# SARAJI EAST MINING LEASE PROJECT

Environmental Impact Statement

## Chapter 3
Project Description

BHP

# Contents

# Saraji East Mining Lease Project

## 3 Project Description

### 3.1 Introduction

This chapter describes the key elements of the Saraji East Mining Lease Project (the Project) throughout its construction, operation and decommissioning phases. This chapter also discusses key infrastructure requirements for the Project and interactions with the adjacent existing Saraji Mine.

### 3.2 Project overview

BMA proposes to develop the Project, a greenfield single-seam underground mine development on Mining Lease Application (MLA) 70383 commencing from within Mining Lease (ML) 1775. The Project also comprises supporting infrastructure, including a Coal Handling Preparation Plant (CHPP), a Mine Infrastructure Area (MIA), a conveyor system, rail spur and balloon loop, water pipelines and dams, powerlines, stockpiles and a construction accommodation village. Some infrastructure utilised for the Project will be located on the adjacent Saraji Mine MLs as well as on MLA 70383 and MLA 70459. The Project will mine up to 11 million tonnes per annum (Mtpa) and produce up to 8 Mtpa of product coal for the export market over a 20-year production schedule (Financial Year 2023 – 2042). Excluding ramp up and ramp down periods, the Project anticipates the production of an annual average of 6.2 Mtpa of product coal over the life of mine.

The key objectives of the Project are to:

- utilise BMA owned land on the adjacent existing Saraji Mine MLs to minimise the environmental impacts from additional infrastructure and to provide Project efficiencies
- operate a profitable Project to provide high-quality hard coking coal, semi hard coking coal and pulverised coal injection coal to the export market
- design, construct and operate a Project that:
  - minimises adverse impacts on the surrounding bio-physical and social environments
  - complies with all relevant statutory obligations and continues to employ processes which enhance sound environmental management.

## 3.3 Project location

### 3.3.1 Regional context

The Project is located within the Isaac Regional Council (IRC) Local Government Area (LGA), approximately 30 kilometres (km) north of Dysart and 170 km southwest of Mackay in Queensland. The location of the Project and its regional context is shown in Figure 3-1.

### 3.3.2 Local context and terminology

The Project Site is located adjacent to, and in some cases overlaps, areas which are currently approved as the existing BMA Saraji Mine. The existing Saraji Mine is an active, open cut mine owned by the Central Queensland Coal Associate (CQCA) Joint Venture, namely BHP Coal Pty Ltd, BHP Queensland Coal Investments Pty Ltd, Umal Consolidated Pty Ltd, QCT Resources Pty Limited, QCT Mining Pty Ltd, QCT Investments Pty Ltd and Mitsubishi Development Pty Ltd. The CQCA is an unincorporated joint venture between BHP (50 per cent) and Mitsubishi Corporation (50 percent). The mine is operated by BMA under a management agreement.

The existing Saraji Mine is approved to undertake open cut operations on ML 1775, ML 70142, ML 1784, ML 1782, ML 2360, ML 2410, ML 70294, ML 70298, ML 70328 and ML 700021 under Environmental Authority (EA) Permit No. EPML00862313. The existing Saraji Mine is not within the scope of this EIS and BMA will continue to undertake open cut mining operations, and related activities (for example rehabilitation), at the existing Saraji Mine in accordance with the terms of its existing approvals.

The Project Site consists of Exploration Permit for Coal (EPC) 837, EPC 2103, MLA 70383, MLA 70459 and components of the Project would operate within MLs at the existing Saraji Mine (ML 1775, ML 70142 and ML 1782) under the existing EA. The Project Site encompasses approximately 11,427 hectares (ha) of land. Mining and the infrastructure required to support the Project is not proposed within the full extent of the Project Site with direct impacts constrained to a smaller area of some 3,425 ha (refer Figure 3-2). Major components of the Project include:

- the Project: underground mine within MLA 70383, MLA 70459, ML 70142 and ML 1775 – this is known as the Project Footprint
- onsite infrastructure including CHPP, a MIA, a conveyor system, rail spur and balloon loop, powerlines, stockpiles and a construction accommodation village
- infrastructure including water pipelines, dams and powerlines.

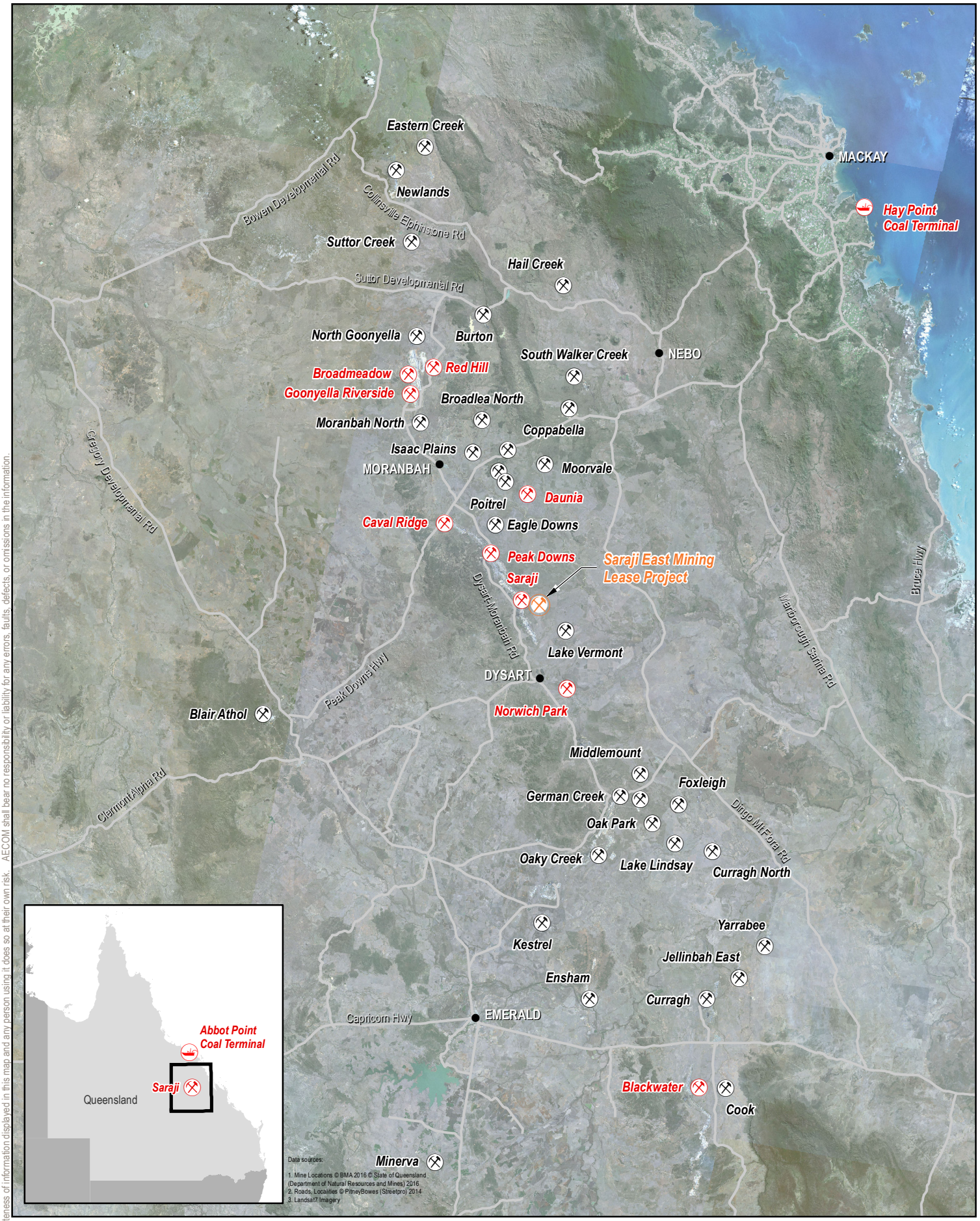
An overhead 66 kilovolt (kV) powerline is proposed to extend off-lease and connect to the Dysart Substation, south of the Project Site. To the extent that the powerline extends beyond the lease boundaries, subsequent negotiation with relevant authorities and legislative approvals will be undertaken where required. It is unlikely that an EA for a prescribed ERA will be required for this off-lease activity as none are of relevance. This matter is subject to further assessment following detailed design.

Figure 3-2 shows the following:

- relevant mining tenements
- the Project Site – delineated by the extent of surface infrastructure and relevant mining tenements
- the Project Footprint – the maximum extent of proposed surface disturbance associated with surface infrastructure and underground mining activities
- optimised underground layout – a mine layout related to the optimised production schedule for the assumed Financial Year (FY) 2023 – FY 2042 period.

This EIS assesses the potential environmental impacts associated with an optimised underground layout and associated production schedule. The optimised underground layout was developed based on consideration of a range of factors including resource recovery, coal quality, production rates and site constraints including social and environmental considerations. The optimised underground layout is designed to provide a generally consistent coal quality and production output and is further discussed in **Chapter 2 Project alternatives and justification**.

To provide a conservative assessment, where appropriate, technical investigations have considered a project footprint based on the potential ground and surface disturbance associated with a maximised underground layout. The maximised layout relates to the maximum mining capacity of known resources within the area for which an optimised production schedule is yet to be developed.






**LEGEND**

- Saraji East Mining Lease Project
- Locality
- Major Road
- BMA Coal Terminal
- BMA Mine
- Other Mine

N

**Figure 3-1**
**Regional Location**

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

0 5 10 20
Kilometres

Scale: 1:1,500,000 (when printed at A4)
Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

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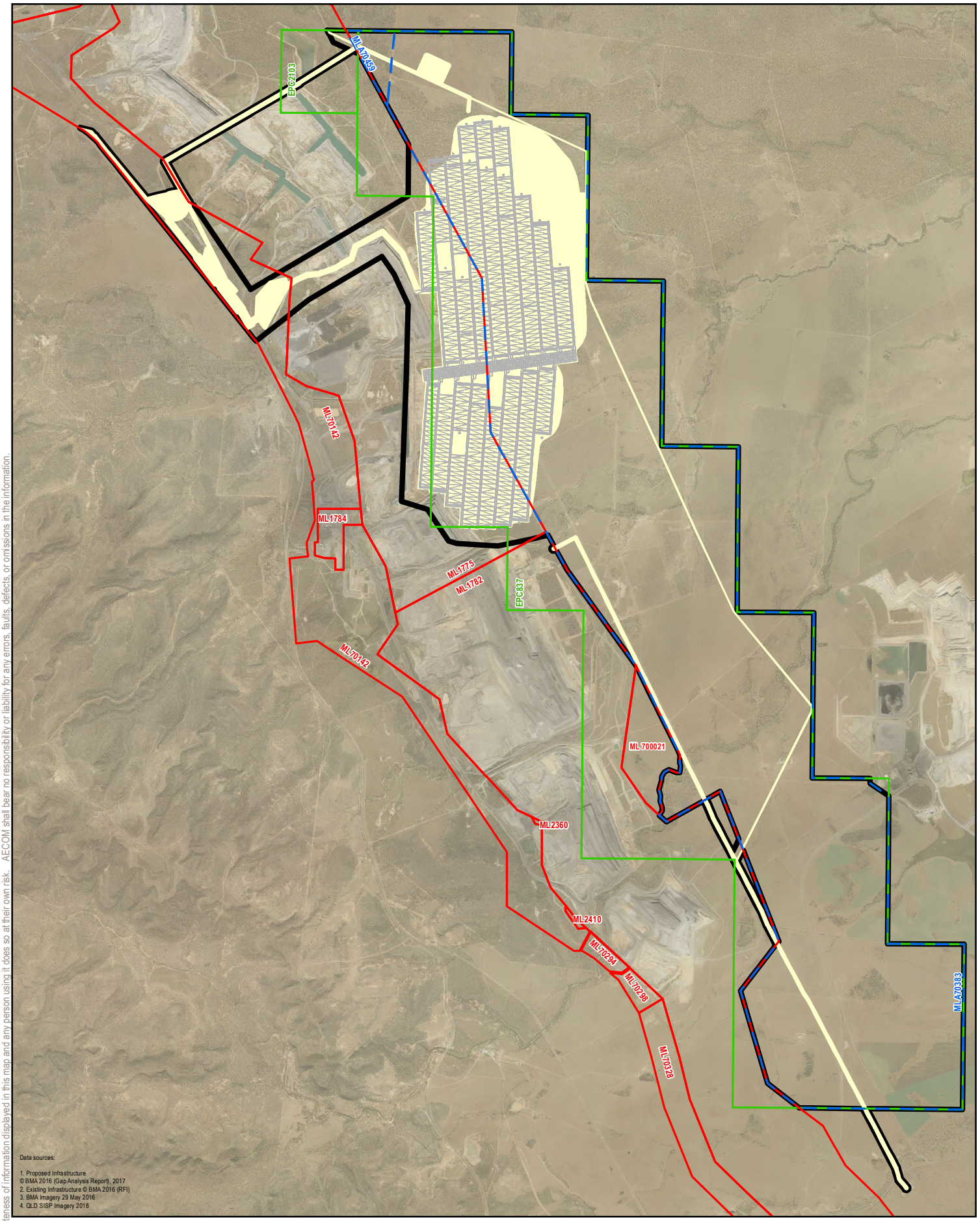


Data sources:

1. Proposed Infrastructure
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2. Existing Infrastructure © BMA 2016 (RFI)
3. BMA Imagery 29 May 2016
4. QLD SISP Imagery 2018

**LEGEND**

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

N

**Figure 3-2**
**Project Site, Project Footprint and Impact Assessment Footprint**

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

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Kilometres

Scale: 1:110,000 (when printed at A4)

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

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## 3.4 Description of the Project

The Project is a greenfield single-seam underground mine development primarily on MLA 70383 commencing from within the existing Saraji Mine (ML 1775) under EA EPML00862313. It has been designed to utilise the existing approved Saraji Mine infrastructure, wherever practical. The Project will require upgrades to existing and new mine infrastructure. The key features of the Project are summarised in Table 3.1 and the Project layout is shown in Figure 3-3.

Where practicable, the Project's infrastructure has been located on disturbed land to minimise the overall impact of the Project on environmental values. The design of the mine plan has been optimised through an iterative process by identifying environmental and operational constraints. Information on the Project alternatives is provided in **Chapter 2 Project alternatives and justification**.

**Table 3.1 Key features of the Project**

| Aspect of the Project | Proposed operations |
|---|---|
| Total production | Approximately 150 million tonnes (Mt) run-of-mine (ROM) coal based on a 20-year production schedule.<br>This equates to approximately 110 Mt of product coal. |
| Average annual production (excluding ramp up and ramp down and potential extensions) | 8.2 Mtpa ROM coal annual average with a maximum of 11 Mtpa.<br>6.2 Mtpa product coal annual average with a maximum of 8 Mtpa. |
| Capital expenditure | Estimated to be approximately $1.3 billion. |
| Mine life<br>• Production<br>• Rehabilitation | Approximately 20 years with potential for extensions.<br>Nominally 10 years. |
| Operating hours | 24 hours per day, 7 days a week. |
| Workforce<br>• Construction<br>• Operation | Up to 1,000 full time equivalent (FTE).<br>Up to 500 FTE. |
| Accommodation<br>• Construction<br>• Operation | Construction accommodation village with capacity for 1,000 personnel.<br>Offsite company provided accommodation options are located in Dysart and Moranbah during operation. |
| Mining method | Underground long wall mining |
| Existing mining lease areas | ML 70142, ML 1782 and ML 1775 |
| Proposed mining lease areas | MLA 70383 and MLA 70459 |
| Mine infrastructure and tailings/rejects man-agement | The Project will utilise existing infrastructure as part of the existing Saraji Mine operations where practical, including:<br>• use of the Saraji Mine CHPP for processing Project coal in years where ROM tonnes exceeds 7 Mtpa<br>• use of an integrated power supply network for Saraji Mine and the Project |

