessment or report | BMA has prepared this EIS subject to the EIS process under the EP Act and therefore has undertaken technical studies to assess the environmental impact of the Project and relevant guidance. The EIS details the existing environmental values, the impacts of the Project and the mitigation measures to be implemented to reduce the impacts. |

| Standard criteria | Integration into Project development |
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| The character, resilience and values of the receiving environment | The character, resilience and values of the receiving environment are described in each chapter of the EIS. |
| All submissions made by the applicant and submitters | The public submissions process is described in **Chapter 1 Introduction**. Interested parties made submissions and comments on the original EIS in accordance with the statutory timeframes and requirements of the EP Act. Refer to **Appendix A-2 Submissions and Responses**. |
| The best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows:<br>• EA<br>• transitional environmental program<br>• environmental protection order<br>• disposal permit<br>• development approval. | Best practice environmental management is defined in the EP Act, Section 21, as: "the management of the activity to achieve an ongoing minimisation of the activity's environmental harm through cost-effective measures assessed against the measures currently used nationally and internationally for the activity".<br>The Project infrastructure and activities will be authorised by an EA. The Project will implement a comprehensive rehabilitation program in accordance with the *Mined Land Rehabilitation Policy* published by Department of Environment and Heritage Protection (now DES), Department of Natural Resources and Mines (now the Department of Resources (DoR)) and Queensland Treasury. This includes introducing the new requirements for a Progressive Rehabilitation and Closure Plan. Where supporting infrastructure extends beyond lease boundaries, subsequent consultation and negotiation with relevant stakeholders and authorities will be undertaken and legislative approvals (to be confirmed following detailed design) obtained where required. |
| The financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument | The cost of environmental compliance is well understood by BMA, who operate numerous mines in accordance with existing EAs. The Project will financially benefit the local and regional community directly, not only in value adding but also in providing employment opportunities. The Project has the technical and financial support to establish and maintain commitments associated with infrastructure requirements and environmental management controls. For more information refer **Chapter 3 Project Description**. |
| The public interest | The consideration of the public interest is incorporated into the EP Act's EIS process, with the requirement to consider public submissions on the terms of reference (ToR) and the original EIS, and also assess social and economic impacts due to the Project's development. For more detail on the EIS process and submissions, see **Chapter 1 Introduction**. Issues of community interest and concern have been identified and assessed during the EIS process and are detailed in **Chapter 19 Stakeholders**. BMA will continue to engage with the community throughout the life of the Project. |
| Any applicable site management plan | It is no longer a requirement for an EIS to produce an environmental management plan (EMP). Following approval of the EIS, comprehensive site EMPs will be prepared to address environmental issues. The management plans will be based on the summary of commitments as presented in **Appendix O-1 Summary of Commitments**. The site management plans will state management strategies to minimise the potential for environmental harm and will also set out a framework to manage environmental obligations set out in the EA conditions. |
| Any integrated environmental management system or proposed integrated environmental management system. | The Project would operate in accordance with the issued EA and summary of commitments (**Appendix O-1 Summary of Commitments**). |

## 2.5 Sustainable development

The Project's compatibility was reviewed against the objectives and principles defined in the *National Strategy for Ecologically Sustainable Development* (Ecologically Sustainable Development Steering Committee, 1992) (refer Table 2-2). The goals of ecologically sustainable development are to develop and improve the quality of life, both now and in the future, in a manner that maintains the integrity of ecological processes on which life depends.