| Aspect of the Project | Proposed operations |
|---|---|
| | • use of the existing open cut pit for mine access and highwall entry to minimise the environmental impacts, costs, time and risks involved in construction of a new mine portal<br>• haul roads and trucks for the transportation of ROM coal from the proposed CHPP to the existing Saraji Mine CHPP<br>• use of open-cut spoil dumps to distribute and dispose of dewatered tailings and rejects from the Project's CHPP.<br>Where possible, above-ground infrastructure will be located within previously disturbed areas.<br>The following additional components are proposed for the Project:<br>• a MIA located on ML 70142<br>• a CHPP with capacity for processing up to 7 Mtpa located on ML 70142. In the years where the Project's mining volumes exceed the processing capacity of the CHPP, excess coal will be trucked to the existing Saraji Mine CHPP for processing using internal on-lease haul roads. Coal processed through the Saraji Mine CHPP will be handled in accordance with the existing EA conditions.<br>• a conveyor system and haul road (see conceptual alignment on Figure 3-3) to transport coal, mining equipment and personnel between the underground portal, CHPP and MIA. The conveyor would enable transport of product coal to the rail loading facilities located over both ML 1775 and ML 70142.<br>• ROM stockpile and product stockpile pads located on ML 70142<br>• a new rail spur, balloon loop and signalling system on ML 70142 adjacent to the existing Norwich Park rail line<br>• a network of gas drainage bores and associated surface infrastructure consisting of gas and water collection networks and access tracks across the underground mine footprint on ML 1775 and MLA 70383. |
| Water infrastructure | Levees, dams and drains will be required to support mining operations as well as provide protection to downstream water resources. The water infrastructure to be built will consist of:<br>• Process water dam<br>- This dam will store mine affected water (MAW) including runoff from disturbed areas of the Project such as the new MIA, the CHPP, stockpiles, spoil piles, rail loop and spur. MAW will be collected from disturbed areas and transferred to the process water dam. The process water dam will be located on MLA 70383.<br>• Temporary gas dewatering storage<br>- The pre-drainage of incidental mine gas will result in the production of water. This water will be collected in local facilities near the well head. These facilitates will act as a balancing storage to allow transfer at a constant rate to the process water dam. |

| Aspect of the Project | Proposed operations |
|---|---|
| | • Raw water dam<br>- The raw water dam will not have a local catchment and will receive clean water inflows from BMA's existing water allocations delivered via BMA's existing pipeline network. The raw water dam will also receive direct rainfall and will lose water through surface evaporation. Water from the raw water dam will be used to satisfy the Project's potable water and underground mining equipment demands. The raw water dam will be located on ML 70142.<br>• Additional highwall pumps<br>- The access portal to the underground workings will be via the existing open cut highwall. Water collected in the highwall portal pit sumps will be pumped to the mine water management system to maintain the flood immunity of the underground workings.<br>• Pipelines<br>- Relocation and re-connection of the existing Eungella Water Pipeline Company (EWPC) Southern Extension Water Pipeline into a new infrastructure and transport corridor located towards the eastern boundary of MLA 70383 and northern boundary of MLA 70459.<br>- A water pipeline will be constructed to connect the Project's surface infrastructure located on ML 70142 to the process water dam located on MLA 70383.<br>- Under normal operating conditions, the Project mine water system will operate independently. However water may be transferred between the Project and the broader BMA network of mines via the existing water pipeline network to enhance available water supply and storage capacity. Site transfers would be subject to operational demand and water quality testing and control.<br>• Minor drainage infrastructure<br>- Sediment dams, bunds and drains to capture run-off from disturbed areas including the CHPP, underground mine portal, new MIA as well as the ROM and product pads. |
| Electricity infrastructure | Relocation and re-connection of an existing 132 kilovolt (kV) powerline into a new infrastructure and transport corridor located towards the eastern boundary of MLA 70383 and northern boundary of MLA 70459.<br><br>Bulk electricity demand will be supplied by the existing Ergon Supply (Dysart 66 kV supply to Saraji Mine). Two new powerlines will be constructed to support the provision of power to the Project:<br><br>• a co-aligned 66 kV powerline and connection extending off lease and connecting to the Dysart Substation<br>• a 66 kV northern extension connecting the Project to the infrastructure and transport corridor.<br><br>To the extent that the powerline extends beyond lease boundaries, subsequent negotiation with relevant authorities and legislative approvals will be undertaken where required. It is unlikely that an EA for a |

| Aspect of the Project | Proposed operations |
|---|---|
| | prescribed ERA will be required for this off-lease activity as none are of relevance. This matter is subject to further assessment following detailed design.<br><br>The existing Saraji Mine currently has an authorised maximum demand of 43 megawatts (MW). The current maximum demand of the Saraji Mine is between 26 MW and 30 MW. The anticipated demand for the Project (underground and surface infrastructure) is estimated to be between 11 MW and 14 MW. |
| Public and private roads | The Project will require the construction of an access road within the new infrastructure and transport corridor to the eastern boundary of MLA 70383 and the northern boundary of MLA 70459.<br><br>Intersection development will occur:<br><br>• between the proposed transport and infrastructure corridor and Lake Vermont Road<br>• Dysart-Moranbah Road and the existing Saraji Mine at the identified access point for the CHPP and MIA. |
| Communications | Communications will be provided by extending the services from the Saraji Mine via the existing service corridor. Telecommunications will be controlled and monitored through a new Project control room located on site or from a centrally located facility in Brisbane.<br><br>An existing telecommunication tower within the Coolibah Mine Pit is located approximately 1 km south west of the Project Site. |
| Rehabilitation | The following rehabilitation and decommissioning strategies will be implemented for the Project:<br><br>• all mine roads will be rehabilitated, unless otherwise agreed with the subsequent landowner and in accordance with the EA.<br>• all water dams not required for long term water management will be decommissioned and removed, unless otherwise agreed with the subsequent landowner and in accordance with the EA.<br>• all major infrastructure, including the CHPP, will be decommissioned and removed offsite.<br>• concrete pads will be covered with benign waste rock or ripped and removed, then topsoiled and re-vegetated.<br>• other facilities, including workshops and warehouses, will be decommissioned and removed, unless otherwise agreed with the subsequent landowner and in accordance with the EA.<br><br>BMA will comply with the legislative amendments associated with the passing of the *Mineral and Energy Resources (Financial Provisioning) Bill 2018.*<br>A Progressive Rehabilitation and Closure Plan (PRCP) will be developed prior to construction commencing and will demonstrate that the proposed Project will:<br>• be rehabilitated to a safe and stable landform<br>• not cause environmental harm<br>• sustain post mining land uses |

| Aspect of the Project | Proposed operations |
|---|---|
| | Progressive rehabilitation will be carried out as described within **Chapter 5 Land Resources** and **Appendix K-1 Rehabilitation Management Plan.** |

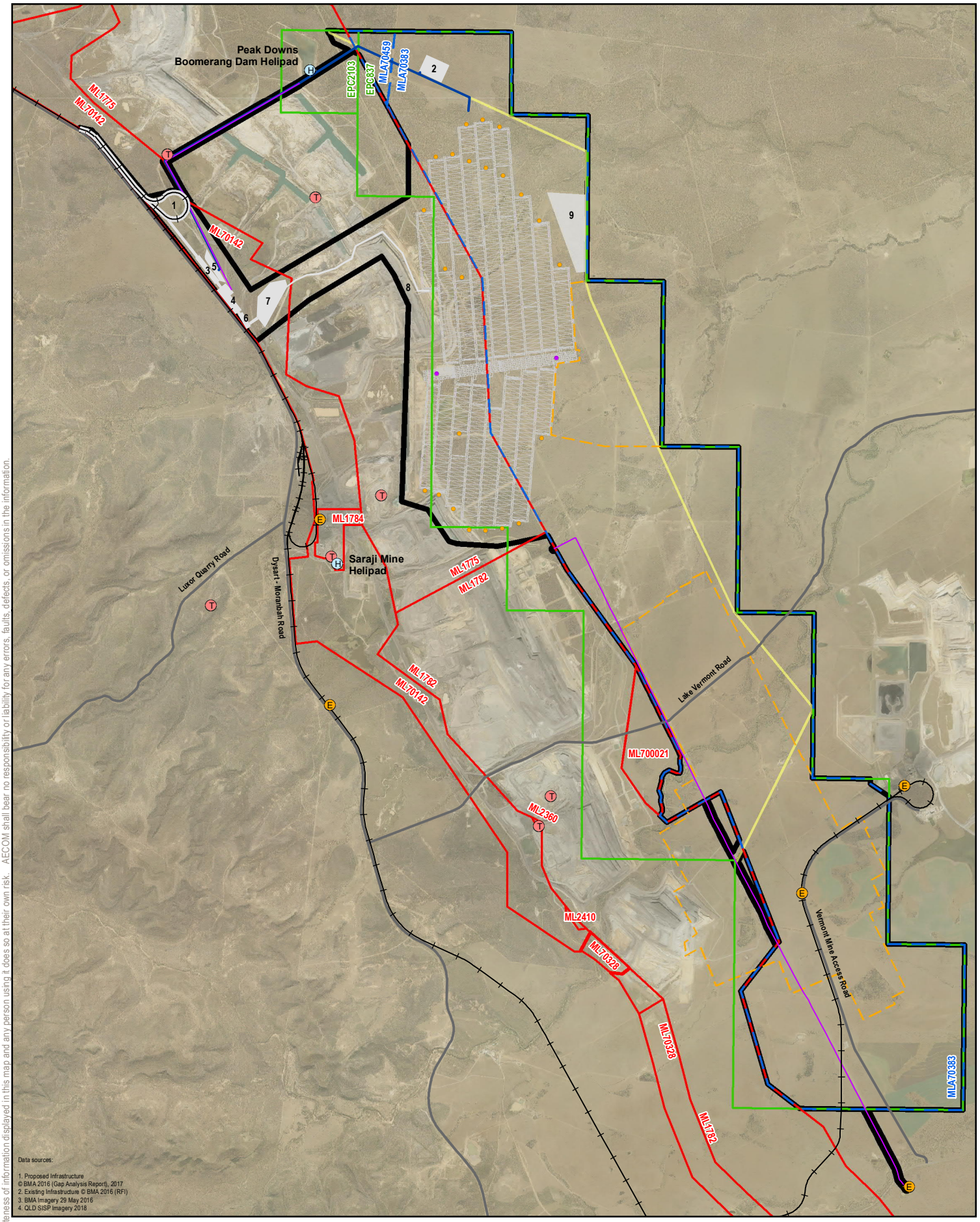
### 3.4.1 Project Layout

The Project layout was developed based on the following key objectives:

- an optimised underground mine layout based on available analysis
- MIA to be in close proximity to the mine access
- proposed rail loading infrastructure should be located in close proximity to the existing rail line
- the CHPP is to be of a sufficient size and located to enable a practical connection between the underground mine and the rail load out
- proposed infrastructure to be constructed in areas that will not be impacted by future mining
- new infrastructure to be separate from the Saraji Mine existing infrastructure
- minimise disturbance of environmentally sensitive areas, utilising the previously disturbed areas of the Saraji Mine, where feasible.

Figure 3-3 identifies two potential future development areas. These areas do not form part of the scope of the Project; however, BMA is continuing to assess the economic viability of developing these areas. The development of these areas will not be discussed further in this EIS.

To the extent that supporting mine infrastructure (i.e. the 66 kV powerline connecting to Dysart Substation) extends beyond the lease boundaries, subsequent negotiation with relevant authorities and legislative approvals will be undertaken where required. This scope does not form part of this EIS. In accordance with Schedule 2 of the EP Act, it is unlikely that an EA for a prescribed ERA will be required for this off-lease activity as none are of relevance. This matter is subject to further assessment relating to detailed construction details.




Data sources:

1. Proposed Infrastructure
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2. Existing Infrastructure © BMA 2016 (RFI)
3. BMA Imagery 29 May 2016
4. QLD SISP Imagery 2018

**LEGEND**

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Underground layout
- Flare
- Vent
- Public Road
- Existing Railway
- 66kV Powerline
- Pipeline
- Rail Loop
- Future Development Area
- Transport and Infrastructure Corridor
- Surface Infrastructure
- Substation
- Helipad
- Telecommunications Tower

**Surface Infrastructure**

1 Rail Loading Balloon Loop
2 Process Water Dam
3 Product Stockpiles
4 CHPP
5 Raw Water Dam
6 ROM Pad
7 Future MIA
8 Conveyor
9 Construction Village

N

**Figure 3-3**
**Project Layout**

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

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)
Projection: Map Grid of Australia - Zone 55 (GDA94)

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## 3.5 Tenements, land tenure and ownership

### 3.5.1 On-lease infrastructure

The Project Site will be located adjacent to, and in some cases will overlap, areas currently approved as the existing Saraji mine. The existing Saraji Mine currently holds all relevant approvals and does not form part of the scope of this EIS.

The Project Site consists of EPC 837, EPC 2103, MLA 70383, MLA 70459, ML 1775, ML 70142 and ML 1782. It includes the application for two additional mining leases, MLA 70383 and MLA 70459. These lease applications are held by BHP Coal Pty Ltd and fall within EPC 837 and EPC 2103. The following Saraji MLs fall outside the Project Site: ML 700021, ML 2360, ML 2410, ML 1784, ML 70328, ML 70294 and ML 70298; no developments are proposed on these leases as part of the Project (refer to Figure 3-2).

A total area of approximately 2,073 ha is proposed to be subject to underground mining. An additional area of approximately 1,155 ha will be disturbed on ML 1775, ML 70142, ML 1782, MLA 70459 and MLA 70383, for mine infrastructure, including the MIA, CHPP, conveyors, roads and a rail spur and balloon loop. The infrastructure and transport corridor, including the relocated 132 kV Powerlink powerline, EWPC Southern Extension Water Pipeline and new access roads, will be located within ML 1775, MLA 70383 and MLA 70459.

Mining tenements and the Project components associated with each tenement are detailed in Table 3.2 and presented in Figure 3-4.

**Table 3.2 Project Site mining tenements**

| Mining tenement | Size (ha) | Status | Date granted/ lodged | Effective until | Development associated with the Project |
|---|---|---|---|---|---|
| **Project tenements** | | | | | |
| MLA 70383 | 9,079 | Application | 18/10/2007 | To be confirmed on granting of the ML | Underground mine panels, infrastructure and transport corridor, gas drainage bores and associated surface infrastructure consisting of gas and water collection networks, access tracks, dams and other water related infrastructure and utilities (power and water). |
| MLA 70459 | 91.5 | Application | 27/09/2011 | To be confirmed on granting of the ML | Infrastructure and transport corridor. |
| **Saraji Mine tenements** | | | | | |
| ML 1775 | 18,240 | Granted | 22/12/1983 | 31/12/2031 | Underground mine panels, MIA, entry portal, conveyor system, gas drainage bores and associated surface infrastructure consisting of gas and water collection networks, dams, other water related infrastructure, access tracks and utilities (power and water). |
| ML 70142 | 3,859.31 | Granted | 23/05/2002 | 31/12/2031 | CHPP, conveyor system, ROM pad, product stockpile, train load out facility, rail spur, balloon loop and signalling system. |

The Project's mining tenements overlap a number of EPCs held by CQCA Joint Ventures, which are the prerequisite tenements for the MLAs. These EPCs are listed in Table 3.3.

**Table 3.3 Prerequisite tenements for the Project**

| Tenement | Holder | Overlapping tenement | Status | Date granted/ lodged | Expiry date |
|---|---|---|---|---|---|
| EPC 837 | CQCA Joint Venture | MLA 70383 and MLA 70459 | Granted | 20/10/2003 | 19/10/2022 |
| EPC 2103 | CQCA Joint Venture | MLA 70459 | Granted | 12/10/2010 | 11/10/2022 |

The Project mining tenements are overlapped by two Authorities to Prospect (ATP), permits for exploration of petroleum, being ATP 1103 and ATP 814. ATP 1103 is managed by Arrow Energy on behalf of Arrow CSG Pty Ltd, ACL Energy Pty Ltd and CH4 Pty Ltd. ATP 814 is managed by Eureka Petroleum Pty Ltd.

Overlapping tenements held by other resource authority holders will be subject to the provisions of the *Mineral and Energy Resources (Common Provisions) Act 2014*. In the event that ATP 1103 or ATP 814 are converted to Petroleum Leases, co-ordination arrangements will be negotiated with the above companies as a prerequisite for developing both the coal and gas resources and securing the grant of MLA 70383 and MLA 70459.

Gas drainage and management for the Project will be undertaken in accordance with the requirements of the *Mineral Resources Act 1989* (MR Act) and the *Petroleum and Gas Act 2004*. Overlapping tenements impacted by the Project are summarised in Table 3.4.

**Table 3.4 Overlapping tenements**

| Tenement | Overlapping tenements | Holder | Status | Date granted/ lodged |
|---|---|---|---|---|
| ATP 1103 (Petroleum Commercial Agreement (PCA) 144 and 262) | MLA 70383 and MLA 70459 | Arrow CSG Pty Ltd, ACL Energy Pty Ltd and CH4 Pty Ltd | Granted | 23/12/2010 |
| ATP 814 (PCA 199) | EPC 837 and MLA 70383 | Eureka Petroleum Pty Ltd | Granted | 02/02/2006 |

The land underlying MLA 70383, MLA 70459 and the associated EPCs is currently used predominantly for cattle grazing. The land underlying MLA 70383 and MLA 70459 is freehold land in title with various associated easement encumbrances. The following easements and associated infrastructure currently run through parts of the Project's tenements:

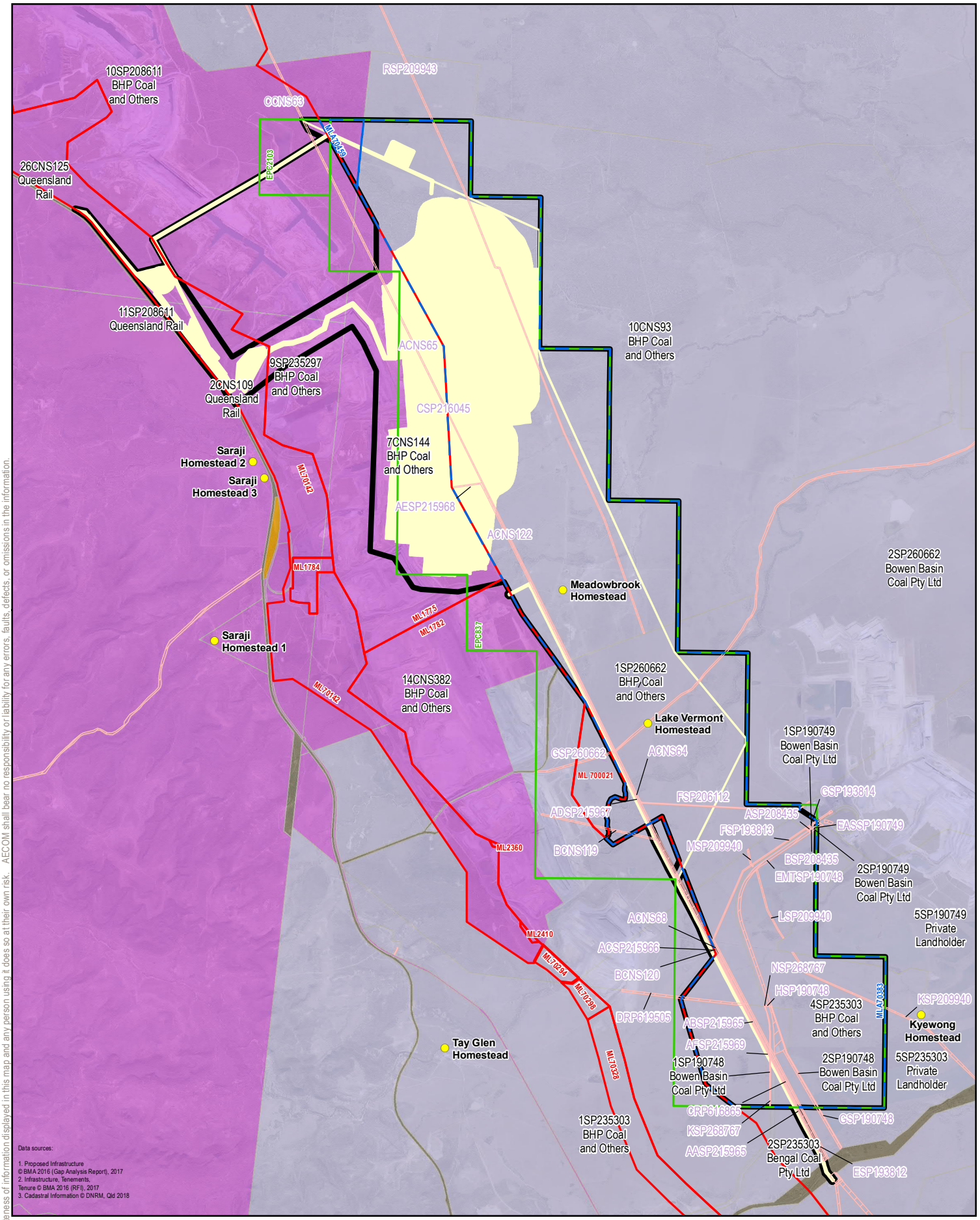
- Lake Vermont Road
- Powerlink 132 kV powerline
- Saraji Mine 66 kV powerlines
- EWPC Southern Extension Water Pipeline
- Lake Vermont Queensland Rail (QR) rail spur
- pipeline license for the Central Queensland Gas Pipeline (CQGP) access easement.

Details of the underlying land tenure and ownership within the Project Site are provided in Table 3.5 and presented in Figure 3-4. Further detail on land tenure and ownership is provided in **Chapter 4 Land Use and Tenure**.

**Table 3.5 Tenure and ownership**

| Lot and plan | Tenure | Registered owner | Tenement |
|---|---|---|---|
| 101SP310393 | Freehold | CQCA Joint Venture | MLA 70383<br>ML 700021 |
| 10SP208611 | Leasehold | CQCA Joint Venture | ML 1775<br>ML 70142<br>MLA 70459 |
| 2SP190748 | Freehold | Bowen Basin Coal Pty Ltd | MLA 70383 |
| 2SP235303 | Freehold | Bengal Coal Pty Ltd | MLA 70383 |
| 5SP190749 | Freehold | Private landholder | MLA 70383 |
| 7CNS144 | Leasehold | CQCA Joint Venture | ML 1775<br>ML 1782<br>MLA 70383 |
| 9SP235297 | Leasehold | CQCA Joint Venture | ML 1775<br>ML 70142 |
| 102SP310393 | Freehold | Bowen Basin Coal Pty Ltd | MLA 70383 |
| 11SP208611 | Leasehold | CQCA Joint Venture | ML 70142 |
| 1SP190748 | Freehold | Bowen Basin Coal Pty Ltd | MLA 70383 |
| 1SP190749 | Freehold | Bowen Basin Coal Pty Ltd | MLA 70383 |
| 2SP190749 | Freehold | Bowen Basin Coal Pty Ltd | MLA 70383 |
| 5SP190749 | Freehold | Private landholder | MLA 70383 |
| Road Parcel, Lake Vermont Road | N/A | Isaac Regional Council | MLA 70383 |

No mining production activities are proposed as part of the scope of the Project in the southern area of MLA 70383 as illustrated in Figure 3-3. This area includes Lake Vermont Road and the Lake Vermont QR rail spur, which terminates at the Lake Vermont Industrial Area rail-loop off MLA 70383 and an infrastructure corridor. However, exploration activities will continue across the entire MLA 70383 and MLA 70459 for ongoing definition and delineation of the Saraji East coal resource and structure. Disturbance due to exploration activities in areas not authorised to be mined will be rehabilitated in accordance with the *Eligibility criteria and standard conditions for exploration and mineral development projects* (DEHP, 2016).






**LEGEND**

- Project Site
- Project Footprint
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Homestead

**Land Tenure**

- Easement
- Freehold
- Leasehold
- Reserve
- Road Type Parcel

N

**Figure 3-4**
**Tenements, Tenure and Ownership**

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

0 0.5 1 2
Kilometres

Scale: 1:120,000 (when printed at A4)

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

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### 3.5.2 Off-lease infrastructure

The EIS has assessed environmental impacts relevant to the off-lease infrastructure including powerline extension to Dysart Substation and relocation and re-connection of the existing Eungella Water Pipeline Company (EWPC) Southern Extension Water Pipeline. However, the off-lease components of the Project do not form part of the MLA and subsequent mining tenement applications. Off-lease infrastructure utilised by the Project is further described in Section 3.6.4.

## 3.6 Project construction

Construction will commence following the grant of relevant approvals and BMA's decision to proceed with the Project.

The timing of the Project is yet to be determined. For EIS-related impact assessment purposes, construction is assumed to commence in FY 2021 with site setup and construction of the mine portal. It is estimated a construction workforce of 500 people will be required in FY 2021, increasing to 1,000 people during FY 2022 and FY 2023. Mine construction hours during this peak period are expected to be in two 12 hour shifts, seven days a week, 365 days per year.

During the later stages of the construction period, the construction workforce will be required to clear all construction waste and equipment. Any disturbed areas that are not proposed to be utilised during operational activities will be progressively rehabilitated.

Table 3.6 provides a summary of the anticipated activities occurring during construction.

**Table 3.6 Construction activities**

| Assumed timeframe | Anticipated activities |
|---|---|
| FY 2021 (or Year 1) | Construction of:<br>• mine portal<br>• construction accommodation village<br>• gas drainage infrastructure (western-most gas wells and western-most locations for the gas pipeline)<br>• raw water dam and process water dam. |
| FY 2022 – FY 2023 | Construction of:<br>• powerline (close to Meadowbrook homestead)<br>• MIA<br>• CHPP<br>• rail loop and load out<br>• vent shafts<br>• water pipelines. |

### 3.6.1 Pre-construction and mine development

The pre-construction phase of the Project includes the collection of information required for the detailed design phase of the Project. Activities that will be carried out include:

- geotechnical investigations to assess ground conditions and enable detailed design of all infrastructure and structures associated with the Project
- soil investigations assessing the potential for contaminated materials to be present onsite
- geological exploration activities, including continued drilling to further define the coal resources associated with the Project.

These activities will be carried out under BHP's *Safety – Our Requirements* (BHP, 2018b) to ensure all health and safety risks are identified and managed.

### 3.6.2 Mine facilities and infrastructure

Facilities and infrastructure associated with the Project includes the MIA, CHPP, water management infrastructure, roads, as well as water and power supply to the Project Site. The construction of this infrastructure will occur in three stages:

- site preparation
- civil works including water storage and transport network and powerlines/connections
- MIA building and CHPP construction.

To manage and facilitate the construction of Project infrastructure, temporary facilities, including offices, will be constructed close to the work centres such as the MIA. The facilities will be located within the Project Footprint which may include previously disturbed areas. A construction accommodation village is proposed and is discussed in Section 3.6.6.

Temporary construction power will be sourced via a connection into the Saraji Mine 66 kV overhead line electrical network. This connection will require a short 66 kV overhead power line, constructed within the existing mining lease boundaries to supply an interim 66 kV/11 kV substation located in close proximity to the underground portal entries. The interim 66 kV/11 kV substation could be a transportable substation structure type sourced from an existing BMA mine site or procured for the Project. The 11 kV construction supplies for the CHPP will be sourced from the underground mine interim 66 kV/11 kV substation or the Saraji Mine 11 kV overhead line electrical network. Both options require sections of a new 11 kV overhead powerline to be constructed. The preferred option will be finalised once construction power requirements are confirmed.

Construction water supply will be sourced from the existing Saraji Mine water management system.

#### Site preparation

Prior to construction, staged clearing will occur where required. Once vegetation has been cleared, topsoil will be stripped and stockpiled for use in rehabilitation. Clearing activities will be staged to minimise the exposure of disturbed areas and degradation of topsoil. Plant and equipment involved in clearing activities will include, but not be limited to, excavators, dozers, scrapers, graders and water carts. All site vehicles and equipment will be properly serviced and maintained.

## Civil works

Civil works will generally occur early in the construction phase and will include, but not be limited to:

- compaction and associated geotechnical works
- civil earthworks, including piling and foundation construction
- installation of permanent and temporary drainage and water storage/transport structures
- construction of powerline and connection network
- trenching and laying of reticulated services and any other underground pipelines and services
- providing all weather pavements for all roads and vehicle parking
- hard stand construction
- progressive re-vegetation of embankments, disturbed areas and open channel drains where practical.

Hard stand areas will be constructed according to relevant design criteria. Excavations will occur during construction for most infrastructure components of the Project. In particular, bulk earthworks will be undertaken within the train load out, rail loop and CHPP area. Where practical, if the excavated material has properties suitable for engineering purposes it will be used as bulk fill, road sub-base, construction material for lay down areas, and foundations. Any unsuitable material will be disposed of at the existing Saraji Mine.

## Mine entry

Access to the underground workings will be through a portal developed in the existing open cut highwall on the eastern side of the existing Saraji Mine. The access portal will cater for a conveyor and incoming/outgoing movement of mining equipment and personnel. Initially, the access portal will be connected to a portal fan and act as the mine return until the down slope (down dip) main ventilation shaft is commissioned.

As part of the Project, the highwall will be designed and engineered to provide additional stability to support the underground portal entry and operations over a 20 year production schedule. The design features of the highwall will include:

- a conservative angle of repose
- batter and drainage design
- pre-splitting the highwall to minimise fracturing of the highwall from blasting over break which occurs as cracks widen due to rain and exposure.

The portal will be designed and constructed in accordance with the Coal Mine Safety and Health Regulation 2017. This will include:

- construction of a frame that extends out from the highwall to provide protection for personnel and equipment entering the mine
- capacity for rapid sealing in the event of a catastrophic occurrence
- a docking station for deployment of a rapid inertisation system. This system is designed to control dangerous gases within the underground mine to safe levels.

## CHPP and MIA building construction

The CHPP and MIA building construction will commence following completion of components of the civil works. Where practicable and cost effective, infrastructure components will be modularised units, utilising off-site fabrication and assembly.

The industrial buildings within the MIA will be steel framed on a concrete slab with steel sheeting clad exterior. The administration office and other associated buildings are likely to be demountable construction materials or precast concrete panel walling on floor slabs.

The MIA will include the following:

- administration, operations, bathhouse, first aid, communications buildings and car parking
- workshop and warehouses
- compressor building
- water treatment plant and a sewage treatment plant
- diesel generator, gas monitoring, fuel storage facilities and vehicle refuelling stations
- waste handling facility
- washdown areas
- construction laydown
- long term warehouse and storage areas.

An indicative layout of the MIA is presented in Figure 3-5.

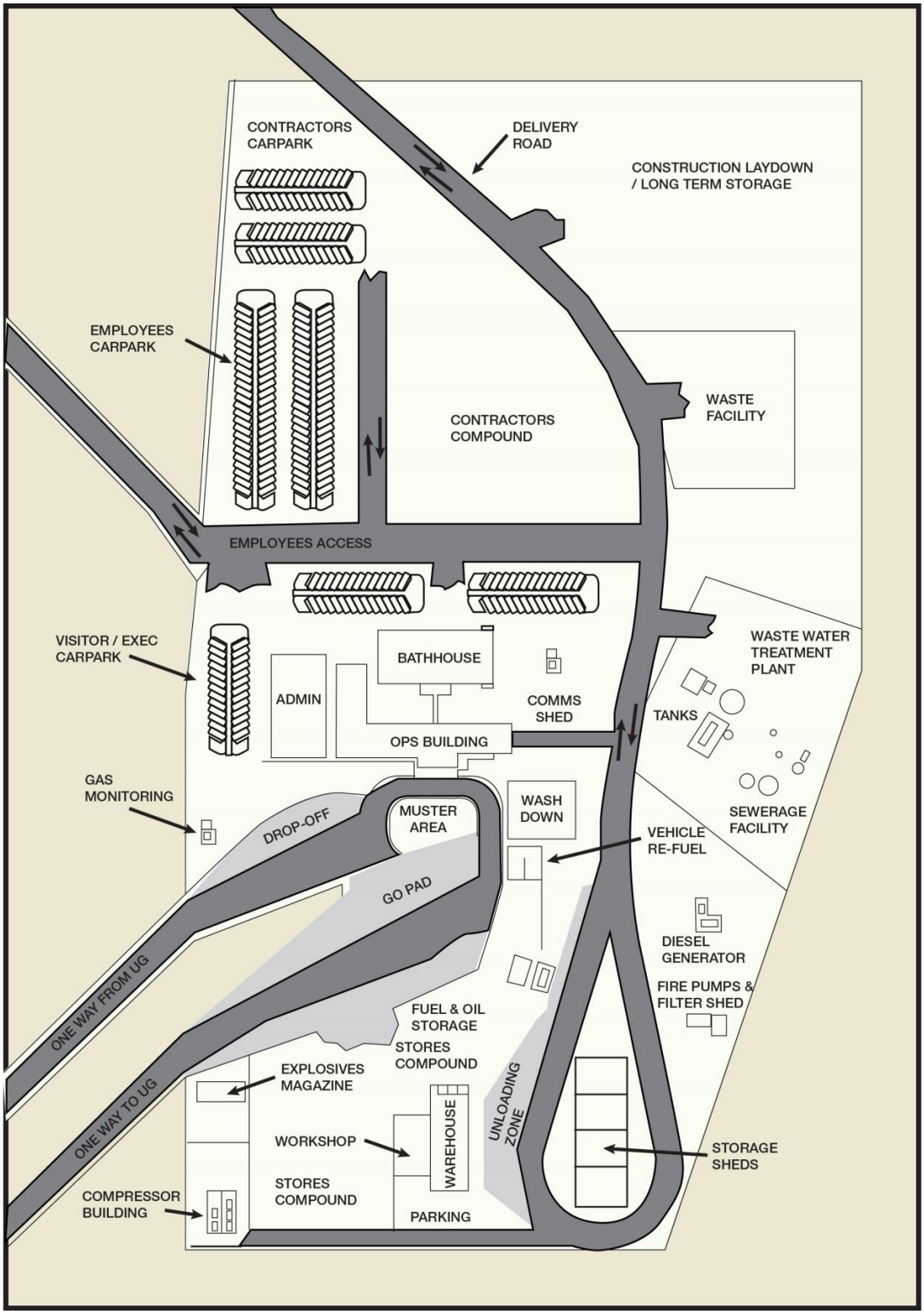



Figure 3-5 Indicative layout of the MIA

### 3.6.3 Material and equipment

The indicative types of construction materials required for the Project are:

- steel
- concrete
- haul road base (gravel)
- prefabricated buildings
- rail track
- conveyor building.