**Table 2-2 Integration of ESD principles into the Project development**

| Guiding principles of ESD | Integration into Project development |
|---|---|
| **Key objectives** | |
| To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations | The Project will provide significant benefits to the broader community in terms of income generation, employment and increased government revenues and reinvestment as detailed in **Chapter 18 Economics**.<br>BHP's approach to working with its communities is guided by a commitment to creating enduring social, environmental and economic value. BHP's CDMP guide partnerships and shared value initiatives with its communities. In FY2022, BHP's voluntary social investment totalled US$186.4 million including US$99.4 million in direct community development and environment projects and donations. Other components related to, for example, donations to the BHP Foundation and expenditure under a Matched Giving Program and on administrative support for the BHP foundation and to facilitate direct social investment activities (BHP, 2022). |
| To provide for equity within and between generations (the Intergenerational Equity Principle) | Through appropriate management strategies and monitoring of the impacts, the Project will not significantly reduce, or fail to maintain the health, diversity and productivity of the Queensland environment or affect future generations. Disturbed land will be progressively rehabilitated in line with **Appendix K-1 Rehabilitation Management Plan**.<br>The Project's proximity to the existing Saraji Mine will provide opportunities for the Project to minimise impacts. This will include the location and construction of above ground infrastructure within previously disturbed areas on the Saraji Mine to reduce clearing of vegetation. Clearing of vegetation will have some effect on individual flora and fauna species as detailed in **Chapter 6 Terrestrial Ecology**. Associated mitigation measures are also discussed in this Chapter.<br>Groundwater drawdown from underground mining activities and the drainage of incidental mine gas and is not expected to impact on availability of groundwater resources as discussed in **Chapter 9 Groundwater**.<br>Mine water management will avoid adverse impacts on downstream water quality by the construction or operational phases of the Project. Measures to protect water quality are detailed in **Chapter 8 Surface Water Resources**.<br>Project emissions will be controlled to have no significant long-term adverse effect on the surrounding environment by implementing best practice environmental management. The Project's potential impacts from air quality and greenhouse gas emissions are assessed in **Chapter 11 Air Quality and Greenhouse Gas,** including a preliminary climate change risk assessment for the Project. |
| To protect biological diversity and maintain essential ecological processes and life-support systems | Project infrastructure has been preferentially located in previously disturbed areas to minimise direct impacts on terrestrial and aquatic systems. The underground mining will result in progressive subsidence. The terrestrial and aquatic ecology values in the vicinity of the Project Site are described in **Chapter 6 Terrestrial Ecology** and **Chapter 7 Aquatic Ecology** respectively. These chapters provide an assessment of the impacts along with mitigation measures throughout the life of the Project. Offsets for residual impacts are proposed in **Appendix C-2 Offsets Strategy**. |

| Guiding principles of ESD | Integration into Project development |
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| **Guiding ESD Principles** | |
| Decision-making processes should effectively integrate both long and short term economic, environmental, social and equity considerations | The Project will provide immediate and long-term benefits to the economic and social fabric of Queensland and in particular the region of IRC. The Project will contribute to the national, state and local economies. BMA's total project costs are anticipated to be approximately $7 billion over the life of the Project. This estimate is inclusive of construction costs, operational costs and the cost of make good agreements. |
| Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the Precautionary Principle) | BMA has undertaken a comprehensive EIS process to assess the risk of unacceptable environmental harm consistent with the Precautionary Principle and used the findings to determine appropriate environmental control strategies detailed in this EIS and the Project's summary of commitments (**Appendix O-1 Summary of Commitments**). The Project has the technical and financial support and resources to establish and maintain these environmental protection controls. Offsets for residual impacts are proposed in **Appendix C-2 Offsets Strategy**. |
| The global dimension of environmental impacts of actions and policies should be recognised and considered | BHP and BMA are aware of their corporate responsibilities in relation to the Project and greenhouse gas emissions. In 1995, BHP was one of the first participants in the Australian Greenhouse Challenge program, a federal government initiative to encourage reductions in greenhouse gas emissions. The company began measuring its greenhouse gas emissions in 1993 and has publicly reported greenhouse gas emissions data since. It exceeded its targets of 10 per cent reduction in greenhouse gas intensity between 1995 and 2000 and exceeded a further five per cent reduction between 2002 and 2007 (BHP, 2018a).<br>The BHP Climate Transition Action Plan (BHP, 2021a) demonstrates how BHP has continued to minimise greenhouse gas emissions and meet its emissions reduction targets. In FY2022, BHP reported Scope 1 and Scope 2 emissions inventory of operated assets totalled 12.3 million tonnes of carbon dioxide equivalent (CO2-e) and Scope 3 emissions inventory for metallurgical coal in FY2022 was 34.5 million tonnes CO2-e. In FY2021, each of BHP's operated assets developed decarbonisation plans out to FY2030, containing a pipeline of emissions reduction initiatives that collectively support the medium term targets and long term goal for operational emissions (BHP, 2021a). As a result of actions taken in FY2020 and FY2021, particularly securing the supply of renewable energy sources for some operated assets, the forecasted operational GHG emissions are currently tracking in line with the FY2023 and FY2030 targets (BHP, 2021a).<br>BHP also works with customers to improve energy efficiency in the downstream consumption of energy coal products, as well as promoting activities to help deliver low or zero-emission coal technologies. These activities include capture of methane in ventilation air, as well as support for external research such as the Australian COAL21 program, Cooperative Research Centre for Greenhouse Gas Technologies and the Cooperative Research Centre for Coal in Sustainable Development.<br>The Project will generate greenhouse gas emissions from operations, product transport and product use. As outlined in **Chapter 11 Air Quality and Greenhouse Gas**, BMA propose mitigation measures for site level emissions and takes action at a BHP corporate level to address the wider implications of greenhouse gas emissions and climate change. |
| The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised | The Project will add value to international, Australian and Queensland economies. There will be indirect flow on effects to other areas of the Queensland economy from the Project. BMA will encourage the use of local suppliers and contractors during construction and operations. Refer to **Chapter 17 Social**. |