Raw materials for concrete and road base will be sourced from the Project Site or appropriately licenced local quarries. Concrete will be batched off-site, with the potential for an on-site batching plant if required. This will be confirmed prior to construction.

The indicative types of construction equipment required for the Project are:

- road train
- body truck
- articulated dump trucks
- road header
- rock bolting machine
- bulldozer
- excavator
- backhoe
- grader
- scraper
- roller compactor
- water truck
- cranes
- elevated work platform
- scissor lift
- air compressor
- welder
- winches
- concrete pumps and trucks
- generators
- tamping machine
- grinding machine
- ballast train
- bitumen sprayer.

As the construction activities are staged, not all equipment is expected to be in use throughout the construction period. Construction equipment will be serviced and maintained at the Project Site's workshop within the MIA.

## 3.6.4 Transport of plant and equipment

Construction equipment will mainly be transported by road to the Project Site, on standard or over-dimensional loads. The majority of the materials and equipment for the construction stage will be sourced from Mackay and/or Rockhampton. Large items that cannot be divided into smaller components, such as large coal crushing and handling equipment, will be transported on State roads under permit. Where necessary, these vehicles will be accompanied by safety escorts.

## 3.6.5 Construction workforce

BMA will own and operate the Project and contract the construction of the CHPP, MIA and associated infrastructure to a suitable construction contractor(s). The workforce will peak in FY 2022 with up to 1,000 personnel. The Project will provide additional opportunities for local employment in construction, transport and the supply of goods and services.

The workforce skills required for construction will include heavy equipment operators, boilermakers, carpenters, scaffolders and electricians. Table 3.7 provides an indicative breakdown of the construction workforce required by year.

**Table 3.7 Indicative workforce numbers: construction**

| Project phase | FY 2021 | FY 2022 | FY 2023 |
|---|---|---|---|
| Construction workforce | 500 | 1,000 | 1,000 |

Construction personnel will work across two 12 hour shifts, with an operating schedule of 24 hours a day, seven days a week, 365 days per year. Rosters will be confirmed prior to construction. For the purpose of impact assessment, the construction workforce roster will be 21 days on and seven days off, with two 12 hour shifts changing over at 6:00 am and 6:00 pm respectively.

### Workforce arrangements

The construction workforce will be determined by workforce planning, labour market conditions and general market conditions during detailed design. The workforce arrangement was informed by investigations into operational requirements, which take into consideration the skills required, labour availability, rostering and planning, and social impacts and benefits. The workforce will be sourced locally, where possible. The social impacts and benefits of the Project are discussed further in **Chapter 17 Social**.

## 3.6.6 Accommodation

A new construction accommodation village may be required to support the Project's construction and has therefore been included in the Project scope for the purpose of this EIS. The village will have capacity for up to 1,000 personnel and will be located along the eastern boundary of MLA 70383 as shown in Figure 3-3.

## 3.7 Project operation

### 3.7.1 Resource utilisation

The Project will be developed to minimise resource waste and sterilisation. The sequencing will be designed to maximise resource extraction. Longwall panels across the underground mine footprint will extract coal from the Dysart Lower (D24 and D14) seams. A discussion of the underlying geology and stratigraphy of the Project Site is provided in **Chapter 5 Land Resources.**

The approximate quality of the coal resource is summarised in Table 3.8 in accordance with the Joint Ore Reserves Committee (JORC) of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia code. Further exploration and resource definition work will further refine the description of the Project's resources.

**Table 3.8 Estimates of the mineral resource in accordance with the JORC code**

| Item and units | Measured | Indicative | Inferred | Total |
|---|---|---|---|---|
| Proportion of resource (%) | 28.94 | 41.16 | 29.90 | 100 |
| Total tonnes (Mt) | 509 | 724 | 526 | 1759 |
| Average washed ash (%) | 10.2 | 10.3 | 10.0 | 10.2 |
| Average washed volatile matter (%) | 16.0 | 15.8 | 15.3 | 15.7 |

The Project's deposit is located on the western limb of a northerly plunging syncline with uniform easterly dips of 2 to 5 degrees (°) and local steepening to 9° on the eastern margin of the MLA 70383. Both normal and thrust faults are present with mapped trends describing two structural domains one trending north-northwest and the other north south. Major structures (those with throws of 10 m or more) are wide-spaced, however, with a periodicity of one to five kilometres and localised steepening occurring around faults. Minor faulting is relatively common and current drilling adjacent to the Saraji Mine Jacaranda, Bauhinia and Coolibah Pits has encountered evidence of minor faulting.

### 3.7.2 Mining methods

The depth and thickness of the coal seams throughout the Project Site are such that underground mining provides the most effective method of extraction. The Project involves mining the Dysart Lower (D24 and D14 splits). The depth of the coal seam generally increases down dip towards the eastern extent of the Saraji East deposit.

#### Coal extraction

The Project will utilise thick seam mining methodologies, which minimise resource sterilisation and allow a high percentage recovery of the thick seam resource. Each longwall panel of the optimised mine layout will be up to approximately 320 m wide and up to 5,335 m long. There are multiple thick seam mining methods available; however, the preferred technique for the Project is Longwall Top Coal Caving (LTCC). LTCC combines longwall coal cutting of the lower proportion of the coal seam accompanied by caving and reclamation of the upper 'top' proportion of the coal seam. The LTCC methodology supports mining of thick seams greater than 4.5 m, such as those of the D24 seam. This approach maximises production of the highest quality coal.

The caving sequence extracts the coal from the top of the seam. The remaining broken coal in the cavity above and at the rear of the supports at the top of the seam is referred to as the goaf coal. The caving sequence allows the broken coal to flow from the goaf onto the rear conveyor and through to the gate end transfer. The flow of coal onto the rear conveyor is controlled by retracting the rear cantilevers of selected supports, exposing the rear conveyor to the goaf coal which 'caves' into the free space.

Once an area has been caved, the rear cantilever is extended back out into the goaf, stopping any further influx of goaf material. The LTCC methodology is illustrated in Figure 3-6.

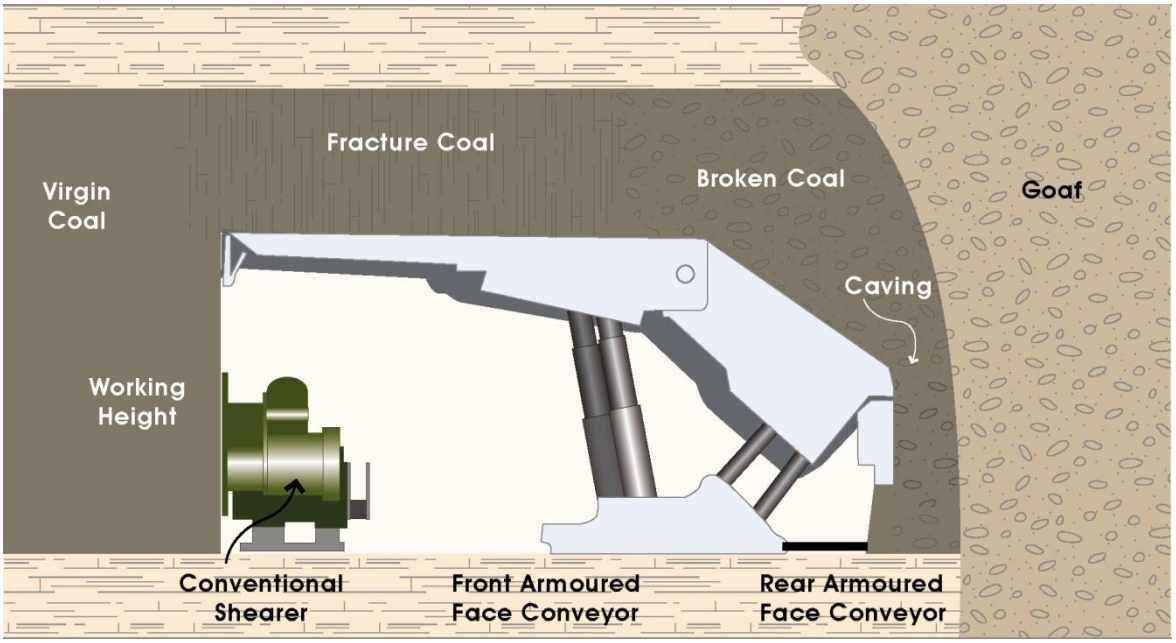



**Figure 3-6 Longwall top coal caving equipment**

In preparation for the longwall mining, a rectangular block of coal, called a longwall panel, is defined by excavating underground roadways in tunnels off the main header within the coal seam and around the perimeter of the panel. These roadways will be developed by the continuous miner. The main headings will feature roadways off the main shaft. The roadways will be approximately 3.2 m high and 5.6 m wide. This width includes an allowance for ventilation.

The mine ventilation will occur in two stages. During the initial development phase, the mine workings will be ventilated via a portal ventilation fan. In the second stage, ventilation will be via approximately 5.5 m diameter concrete lined shafts. The shafts will be located along the main headings. The main ventilation fan will have a capacity in the order of 320 cubic metres per second ($m^3/s$). This design will cater for 60 $m^3/s$ at the longwall face, 30 $m^3/s$ for each development face and the remainder will cater for leakages and ventilate faces not under production.

## 3.7.3 Mining sequence and schedule

The timing for the development of the Project has not been finalised. However, FY2021 and FY2023 have been adopted as the assumed commencement dates for construction and for long-wall coal production respectively, should the Project be approved. The proposed underground extraction sequence is expected to commence in FY 2023.

The proposed underground extraction sequence is to commence longwall extraction with the shallowest longwall panel in the southern mining domain of the Dysart Lower (D24) seam. Mining will then alternate north and south of the main headings, progressing to the east as the coal resources dip. The rationale for the proposed mining program is to mine the thickest section of the Dysart Lower seam first in order to maximise high-quality hard coking coal production in the early years.

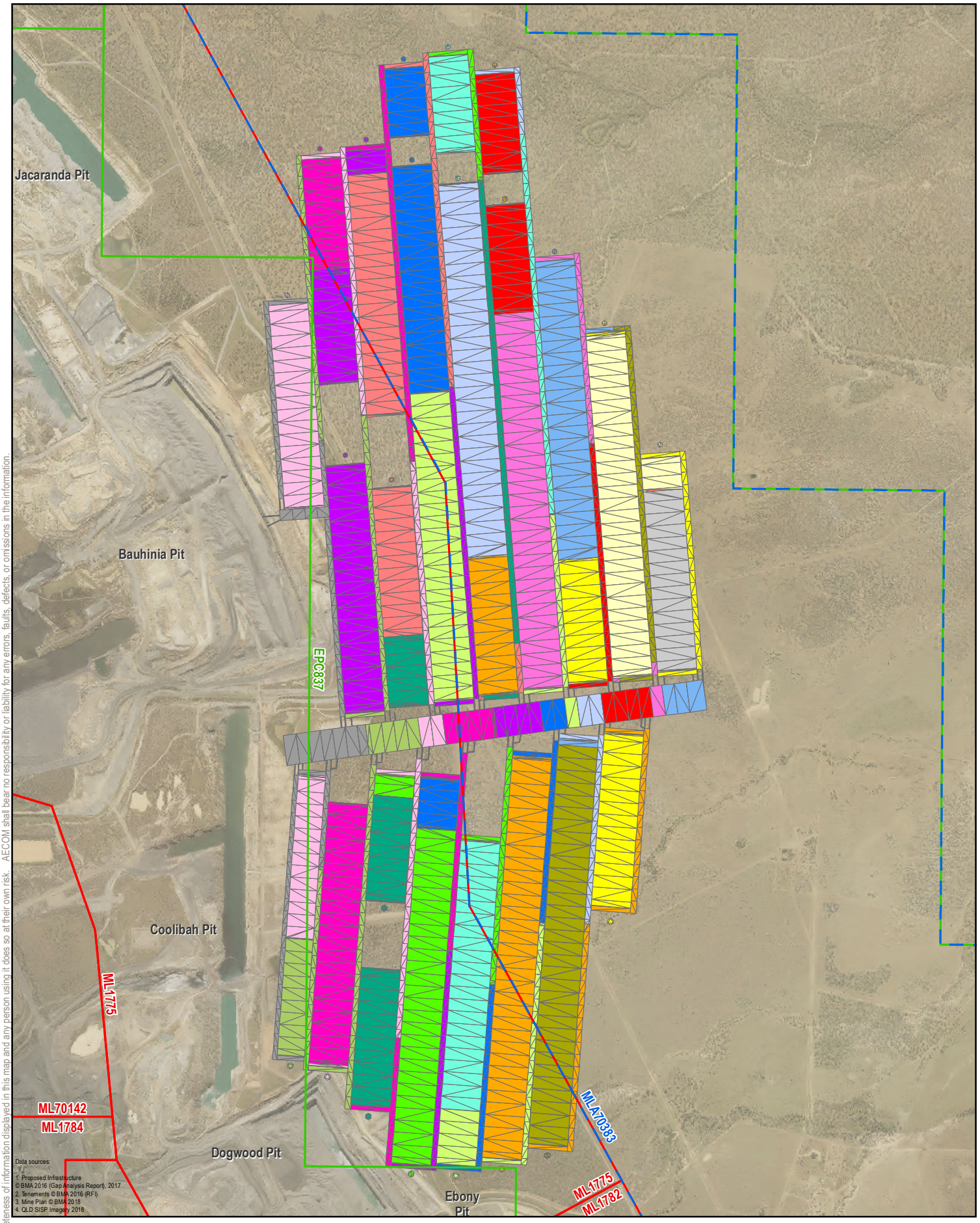
## 3.7.4 Production schedule

Table 3.9 provides the assumed timing for the annual production over the nominal 20 year production schedule subject to the currently unknown timing of a BMA investment decision. The final production sequence will depend on sales and infrastructure constraints.

**Table 3.9 Indicative coal production schedule**

| Financial year | Mining activities | ROM (Mtpa) | Product coal (Mtpa) |
|---|---|---|---|
| 2021-2023 (i.e. Project years 1-3) | Development of the mine portal and associated infrastructure areas. | - | - |
| 2023-2042 (i.e. Project years 3-20) | Thick seam mining commences within the Dysart Lower (D24 and D14) seam. | Up to 11 Mtpa | Up to 8 Mtpa |

Figure 3-7 shows the proposed optimised mining sequence nominally between FY 2023 and FY 2042.






**LEGEND**

- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)

**Optimised Mine Plan (Financial Year)**

| | | |
|---|---|---|
| 2023 | 2030 | 2037 |
| 2024 | 2031 | 2038 |
| 2025 | 2032 | 2039 |
| 2026 | 2033 | 2040 |
| 2027 | 2034 | 2041 |
| 2028 | 2035 | 2042 |
| 2029 | 2036 | |

N

**Figure 3-7**
**Mine Plan**

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

0 0.25 0.5 1
Kilometres

Scale: 1:40,000 (when printed at A4)

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

BHP

DATE: 4/08/2020 VERSION: 2

### 3.7.5 Mine equipment

The indicative mining equipment required for the Project's operational phase is detailed in Table 3.10.

**Table 3.10 Indicative mine equipment**

| Mine activity | Indicative mine equipment |
|---|---|
| Development of mine | Continuous miners |
| | Shuttle cars |
| | Distribution control box |
| | Breaker feeders |
| | Development transmitter |
| | Auxiliary fans |
| Coal extraction (longwall equipment) | Longwall shearer |
| | Conventional longwall face |
| | Longwall supports |
| | Front and rear armoured face conveyors |
| | Beam stage loader |
| | Bootend |
| | Longwall transformer |
| | Longwall pump station |
| Conveyors | Stockpile conveyor |
| | Ramp conveyor |
| | In-pit conveyor |
| | Trunk conveyor |
| | Interseam conveyor |
| | Longwall maingate conveyor |
| | Development conveyor |
| Ventilation | Ventilation fan housing |
| | Fan motors |
| | Ventilation transformers |
| First response | Inertisation unit |
| | Diesel generator |
| Mobile fleet | Personnel carriers |
| | Load haul dump |
| Dewatering | Major pumping station |
| | Minor pumping stations |
| Surface (MIA) | Dual cab 4WD(s) |
| | Front end loader |
| | 2.5 tonne forklift |
| | 10 tonne forklift |
| Surface (portal) | 2 person utility |
| | Grader |
| | Concrete agitator |
| | Slurry pumps |

### 3.7.6 Hours of operation

Mine operation hours are expected to be 24 hours per day, seven days per week, 365 days per year.

### 3.7.7 Subsidence

As mining progresses, the unsupported strata or goaf, progressively collapses. With time, the overlying stratum compacts down into the collapsed area resulting in a lowering of the ground surface. This is referred to as subsidence and is illustrated in Figure 3-8.

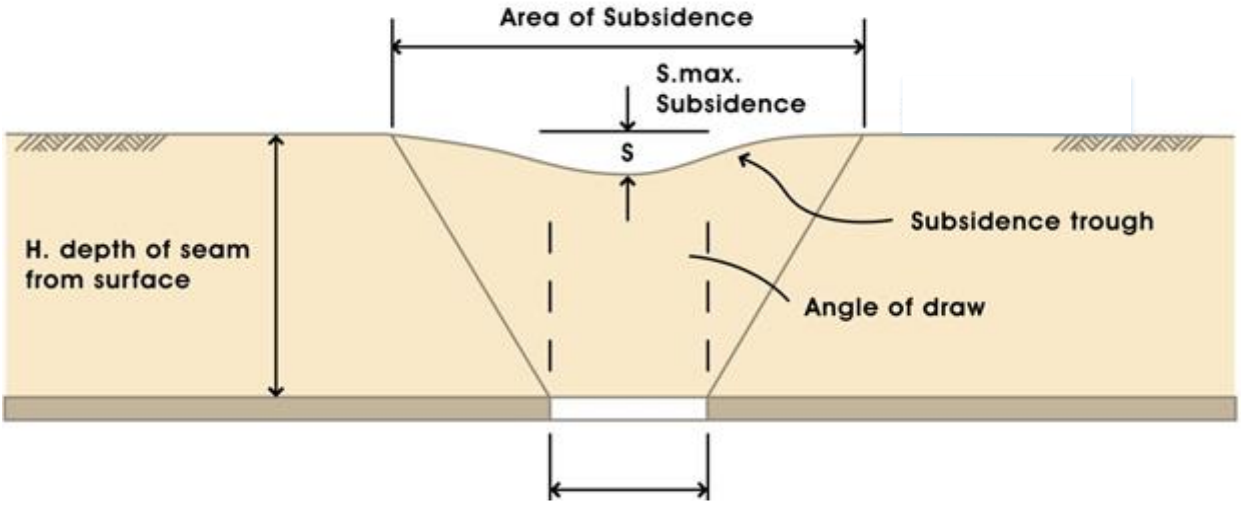



**Figure 3-8 Overview of subsidence**

The magnitude of the Project's subsidence varies along the length and across each of the longwall panels. LTCC is predicted to result in a maximum vertical subsidence of 3.5 m. The potential level of subsidence and associated surface and subsurface impacts are discussed further in **Chapter 5 Land Resources**.

The surface subsidence profile perpendicular to the longwall panels will consist of distinct rolls in the subsided topography. It is noted that the subsidence will occur progressively with surface impacts from each panel appearing over a period of months or years, in line with the mining sequence shown in Figure 3-7.

### 3.7.8 Waterway management

The Project's underground mining operations are situated beneath Plumtree, Boomerang, Hughes and a tributary of One Mile creek. All of these creeks are ephemeral and are located in the downstream reaches of the catchment where the creeks are relatively well defined. The Project Site also includes several minor water courses.

Boomerang, Hughes and One Mile creeks are currently diverted upstream of the Project by the existing Peak Downs (Boomerang Creek diversion) and Saraji Mine (Hughes and One Mile creek diversions). As part of the Project, sections of these creeks will be progressively managed to reduce the impact of subsidence on the creeks' physical and biological environments as well as the impact on flows to downstream users. **Chapter 8 Surface Water Resources** and **Appendix K-1 Rehabilitation Management Plan** provide management measures for works within waterways. Any work within a watercourse will include progressive rehabilitation and specific monitoring programs. Appropriate licences or equivalent will be sought, as required.

No new stream diversions are planned as part of the Project. Within the existing Saraji Mine tenement area, overland flows are managed through a series of existing diversion drains. These diversions are designed to provide conveyance of clean water flows across the existing Saraji Mine. These existing diversion drains will continue to operate and be maintained in accordance with EPML00862313.

A Subsidence Management Plan (SMP) has been prepared for the project and existing diversion drains will be managed in accordance with the SMP where they extend above underground mining areas. Key components of the SMP include:

- Ongoing subsidence monitoring, evaluation and review
- Indicative mitigation measures to manage bed and bank stability
- Reporting requirements, including the requirement to address watercourse condition and geomorphic process.

### 3.7.9 Gas drainage and management

Incidental mine gas is present in the two major coal bearing geological formations of the Project Site. These formations are the Fort Cooper Coal Measures (FCCM) and Moranbah Coal Measures (MCM).

The Project will require construction of infrastructure to drain and manage incidental mine gas to enable the safe and efficient mining of coal.

An incidental mine gas hazard management strategy will be developed prior to construction to reduce the associated risks during operation. This will include:

- pre-drainage of coal measures prior to underground mining (pre-drainage methane)
- dilution of methane through mine ventilation during underground mining, known as ventilation air methane
- post-drainage of goaf after underground mining (goaf methane)
- co-development agreements are being discussed with relevant tenement holders to enable gas drainage activities which are expected to be resolved prior to granting of the mining leases.

Figure 3-9 illustrates the incidental mine gas pre-drainage process.

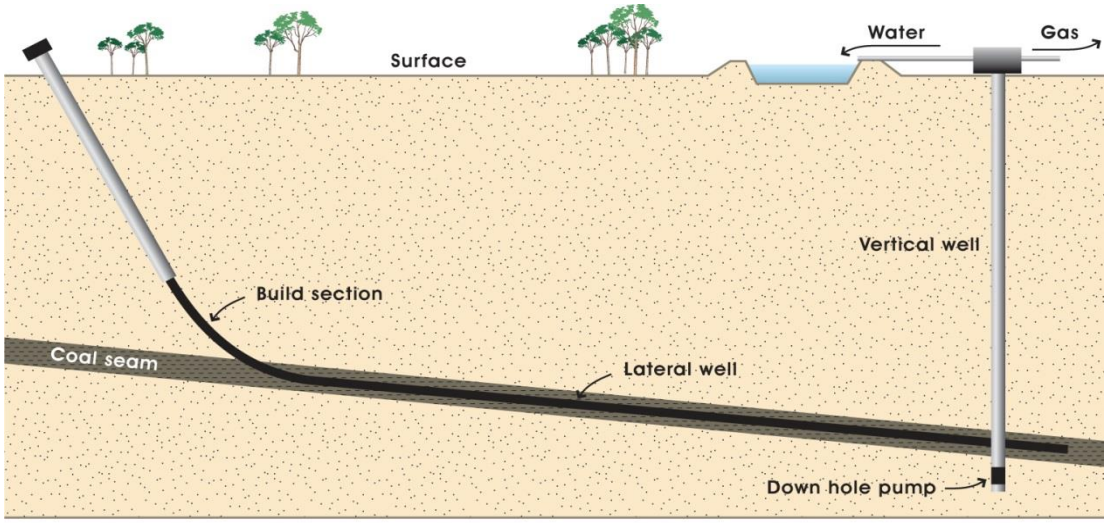



**Figure 3-9 Incidental mine gas pre-drainage process**

### Use of incidental mine gas

Ventilation air methane will be vented to the atmosphere. The incidental mine gas will be flared where it is not commercially or technically feasible to:

- use it beneficially for mining under the ML
- transport or store it within the area of the ML to allow it to be used beneficially for mining under the mining lease
- use or dispose of for a purpose other than mining in accordance with applicable legislation.

The gas drainage program will require dewatering infrastructure. The final extent or scale of drainage will be influenced by actual mining conditions and maintaining safety.

Further abatement opportunities are associated with drainage of incidental mine gas from the Project. BMA will assess the following initiatives for incidental mine gas from the Project:

- the combustion of incidental mine gas for the purposes of on-site power generation
- the sale of incidental mine gas to a third-party for use off-site.

Other uses, including collecting and piping the gas off the mining lease for any commercial use, and generating electricity on the mining lease for sale to the grid are not allowed unless the mining lease holder also holds a petroleum lease or has an agreement with the overlapping petroleum lease holder, together with all necessary approvals to permit these activities.

### Flaring

Flaring of incidental gas is the process whereby methane collected from boreholes in advance of or during mining is destroyed by combustion in a flare. Flaring of incidental mine gas significantly reduces greenhouse gas emissions. The oxidation of methane, which has a greater global warming potential compared to carbon dioxide, substantially reduces the potential impact of project emissions. Flares are also required for safety purposes, as it is generally not safe to shut off the gas wells during operations in the event that gas cannot be captured and beneficially used. BMA will assess the following initiatives for incidental mine gas from the Project:

- the combustion of incidental mine gas for the purposes of on-site power generation
- the sale of incidental mine gas to a third-party for use off-site.

Locations of gas flares will depend on the beneficial use opportunities and incidental mine gas surface infrastructure installation option progressed. At least one main central flare will be required.

## 3.7.10 Run-of-mine coal conveyor

The raw coal handling system will be required to size and deliver raw (or ROM) from the underground operation to the CHPP.

The underground drift conveyors will discharge ROM coal into large primary sizers that will size (reduce) any oversized lumps before discharging onto a stacking conveyor. The stacking conveyor will deliver ROM coal onto a large conical stockpile. This will provide underground surge capacity while de-coupling the mine from the CHPP. Feeders under the stockpile will reclaim coal and deliver it to the secondary sizing system for further sizing and reject removal using a rotary breaker.

## 3.7.11 Coal handling and preparation

### Process selection and basis

A CHPP removes dirt, rock and other impurities from the ROM coal before it is sold as product coal. This increases the value of the coal and reduces transportation costs as impurities do not need to be transported. The CHPP uses physical and mechanical processes to clean coal and remove impurities and fine materials from the coal.

The indicative CHPP design will follow a standardised BMA design consisting of large diameter cyclones, reflux classifiers and flotation cells. The Project will utilise belt press filters to dewater the coal tailings so that only dewatered tailings are produced. The CHPP will be constructed using equipment with sufficient capacity in line with current industry practices. It is expected this design strategy will lead to greater efficiencies when compared to traditional CHPPs with multiple small capacity parallel streams.

The CHPP has been designed with a maximum processing capability of 7 Mtpa ROM coal feed. In years that the annual production exceeds the CHPP capacity, the remaining coal will be processed through the existing Saraji Mine CHPP.

The CHPP area will include the CHPP itself as well as rejects management systems, offices and amenities, control room, chemical and diesel storage, a water treatment (recycling) plant, maintenance facilities and stormwater management system. The CHPP operations and maintenance activities occur 24 hours per day, up to 365 days per year.

### CHPP process

The CHPP will be located within ML 70142. The CHPP will be designed and constructed for processing ROM coal at a rate of 800 tonnes per hour (tph). The CHPP will be designed to yield up to 5 Mtpa of metallurgical product coal (or 7 Mtpa ROM coal) and delivered to the train load out bin at a rate of approximately 4,500 tph. The CHPP will require a raw water supply of approximately 1,500 mega litres (ML) per annum to achieve this production rate.

The 4,500 tph train load out system will be designed to comply with Aurizon regulations and standards.

Appropriately sized ROM coal feed and product delivery systems will be designed and constructed to include:

- ROM coal stockpile
- sizing stations
- overland conveyors
- raw coal
- ROM bin
- plant feed
- surge bin
- product coal reject
- coal stackers
- stockpile stacker
- stockpile stacker reclaimer
- truck loading bin
- rejects bin
- train loadout.

The steps to processing coal within the CHPP are generally as follows:

- coal is delivered into the surge bins from the overland conveyor
- the coal will pass by gravity from the surge bins to a tertiary sizing system where coal size will be reduced ready for further processing
- the coal is deslimed where very fine material is washed away to improve the quality of the coal. The process is dependent on the size of coal particles, the coal is mixed with water and separated into either:
  - dense medium cyclones for coarse coal
  - reflux Classifiers for fine coal
  - microcel column flotation for ultra-fine coal
- coarse coal passes through a centrifuge (dense medium cyclone) which separates out the very fine material from the coarser material. The product coal is then drained and rinsed on a sloping screen and excess water is removed in another centrifuge before the coarse coal is released to the product coal conveyor
- fine coal passes through a series of centrifuges and then to a flotation circuit which relies on gravity to separate the product coal from impurities. The product coal is then passed through a series of centrifuges to remove water and, once dried, is directed to the product coal conveyor
- ultra-fine coal is pumped from the base of the column of the microcel column flotation where air and slurry are mixed under high-shear conditions to create the bubble dispersion of coal and slurry. The coal is then directed to the product coal conveyor
- the product conveyor will transfer product coal to stockpiles adjacent to the train load-out facility. Coal stackers will place the coal on to stockpiles, with segregation within stockpiles for different product types.

The conceptual processes described above may be modified. Figure 3-10 provides a flow diagram of the CHPP, coal washing process and interaction with other aspects of the mining operations.

## CHPP contaminant consumption CHPP water consumption

The demand for CHPP process water is 5,100 kilolitres per hour (kL/hr). Process plant water will be recycled to minimise water make-up requirements for the site. An estimated 4,950 kL/hr (97 per cent) of the water in the CHPP will be recycled with a makeup water requirement of only 150 kL/hr. The CHPP layout will be designed to contain local area and stockpile runoff. Mine water collected from disturbed areas including from the underground working, will be preferentially used as the primary source of water, with the raw water dam used for make-up as required.

A combined fire, washdown and dust suppression reticulation system will be provided around the CHPP and will also service the MIA.

Dust suppression sprays will be provided at appropriate transfer points in the raw coal handling system including the ROM coal bin. A potable water system will be provided around the CHPP area and will also service the CHPP site offices and workshops. Potable water will be supplied from the raw water dam. The water management system will include reuse and recycling of MAW and is discussed in further detail in Section 3.7.15.

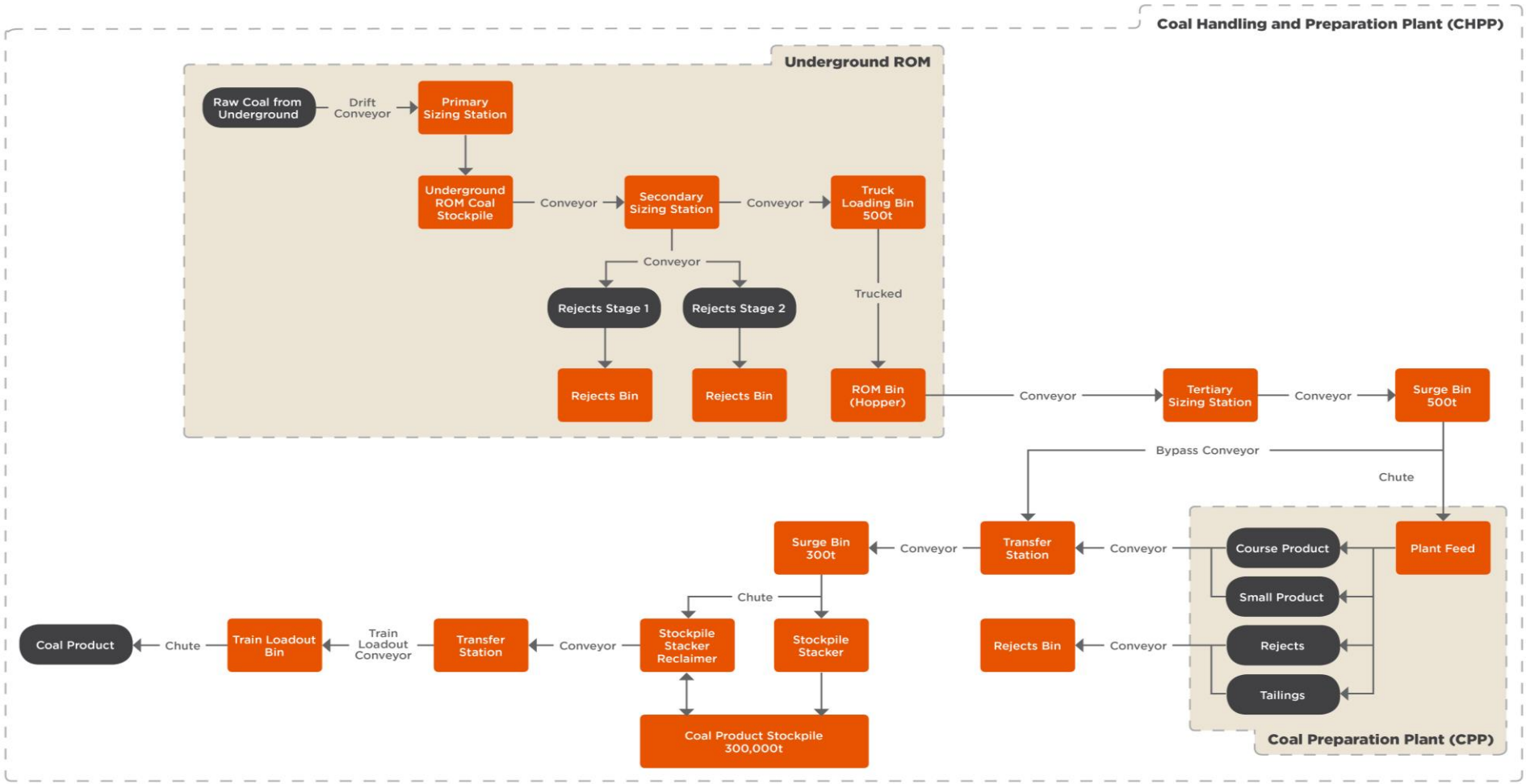



Figure 3-10 Indicative raw coal handling process

## 3.7.12 Tailings and coarse reject management

The rejects materials from the CHPP may consist of the following:

- dense medium coarse reject material
- reflux classifier reject material
- dewatered flotation tailings material.