| Guiding principles of ESD | Integration into Project development |
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| The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised | The Project will enhance Australia's international competitiveness by adopting latest technology and mining methods. BMA has used the Project's proximity to the Saraji Mine to minimise environmental impacts. The Project will be subject to an EA which will ensure that all environmental impacts are managed appropriately. |
| Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentives mechanisms | The Project is consistent with the relevant local, State and Commonwealth government policies. Refer to **Chapter 1 Introduction**. |
| Decisions and actions should provide for broad community involvement on issues which affect them | BMA has undertaken community consultation prior to preparing the EIS, which is detailed in **Chapter 19 Stakeholders** and will continue the process through the Project's life. BMA intends to work with and maintain open communication with the community and stakeholders on all aspects of the Project. BMA will continue to have meetings with local councils and continue briefings by Project representatives to community groups and stakeholders. |
| **Specific ESD objectives for the mining sector** | |
| To ensure mine sites are rehabilitated to sound environmental and safety standards and to a level at least consistent with the condition of surrounding land | BMA has prepared a Rehabilitation Management Plan (**Appendix K-1 Rehabilitation Management Plan**) in which the land disturbed by mining activities is proposed to be progressively rehabilitated to a safe and stable landform that does not cause environmental harm and is able to sustain an approved post-mining land use.<br>The proposed post mining land use will be an undulating landscape that could be used as grazing land, consistent with the surrounding pastoral land use that dominates the region. The exception to this is where remnant native bushland is disturbed. Where practicable, the post mining land use for these areas is woodlands habitat as this is compatible with the pre-existing land use for biodiversity values. There may be instances in which a mix of native and non-native species will be implemented. Post mining land uses for the Project will be confirmed prior to construction. |
| To provide appropriate community returns for using mineral resources and achieve better environmental protection and management in the mining sector | This Project will produce metallurgical coal for export. Increased demand for coal products in India, China and other international markets, particularly for steel manufacturing, has created a window of opportunity for the development of this new mine. Coal exports from the Project will provide significant revenues to Commonwealth, State and local Governments.<br>The coal resource has been subject to detailed investigations to define the extent of the resource and the feasibility of its extraction and processing. The Project and mine sequencing will be designed to maximise resource extraction and minimise resource waste and sterilisation.<br>**Appendix L-1 Social Impact Assessment** outlines the potential impacts and benefits of the project on various social aspects as well as the management measures BMA intends to take to address them. This includes community returns such as investment in community development, training, housing and infrastructure and amenity development. Details of initiatives for supporting the community and providing returns are also presented in **Chapter 17 Social**.<br>BMA has undertaken a comprehensive EIS process to identify opportunities to improve environmental protection and management for the Project. This EIS documents detailed assessments that have been undertaken. In addition, the summary of commitments (**Appendix O-1 Summary of Commitments**) outlines the proposed environmental management strategies for the Project. The Project has the technical and financial support to establish and maintain these environmental management controls. |

| Guiding principles of ESD | Integration into Project development |
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| To improve community consultation and information, improve performance in occupational health and safety and achieve social equity objectives | BMA has undertaken community consultation prior to submitting the EIS. The details are presented in **Chapter 19 Stakeholders** and have been incorporated into the assessment of social impacts as defined in **Chapter 17 Social**. BMA has undertaken a review of the risks to occupational health and safety posed by the Project and proposed appropriate management measures as detailed in **Chapter 20 Hazards, Health and Safety**. |