The dewatered tailings and coarse rejects will be disposed of via a dry disposal system. Coarse rejects from the high frequency rejects screen will be discharged onto the plant reject conveyor. Fine rejects will be transported to the fine coal reject dewatering screen. Dewatering of the CHPP tailings will be achieved through the use of belt press filters. All reject and dewatered tailings material will be trucked to the Saraji Mine's existing in-pit reject storage facilities for disposal.

In the unlikely event that reject haulage falls behind, the rejects 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.

## 3.7.13 Transportation

### Train movements

Product coal will be transported along the existing Goonyella rail system that currently runs along the western boundary of the existing Saraji Mine on ML 70142. The volume of coal to be transported via the network will be within Aurizon's existing approval limits. As such, no additional impacts are expected. A new rail spur, balloon loop and signalling system will be required to connect to the existing rail network. The balloon rail loop will be approximately 4.4 km in length, located on ML 70142 and adjacent to the existing rail line. The balloon rail loop will be an electrified line.

The product coal will be transported by rail over a distance of approximately 250 km to ship loading facilities at the Hay Point Coal Terminal or approximately 400 km to the Abbot Point Coal Terminal. The total amount of coal railed will be up to 110 Mt over the 20-year production schedule, with an average of
6.2 Mtpa (excluding ramp up and ramp down periods). Table 3.11 outlines the approximate number of trains required over the 20-year production schedule.

**Table 3.11 Daily coal train movements**

| Financial year | Average number of additional coal trains per day |
|---|---|
| 2021 - 2022 | 0 |
| 2023 - 2042 | 2 (up to a maximum of 3) |

### Port capacity

Product coal from the Project will be exported to international markets via either:

- Hay Point Coal Terminal: located approximately 40 km south of Mackay and commenced operations in the 1970s. The Hay Point Coal Terminal is owned and operated by BMA.
- Abbot Point Coal Terminal: located approximately 25 km north of Bowen on the Central Queensland Coast.

The product coal shipped via these ports will be within the approved port and shipping capacity and throughput limits, as such no additional impacts to the surrounding environment are expected.

The average shipping size through the Hay Point Coal Terminal and Abbot Point Coal terminal is 93,000 tonnes (t). The approximate number of additional ships per year of operation is outlined in Table 3.12.

**Table 3.12 Number of additional ships**

| Financial year | Average number of additional ships per year |
|---|---|
| 2021 - 2022 | 0 |
| 2023 - 2042 | 67 |

## Airport capacity

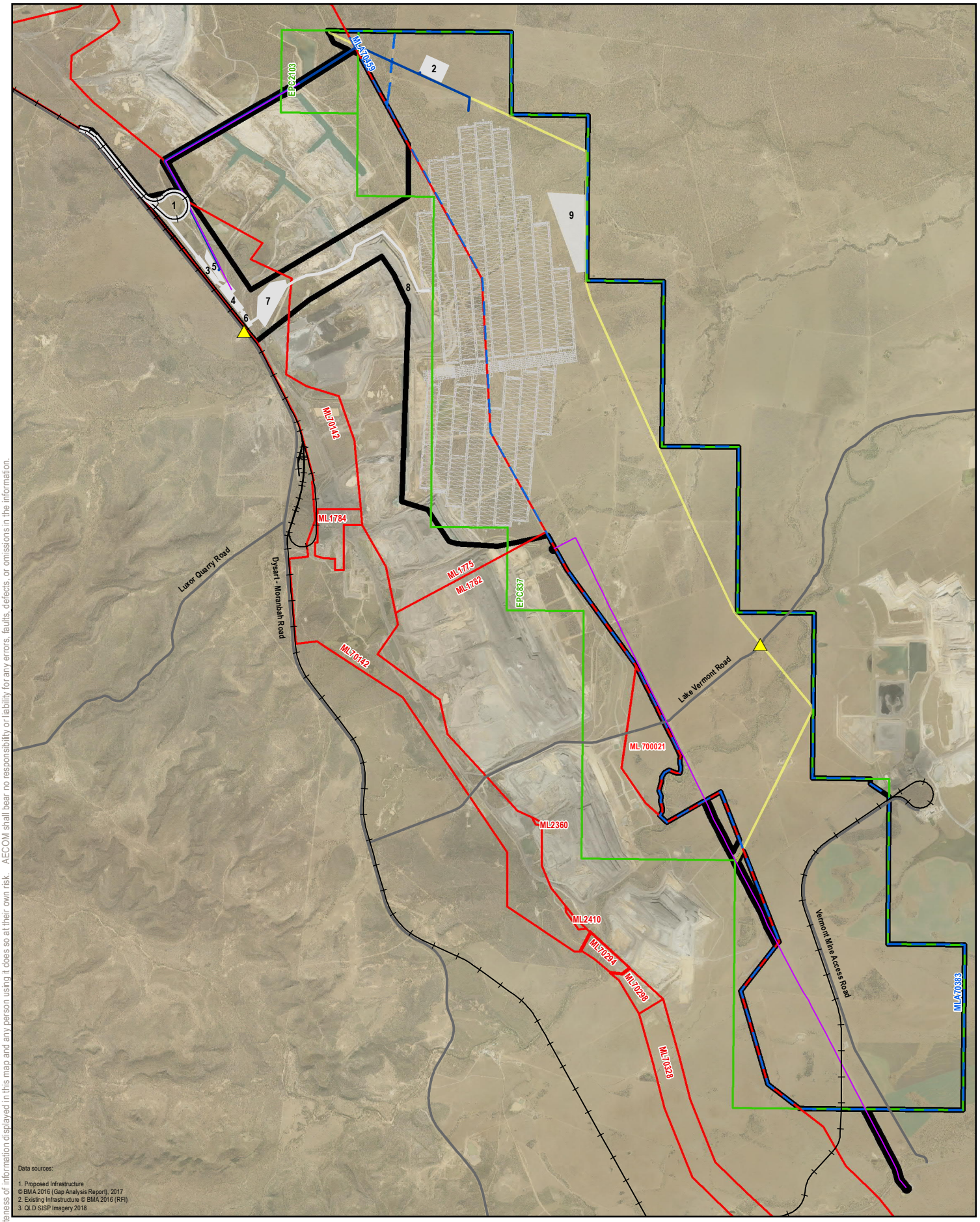
The existing Moranbah Airport operated by BMA will be utilised for the transportation of the Project workforce. Currently, the Moranbah Airport is operating approximately 36 flights per week on Dash 8 (or equivalent) aircraft with approximately 60 passengers per aircraft. During operations, the Project will result in up to 15 additional trips per week. This increase can be accommodated within the existing capacity of the Moranbah Airport.

## Road transportation

The Dysart-Moranbah Road runs along the western edge of the proposed MIA. Dysart-Moranbah Road is a sealed, two lane road and is under the jurisdiction of the IRC. Access to the MIA and the CHPP will require a new intersection into Dysart-Moranbah Road. The intersection proposed for Dysart-Moranbah Road will be designed as per the existing Saraji Mine intersection, two lanes at a T-intersection with the existing Dysart-Moranbah Road. The access road will cross the Goonyella Rail Line and therefore will include the construction of a grade controlled (boom gates and lights) crossing.

The intersection proposed at the Lake Vermont Road/accommodation village road junction will also be two lanes at a T-intersection with the existing Lake Vermont Road. The proposed intersections will require approval from the Department of Transport and Main Roads (DTMR), QR and IRC.

Additionally, an internal access road will be constructed to provide access to Lake Vermont Road. A new intersection at the juncture will be required. The location of these new intersections and road upgrades is shown on Figure 3-11.




Data sources:

1. Proposed Infrastructure © BMA 2016 (Gap Analysis Report), 2017
2. Existing Infrastructure © BMA 2016 (RFI)
3. QLD SISP Imagery 2018

**LEGEND**

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Underground layout (optimised)
- Transport and Infrastructure Corridor
- Surface Infrastructure
- Intersection Upgrade Locations
- Public Road
- Existing Railway
- 66kV Powerline
- Pipeline
- Rail Loop

**Surface Infrastructure**

1 Rail Loading Balloon Loop
2 Process Water Dam
3 Product Stockpiles
4 CHPP
5 Raw Water Dam
6 ROM Pad
7 Future MIA
8 Conveyor
9 Construction Village

N

**Figure 3-11**
**Mine Access and Intersection Upgrade Locations**

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

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

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

BHP

DATE: 26/11/2020 VERSION: 5



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## 3.7.14 Associated infrastructure requirements

### Power supply

Electrical power demand for the Project will be supplied via the existing power network supplying the Saraji Mine with the following new powerlines:

- a co-aligned 66 kV powerline and connection extending off lease and connecting to the Dysart Substation
- a 66 kV northern extension connecting the Project to the infrastructure and transport corridor.

The initial power demand increase associated with the Project is in the order of 14 MW and is required by FY 2021. The total power demand for the Project is estimated to be between 11 MW and 14 MW and will be required by FY 2023.

Preliminary assessment indicates that the proposed increase in fleet and CHPP would not exceed the existing network capacity following the construction of the supporting power infrastructure.

### Relocation of existing powerlines

The existing 132 kV powerline, which is owned and operated by Powerlink, will be relocated to the proposed infrastructure and transport corridor. A number of transformers will be required to step down the voltage in order to supply other mine infrastructure. Additionally, a number of powerlines currently servicing the existing Saraji Mine will require decommissioning.

Proposed and existing powerlines are shown in Figure 3-12.

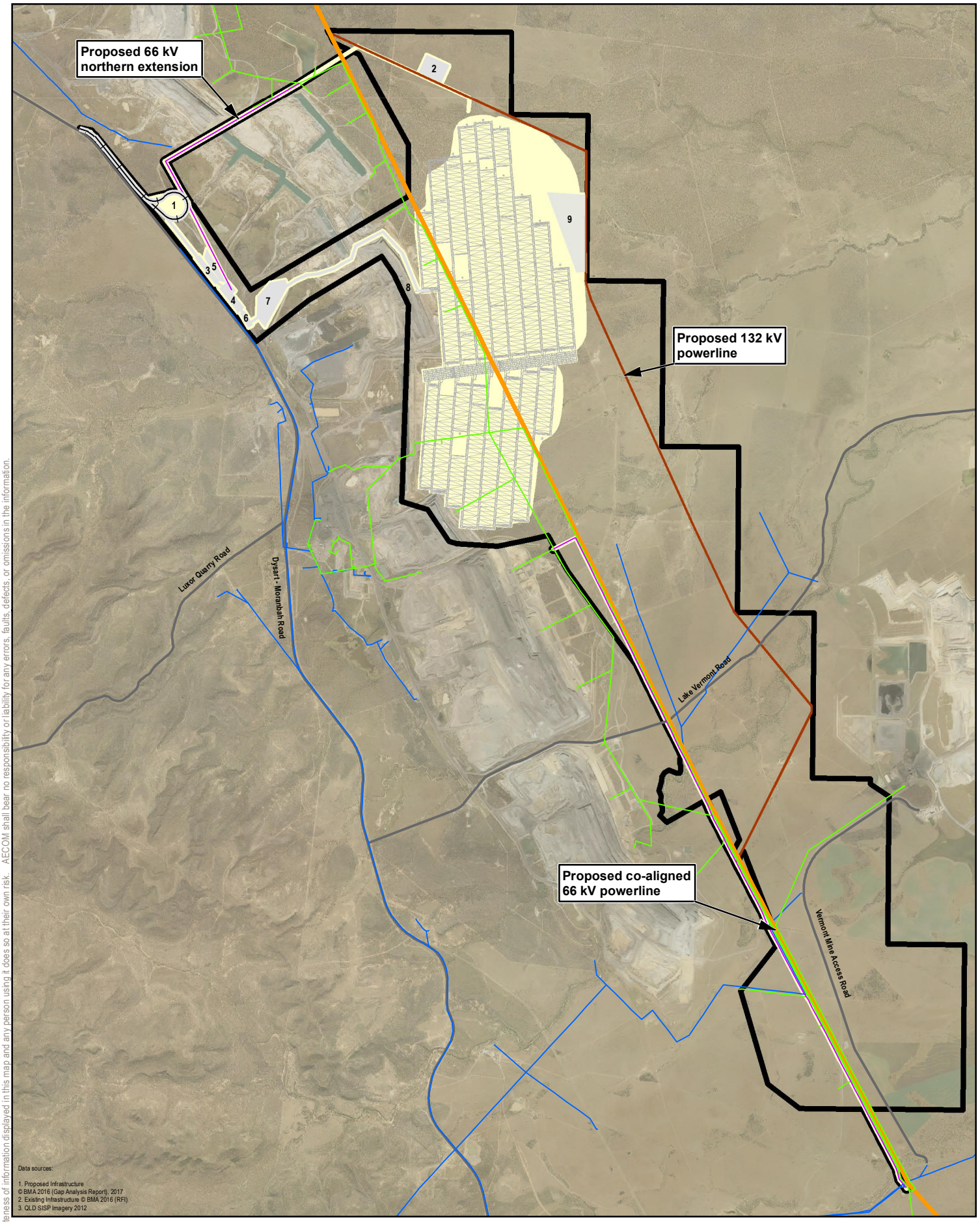
### Water supply

Water supply for the Project will be provided via the existing water network supplying Saraji Mine. The initial water demand increase associated with the Project is in the order of 2.3 mega litres per day (ML/d) and is required by 2021. The peak water demand for the Project is 6 ML/d and will be required by FY 2024. See Section 3.7.15 for further details.

### Relocation of existing EWPC Southern Extension Water Pipeline

The existing EWPC Southern Extension Water Pipeline, which supplies water to the Lake Vermont Mine, has the potential to be impacted by subsidence associated with the Project's underground mining operations. It is proposed that the pipeline be relocated to the infrastructure and transport corridor on the eastern edge of the Project Site.

Figure 3-13 illustrates the proposed and existing water infrastructure locations.




Data sources:

1. Proposed Infrastructure © BMA 2016 (Gap Analysis Report), 2017
2. Existing Infrastructure © BMA 2016 (RFI)
3. QLD SISP Imagery 2012

**LEGEND**

- Project Site
- Project Footprint
- Underground layout (optimised)
- Transport and Infrastructure Corridor
- Surface Infrastructure
- Public Road
- Rail Loop

**Existing Powerlines**

- 132kV
- 66kV
- <66kV

**Proposed 66kV Powerline**

- 66kV

**Surface Infrastructure**

1. Rail Loading Balloon Loop
2. Process Water Dam
3. Product Stockpiles
4. CHPP
5. Raw Water Dam
6. ROM Pad
7. Future MIA
8. Conveyor
9. Construction Village

N

**Figure 3-12**
**Proposed Power Supply Infrastructure**

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

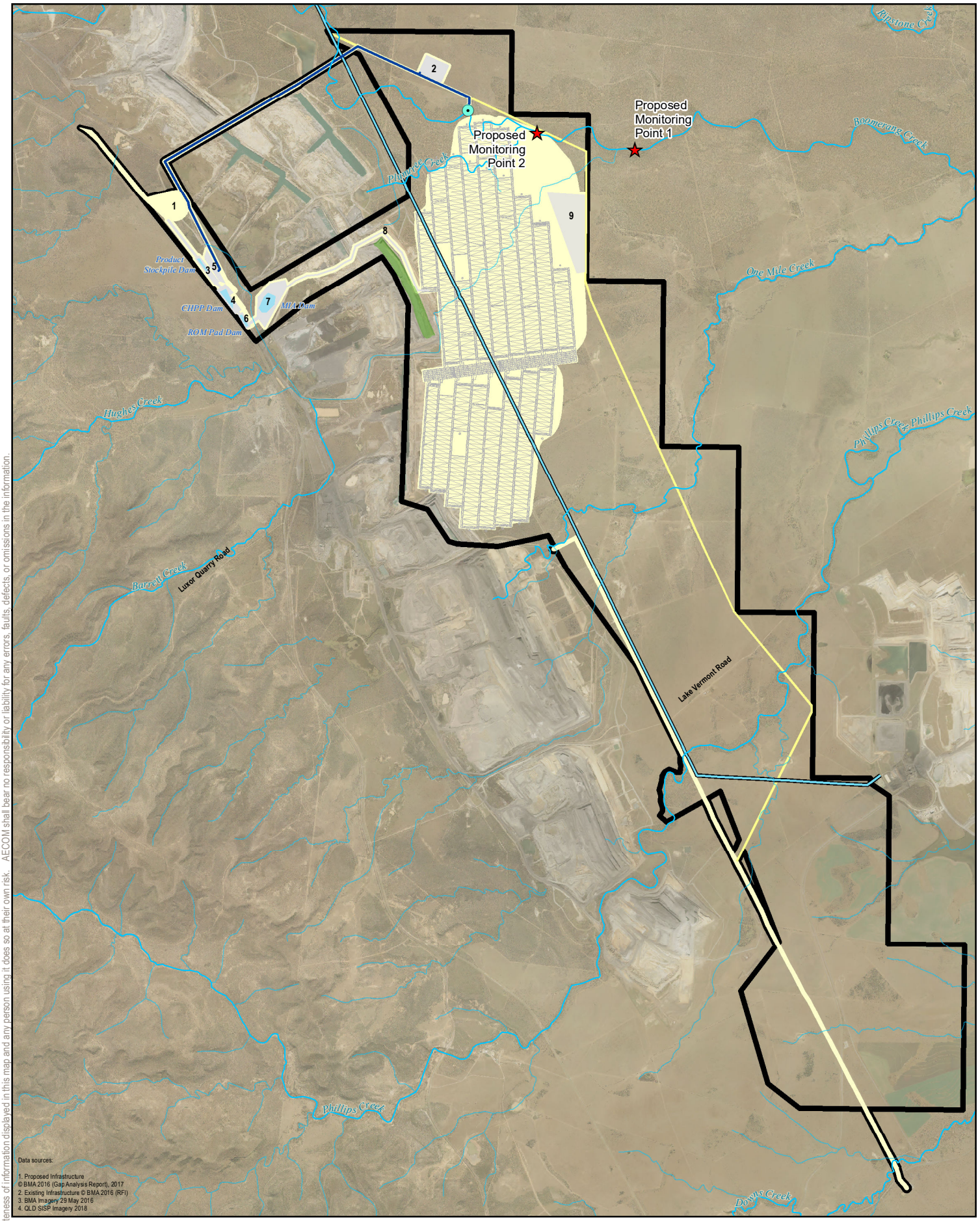
0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

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

BHP

DATE: 9/11/2020 VERSION: 4




Data sources:

1. Proposed Infrastructure © BMA 2016 (Gap Analysis Report), 2017
2. Existing Infrastructure © BMA 2016 (RFI)
3. BMA Imagery 29 May 2016
4. QLD SISP Imagery 2018

**LEGEND**

- Project Site
- Project Footprint
- Underground layout (optimised)
- Transport and Infrastructure Corridor
- Surface Infrastructure
- Indicative Proposed Monitoring Point Location
- Indicative Proposed Mine Water Release Point
- Bauhinia Pit Portal Sump Catchment
- Minor Waterway
- Major Waterway
- Indicative Dam Location

**Existing Pipeline**

- Southern Extension Water Pipeline

**Proposed Pipeline**

- Pipeline

**Surface Infrastructure**

1. Rail Loading Balloon Loop
2. Process Water Dam
3. Product Stockpiles
4. CHPP
5. Raw Water Dam
6. ROM Pad
7. Future MIA
8. Conveyor
9. Construction Village

N

**Figure 3-13**
**Proposed Water supply infrastructure, discharge and monitoring points**

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

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

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

BHP

DATE: 4/08/2020 VERSION: 3

## Sewage treatment

A sewage treatment plant will be installed to service the MIA and the construction accommodation village to treat all site sewage generated. Sewage from the CHPP area and from the washdown facilities at the mine portal will be pumped back to the MIA.

The sewage treatment plant will be designed to provide sufficient capacity for the construction workforce and the operational mine workforce. Treated effluent that does not meet the desired water quality will be recycled through the STP until it meets a standard which is safe for reuse as defined by the Australian Guidelines for Water Recycling. The Australian Guidelines for Water Recycling form a part of the National Water Quality Management Strategy and provide a risk management approach to waste water management. The reuse of effluent for irrigation purposes is covered by the Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) document. Once at a desired water quality, treated effluent from the sewage treatment plant and the water treatment plant will be captured and stored on site at the process water dam and used for dust suppression.

## Telecommunications

The telecommunications network will be managed by extending the services from the existing Saraji Mine through to the Project Site via the existing service corridor. Telecommunications will be controlled and monitored through the Project control room located on site or from a centrally located facility in Brisbane.

## Underground voice communications

An underground telephone system will provide the primary means of voice communications throughout the mine to the surface of the mine. The surface communications station provides an interface into the Private Branch Exchange telephone system for the Project.

In addition, a public address voice communications system will be located along the entire length of each conveyor system as well as other strategic locations. This system will be used to broadcast emergency tones and voice messages if required.

## Messaging and tracking

A text messaging system will be used to transfer text messages from the surface of the mine to individuals underground. The messaging system will be applied predominately for emergency situations but may also be utilised as a means of communications for normal operations.

The tracking system will be utilised in conjunction with the messaging system to keep track of the movements of personnel and vehicles underground.

## Data communications

The Project will use supervisory control and data acquisition and data communications system with an ethernet based fibre optic data network for the communications between the surface stations and the distributed programmable logic controllers located within each major item of electrical plant.

This system will support continuous underground environmental monitoring through real time and tube bundle gas sensors and analysers. These systems include a gas chromatograph system, portable gas detectors and machine specific gas detectors. The gas monitoring system will be located on the surface within the MIA.

### Fuel and lubricant storage

Fuel (diesel and unleaded petroleum) and lubricant storage and transfer facilities will include self-bunded storage tanks, bunded delivery areas and electronic process controls.

**Chapter 20 Hazards, Health and Safety** provides further information on the quantities of fuel and lubricants to be stored for the Project.

### Fire protection system

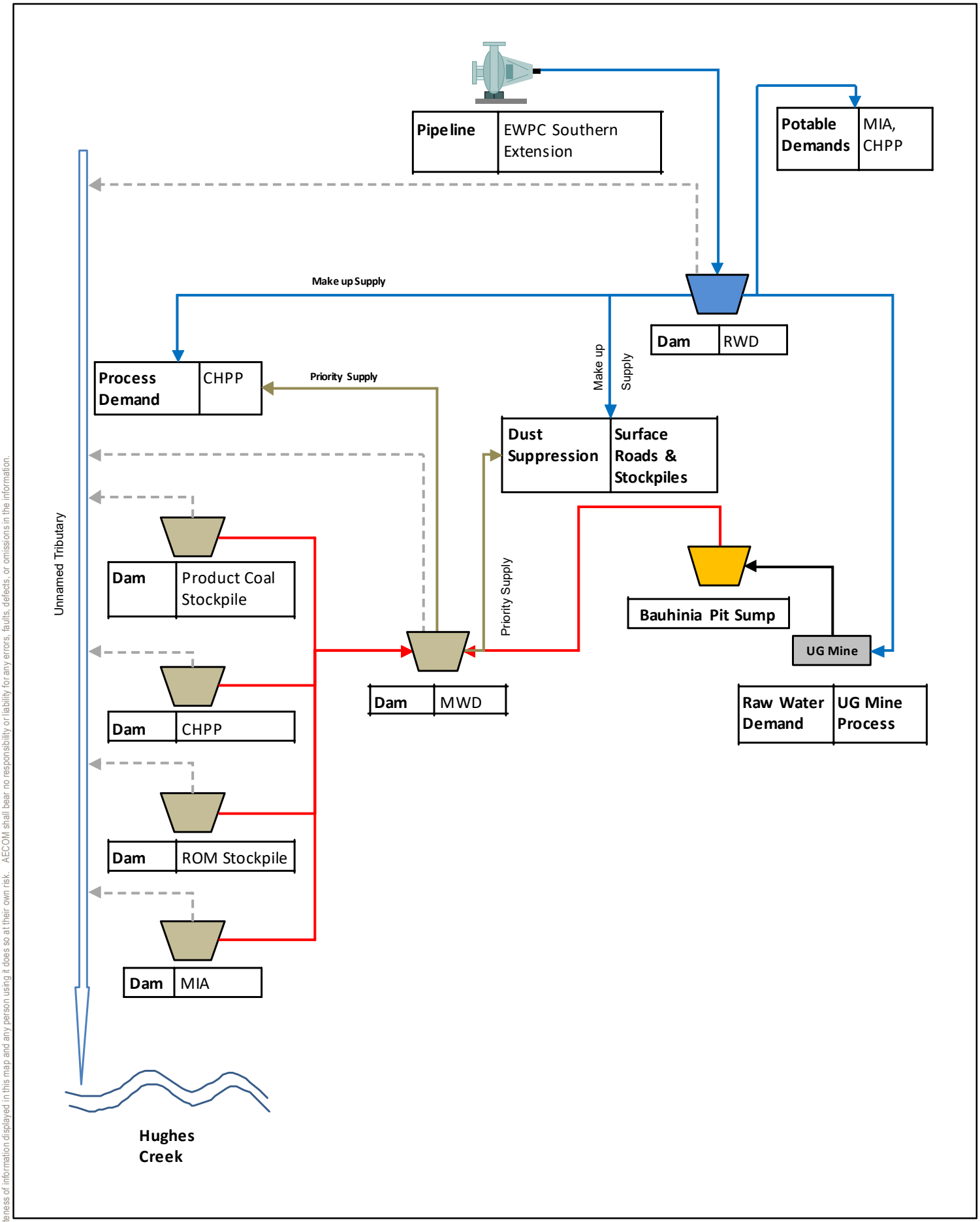
The fire protection system for the Project will include:

- A pipeline from the raw water dam to the MIA, CHPP and the construction workforce accommodation village
- Internal and external fighting systems include hydrants, portable extinguishers, hose reels and electric/diesel fire pumps spaced around the buildings and CHPP. The system will be constructed and operated according to relevant standards, statutory and local council requirements
- Fire indicator panels with automatic detection and alarm system for default detection in all buildings
- Real time gas monitoring matched to Safegas software, gas chromatography and portable gas detection units
- Where possible and practical, mobile mining equipment will be fitted with automatic fire detection and suppression options
- ROM and product coal conveyors will be fitted with automatic fire suppression systems
- The storage tank at the MIA will be sized to include a firefighting allowance of 0.6 ML (40 litres/second for four hours).

## 3.7.15 Water management

### System overview

A conceptual schematic for the water management system is provided in Figure 3-14.




## Legend

- Dam (Clean)
- Dam (Mine Affected)
- Open Cut Pit Sump (Mine Affected)
- Water Transfer (Mine Affected)
- Raw Water Supply (Clean)
- Water Supply (Mine Affected)
- UG Mine Dewatering (Process Effluent & GW Inflow Incl. Gas Drainage)
- Dam Overflow

**Figure 3-14**
Mine Water Balance Schematic

Environmental Impact Statement
Saraji East Mining Lease Project

BHP

DATE: 23/07/2020 VERSION: 0



Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\03 Project Description\60507031_G336_v1_A4P.mxd GISWR-23, 45

## Water supply

The Project's raw water supply will be linked to the existing Saraji Mine's water management system. While it is planned to reuse MAW whenever possible, raw water is still required for those consumptive demands for which MAW is not suitable or for when supplies of MAW are unavailable.

BMA operates a water pipeline network in Central Queensland, servicing its mines, landholders and towns. BMA holds contractual rights to approximately 10,000 mega litres per year (ML/yr) of water from the Burdekin Pipeline (owned by SunWater) as a supply source for BMA operations in the vicinity of Moranbah. In addition, BMA has a water allocation of 6,200 ML/yr from the Eungella Dam that is also available for use in BMA operations in the Moranbah vicinity. In securing its water rights, BMA has allowed for the current and potential future use of water from these sources at the Saraji Mine and for growth options associated with MLA 70383.

In relation to the proposed activities on MLA 70383, BMA will prepare, update and maintain a Water Management Plan. The Plan will recognise that water to be used for Project operations will be sourced via an off-take from the existing water pipelines developed to support BMA's current and future mining operations, along with various other purposes. Further, this Plan will recognise that water will be sourced from the Eungella Dam and/or the Burdekin Pipeline. The Project will have an internal BMA allocation to draw water from as part of the BMA-related water allocations.

These allocations are held by BMA directly or indirectly via contractual arrangements with SunWater in accordance with the Burdekin Water Resource Plan and the *Water Act 2000* (Water Act).

BMA also holds allocations of water from the Fitzroy and Burdekin water catchments and numerous licences to interfere with and take water across BMA's mine sites.

## Water produced by the Project

Water will be produced by the Project activities from the following sources:

- mining processes using water and creating effluent
- water from the coal seam in which the underground coal mining is taken place
- water from aquifers extracted through gas pre-drainage

Surface runoff reporting to highwall entry, and underground dewatering exiting the underground via the main drive will be intercepted in the pit via a sump.

## Mine water use

The Project's water requirements include:

- potable water for drinking, bathhouse, emergency showers and eyewashes
- operational demands including processing and mining requirements, dust suppression, waste product movement, underground vehicle emission scrubbing, machine cooling and washdown
- fire control requirements, both in water and foam discharge forms.

Table 3.13 provides a summary of the projected Project water demands. The values presented are based on the maximum use of water recycling and proposed water usage during the early stages of the operational phase. These figures may be higher than that indicated until all recycling systems are fully functional. Construction water will be supplied temporarily to the Project through the use of water stored within open-cut pits on the existing Saraji Mine. The volume of water within the existing pit storages is sufficient to satisfy the construction demands for the Project.

**Table 3.13 Projected water demands**

| Use | Daily demand (ML/d) | |
|---|---|---|
| | FY 2021-22 | FY 2023-2042 |
| Potable water | 0.66 | 0.66 |
| Underground mining water | 1.5 | 3.36 |
| Processing makeup water* | - | 1.5 |
| Fire fighting** | 0.6 | 0.6 |
| Surface road and dust suppression | 0.05 | 0.05 |
| Total | 2.67 | 6.03 |
| Maximum potential process water demand*** | - | 5.77 |

*Note:* Does not include any allowance for stockpile dust suppression; ** Based on AS2419 requirements for hydrants; ****Based on no recycling of any site water.*

## Water management structures

Table 3.14 provides a summary of the indicative storage volumes for the proposed water management structures. Storage volumes have been reviewed following detailed water balance modelling. Further detail on this can be found in **Chapter 8 Surface Water Resources**.

**Table 3.14 Water storages**

| Storage | Approximate size (ML) |
|---|---|
| Raw water dam | 200 |
| CHPP dam | 80 |
| Product coal stockpile pad dam | 135 |
| ROM coal stockpile pad dam | 45 |
| MIA dam | 100 |
| Process water dam | 1,050 |

## Discharge and monitoring points

The sizing of mine water management structures for the Project has been conservatively designed such that controlled releases of mine affected water to the receiving environment are not required, and that capacities are sufficient to mitigate the uncontrolled (spillway) discharge of mine affected water to the receiving environment. As such, under normal operating circumstances, there is not anticipated to be any controlled or uncontrolled discharges from the Project Site.

However, the Project Site is an open system and has the potential for an uncontrolled discharge of mine affected water as a result of extreme rainfall events. As part of the EA for the Project, BMA are seeking authority and licence conditions to conduct the controlled release of mine affected water from the Project Site. The discharge point is proposed on Boomerang Creek adjacent to the proposed process water dam, as shown in Figure 3-13

Two new monitoring points are proposed downstream of the controlled discharge point on Boomerang Creek. The indicative locations of the monitoring points are shown in Figure 3-13

### Potable water treatment

A potable water treatment plant will be installed at the MIA to address the potable water demand for the Project. Effluent from the water treatment plant will be captured and stored on site at the process water dam and used for dust suppression.

Potable water will be regularly monitored to test the water quality. Potable water production will comply with the Australian Drinking Water Guidelines as published by the National Health and Medical Research Council (NHMRC and NRMMC 2011).

## 3.7.16 Operational workforce

The Project's operational phase will employ up to 500 FTE. An operational roster pattern of eight days on, six days off, seven nights on and seven nights off is planned, offering a high ratio of rest days to workdays and a roster pattern which is conducive to work/lifestyle balance.

The Project will provide additional opportunities for local employment through support services such as transport and the supply of goods and services.

The workforce skills required for operation will include heavy equipment operators, skilled trades (i.e. electricians, boilermakers) and professionals. Table 3.15 provides an indicative breakdown of the operational workforce by year and trade type.

**Table 3.15 Indicative workforce numbers: operation**

| Labour role | FY 2023 - 2024 | FY 2025 - 2040 | FY 2041 - 2042 |
|---|---|---|---|
| Operators | 107 | 226 | 107 |
| Skilled trades | 78 | 140 | 78 |
| Professionals | 75 | 134 | 75 |
| **Total** | **260** | **500** | **260** |

The operational workforce will be determined by workforce planning, labour market conditions and general market conditions during the pre-project execution development process. The workforce arrangement was informed by investigations into operational requirements, which take into consideration the skills required, labour availability, rostering and planning, and social impacts and benefits. The workforce will be sourced locally, where possible. The social impacts and benefits of the Project are discussed further in **Chapter 17 Social**.

## 3.7.17 Accommodation

Non-resident workers will reside at existing accommodation villages adopting an equal split between Moranbah and Dysart. The existing villages that may be used include Moranbah Single Persons Village (SPV), Dysart SPV and Dysart Ausco (Stayover). For the purpose of this assessment, the number of vehicles associated with non-resident workers will be equally assigned on Dysart-Moranbah Road between Moranbah and Dysart.

## 3.7.18 Waste management

The Project will consider the waste management hierarchy (avoid/reduce, reuse, recycle, recover, treat and dispose). An inventory of the types of waste expected from the Project is shown in Table 3.16 and Table 3.17. Sources, impacts, mitigation measures and management strategies (including efficiency of resource use) for these wastes are discussed in **Chapter 15 Waste Management**, where the emphasis is placed on adhering to the waste management hierarchy.

### Construction wastes

The wastes generated by the Project's construction activities along with the proposed management method and approximate quantities are shown in Table 3.16.

**Table 3.16 Waste generation and management: construction phase**

| Waste type | Source(s) | Management method | Approximate quantity |
|---|---|---|---|
| Non-mining excavated waste | Site infrastructure, mine portal | Used as fill onsite where suitable for construction of haul roads and pads or as backfill at the existing Saraji Mine. | 5 t |
| Cleared vegetation | Site infrastructure | Where possible, use on re-vegetated areas, onsite as fauna habitat and or chipped as mulch for landscaping, erosion control and rehabilitation activities. | < 1 t |
| Concrete | Site infrastructure (i.e. accommodation village, CHPP, mine portal and MIA) | Minimise waste by producing/procuring only the amount necessary. Where required, will be taken offsite for disposal. | 35 t |
| Steel/metal off-cuts | Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Minimise waste by producing/procuring only the amount necessary. Segregation and collection onsite. Transportation from site by a waste contractor for offsite recycling. | 20 t |
| Timber – pallets and off-cuts | Site infrastructure (i.e. accommodation village, CHPP and MIA) | Minimise waste by producing/procuring only the amount necessary. Undamaged pallets returned to the workshop/warehouse for reuse; some damaged pallets repaired and reused. Irreparably damaged pallets will be taken offsite for disposal at a nearby landfill. | 200 t |
| Paints and resins | Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Minimise waste by producing/procuring only the amount necessary. Collection onsite and stored in a regulated area. Transportation offsite by a licensed regulated waste contractor and disposal by a regulated waste receiver. | 2 t |

| Waste type | Source(s) | Management method | Approximate quantity |
|---|---|---|---|
| Putrescibles & organic (food waste) and some plastics | Site infrastructure (i.e. accommodation village, CHPP, MIA and construction offices) | Taken offsite for disposal at a nearby landfill with suitable capacity. | 160 t |
| Paper, cardboard, some plastics, metal cans | Site infrastructure (i.e. accommodation village, CHPP, MIA and construction offices) | Collection and segregation onsite. Transportation by a waste contractor for offsite recycling. | 8 t |
| Grease trap wastes | Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Collected and transported offsite by a licensed regulated waste contractor to a licensed regulated waste receiver for recycling. | 2.5 t |
| Waste oil and containers | Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Collected and stored onsite in a bunded tank. Transported offsite by a licensed regulated waste transporter to a licensed regulated waste receiver, for filtering and dehydration processes and recycling. | 130 t |
| Oily water | Site infrastructure (i.e. accommodation village, CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Oil will be separated from water. The resulting oil will be collected and transported offsite by a licensed regulated waste transporter to a licensed regulated waste receiver for recycling. The separated water will be managed as part of the mine water management system. | 12 t |
| Tyres | Vehicles for the construction of site infrastructure | Tyres will be transported offsite by a licensed regulated waste transporter to a licensed regulator waste receiver for recycling or disposal. | 2,000 t |
| Sewage effluent | Site infrastructure (i.e. accommodation village, and offices) | A sewage treatment plant will be installed to service the MIA, the accommodation village, and to treat all sewage generated onsite.. Sewage from the stockpile/CHPP area, and from the ablutions facility at the mine portal, will be pumped back to the MIA.<br>Treated effluent from the sewage treatment plant will be captured and stored on site at the process water dam and used for dust suppression. Biosolids will be removed from site and disposed of at a licenced facility. | 400 ML (effluent)<br><br>240 t (sludge) |

## Operational wastes

The management method and approximate quantities of each waste type (apart from mineral wastes) likely to be generated by the Project are shown in Table 3.17. Quantities of wastes were estimated based on experience at BMA's Broadmeadow underground mine in central Queensland and assumes a maximum mining rate of 11 Mtpa of ROM coal.

**Table 3.17 Waste generation and management: operational phase**

| Waste type | Source(s) | Management method | Approximate quantity |
|---|---|---|---|
| Mineral waste | Underground mine | Mine waste and tailings excavated and disturbed during operation will be disposed of at the Saraji Mine along with spoil from Saraji Mine. Coarse reject and dewatered tailings will be disposed, amongst spoil, into in-pit reject storage facilities at the Saraji Mine, well away from final landform surfaces, as per the current approved practice for rejects storage at the Saraji Mine. | 40 Mt |
| Waste oil | Site infrastructure (i.e. , CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Minimise waste by producing/procuring only the amount necessary. Collected and stored in a bunded tank. Transported offsite by a licensed regulated waste transporter to a licensed regulated waste receiver, for filtering and dehydration processes and recycling. | 110,000 Litres per year (L/y) |
| Waste oil containers | Site infrastructure (i.e., CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Drained onsite. Drums will be transported offsite by a licensed regulated waste contractor for reuse, recycling or disposal. | 20 t/a |
| Oily sludge, absorbent, degreaser, grease, oily rags, oil filters | Site infrastructure (i.e., CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Collected onsite then transported offsite by a licensed regulated waste transporter to a licensed regulated waste receiver, for filtering and dehydration processes and recycling. | 110 t/a |
| Scrap metal | Site infrastructure (i.e., CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Minimise waste by producing/procuring only the amount necessary. Stored in bins and/or skip bins and/or stockpiled in appropriate areas to be collected by scrap metal merchants under the supervision of waste contractor. | 8.5 t/a |
| General waste (putrescibles and organic, some plastics and paper not suitable for recycling | Site infrastructure (i.e., CHPP, MIA and construction offices) | Waste will be compacted and transported by the waste contactor, to be disposed of at the Dysart Landfill. | 3,750 t/a |

| Waste type | Source(s) | Management method | Approximate quantity |
|---|---|---|---|
| Recyclable waste (paper and cardboard, metal cans and some plastics) | Site infrastructure (i.e. accommodation village, CHPP, MIA and construction offices) | Collection and segregation onsite. Transportation by a waste contractor for offsite recycling. | 1,660 $m^3$/a |
| Paints and resins | Site infrastructure (i.e., CHPP, MIA, water pipeline, transmission line, rail spur and conveyor system) | Minimise waste by producing/procuring only the amount necessary. Collection onsite and stored in a regulated area. Transportation offsite by a licensed regulated waste transporter and disposal offsite by a regulated waste receiver. | 3 t/a |
| Timber pallets and off-cuts | Site infrastructure (i.e., CHPP and MIA) | Minimise waste by producing/procuring only the amount necessary. Undamaged pallets returned to the workshop/warehouse for reuse; some damaged pallets repaired and reused. Irreparably damaged pallets will be taken offsite and disposed of at nearby landfill. | 3 t/a |
| Tyres | Vehicles for the construction of site infrastructure | Minimise waste by producing/procuring only the amount necessary. Tyres will be transported from site by a licensed regulated waste transporter to a licensed regulator waste receiver for recycling or disposal. | 480 t/a |
| Sewage waste, residues (sewage sludge) and wastewater | Site infrastructure (i.e., and offices) | A sewage treatment plant will be installed to service the MIA, the construction accommodation village, and to treat all sewage generated onsite. Sewage from the stockpile/CHPP area, and from the ablutions facility at the mine portal, will be pumped back to the MIA. Treated effluent from the sewage treatment plant will be captured and stored on site at the process water dam and used for dust suppression. Biosolids will be removed from site and disposed of at a licenced facility | Volume will vary depending on the number of personnel onsite, initial estimate of 126 ML/yr (effluent) based on 1400 EP and 20 t sludge |
| Water treatment plant residues | Water treatment plant | Treated effluent will be captured and stored on site at the process water dam and used for dust suppression. | Volume will vary depending on the number of personnel onsite |

## 3.8 Interrelationship with the existing Saraji Mine

The existing Saraji Mine currently operates on ML 1775, ML 70142, ML 1784, ML 1782, ML 2360, ML 2410, ML 70294, ML 70298, ML 70328 and ML 700021 under Environmental Authority (EA) Permit No. EPML00862313.

The Project will share some facilities with the existing adjacent Saraji Mine. This proximity to the Saraji Mine will provide BMA with the following operational flexibility:

- use of the Saraji Mine CHPP for processing Project coal in years where ROM exceeds 7 Mtpa. In the years where mine production volumes exceed the processing capacity of the Project CHPP, excess coal will be trucked to the existing Saraji Mine CHPP for processing. Coal processed through the Saraji Mine CHPP will be handled in accordance with the existing EA (EPML00862313)
- use of existing open-cut spoil dumps associated with the Saraji Mine to distribute and dispose of dewatered tailing and rejects from the Project's CHPP and Saraji Mine CHPP
- use of an integrated power supply network for Saraji Mine and the Project
- use of the existing open cut pits for mine access and highwall entry to limit the environmental impacts, costs, time and risks involved in construction of new mine portals
- locate and construct above-ground infrastructure, including the MIA within previously disturbed areas on the Saraji Mine
- transport water between the Project and the broader BMA network of mines via the existing water pipeline network (under normal operating conditions, the Project mine water system will operate independently)
- telecommunications will be provided by extending the services from the Saraji Mine via the existing service corridor
- transport product coal along the existing Goonyella rail system that currently runs along the western boundary of the existing Saraji Mine on ML 70142
- supply electrical power demand by extending existing powerlines from the Saraji Mine via the proposed infrastructure and transport corridor
- truck mineral wastes generated by the construction of the mine portal, ventilation shafts to Saraji Mine in-pit spoil dumps for disposal
- truck all rejects (dense medium coarse rejects, fine rejects and dewatered tailings) generated by the Saraji East CHPP to Saraji Mine open cut spoil dumps located on ML 1775 and ML 1782.

An overview of where key project elements are proposed within existing mining lease areas is provided in Table 3.18.

**Table 3.18 Project elements within existing mining lease areas**

| Existing Mining Lease Areas | Proposed Project Elements |
|---|---|
| ML 70142 | • MIA<br>• CHPP<br>• conveyor system<br>• ROM pad<br>• raw water dam<br>• product stockpiles<br>• train load out facility<br>• rail spur, balloon loop and signalling system<br>• water supply related infrastructure<br>• access tracks<br>• utilities (e.g. power, telecommunications and water) |
| ML 1775 | • Underground mine panels<br>• mine entry portal |

| Existing Mining Lease Areas | Proposed Project Elements |
|---|---|
| | • conveyor system<br>• gas drainage bores and associated surface infrastructure<br>• water supply related infrastructure,<br>• in-pit open cut spoil dumps<br>• access tracks<br>• utilities (e.g. power, telecommunications and water) |
| ML 1782 | • in-pit open cut spoil dumps |

### 3.8.1 Environmental management systems and compliance

Saraji Mine is licensed to operate under EA (EPML00862313). Operation of the Saraji Mine is anticipated to extend into the 2040s under approved and proposed ML boundaries. An amendment was made to the EA in 2017 to permit the extension of the Grevillea Pit to access further coal resources in MLA 700021 over ten years from 2022. Future operations may include mining development within MLA 7083.

BMA has an excellent record of responsible environmental management and a strong commitment to continual improvement of environmental performance. BMA has not been subject to any environmental related proceedings in any of the following Courts - High Court, Federal Court, Supreme Court, District Court, and Planning and Environment Court. BMA has been the subject of environmental related proceedings in the Queensland Magistrates Court, for matters related to State legislation. A fine was imposed and paid by BMA. No conviction was recorded.

BHP's approach to environmental management is incorporated in the Charter, which outlines 'an overriding commitment to health, safety, environmental responsibility and sustainable development'. BHP strives to achieve the efficient use of resources, including reducing and preventing pollution, and enhancing biodiversity protection by assessing ecological values and land use in our activities. Our stewardship approach is designed to ensure that the lifecycle health, safety, environment and community impacts associated with resources, materials, processes and products related to our businesses are minimised and managed. BHP's environmental policy describes these values and is available on the company's website (https://www.bhp.com/our-approach/our-purpose/).

Further information can be found in the annual BHP sustainability report available on the company's website (https://www.bhp.com/investor-centre/sustainability-reporting-2020/). During the 2020 period BHP reported zero work-related fatalities, zero significant environment incidents and zero significant community incidents. Social investment spending for the 2020 financial year reached (US) $149.6 million (BHP,2020).

The Saraji Mine operates an Environmental Management System (EMS) consisting of a number of systems, programs and procedures to manage water, biodiversity, dust and noise nuisance, waste, cultural heritage and rehabilitation. While the Saraji Mine and the Project are two independently operated operations, relevant environmental management plans will be updated where necessary to address operational overlap.

The Saraji Mine Rehabilitation Management Plan (RMP) adopts a progressive rehabilitation approach to disturbed land. Under conditions within the RMP and the EA for the Saraji Mine, generally and unless otherwise stated, disturbed land is required to be rehabilitated within two years of the mined area becoming available. Access to the Project will be via a portal on the far eastern side of the existing open cut development, an area of the Saraji Mine which would not be available for

rehabilitation until the end of the operational life of the Saraji East Project. It is anticipated that the progressive rehabilitation approach currently employed at the Saraji Mine would continue and that the establishment of the proposed post-mining land uses would be unaffected in the long term.

The recently passed *Mineral and Energy Resources (Financial Provisioning) Act 2018* amends the *Environmental Protection Act 1994* (EP Act), replacing the Plan of Operations and Financial Assurance (FA) with Estimated Rehabilitation Cost (ERC) and Progressive Rehabilitation and Closure Plan (PRCP). The Project will comply with the *Mineral and Energy Resources (Financial Provisioning) Act 2018.* While a Progressive Rehabilitation and Closure Plan (PRCP) for the existing Saraji Mine may be developed in future, the scope of the Project will not change the rehabilitation objectives of the existing mine and preparation of a PRCP for the existing mine is beyond the scope of this EIS.

If needed, a consistency review of the Saraji Mine EA would be undertaken and a modification sought if the Project were to alter or introduce any additional ERAs to site operations.

### 3.8.2 Mining operations

The Saraji Mine CHPP is capable of processing around 18.4 Mtpa of ROM coal per year. The maximum processing capability of the Project CHPP is 7 Mtpa ROM coal feed. In years where the maximum processing capability is exceeded at the Project CHPP, the nearby Saraji Mine CHPP would be used. If this is required, the coal would be hauled between the Project and the Saraji Mine CHPP via dump truck. Any ROM coal from the Project sent to the Saraji Mine CHPP would not increase annual product tonnage output from the Saraji Mine above 18.4 Mtpa.

The Project incorporates a 20 year production schedule. Coal will be mined by longwall methods consisting of a northern region of panels and a southern region of panels separated by a portal which will be progressively mined out and developed as mining progresses. Mining will commence from the western end within ML 1775, adjacent to the existing Saraji open-cut operations, and progressing towards the east into MLA 70383.

The current approved Saraji open-cut mine plan is expected to continue until around 2031 (in some pits reaching the ML boundary). This means that the proposed underground mining and approved open-cut mining will occur concurrently between 2023 and 2031 i.e. an eight-year overlap. As a portion of the Project covers an area currently approved for open cut mining (ML 1775), BMA are seeking the flexibility to mine coal within this area using the most effective and economic mining method. It is noted that in areas where there are both open-cut mining and underground mining proposed, only one type of mining activity will be carried out. During the time of overlap between the proposed underground and approved open-cut mining an offset distance will be maintained between the two operations to ensure safe working distances and minimise geotechnical risks.

Progressive rehabilitation of disturbed areas following completion of mining and decommissioning of the infrastructure areas is planned and will be undertaken in accordance with the approved environmental authority (EA) conditions.

### 3.8.3 Waste management

The Saraji Mine is an open-cut operation with approved waste management practices allowing for disposal of mineral waste within previously mined pits, along with overburden to assist in achieving the final landform design. On completion disposal pits are covered with inert soil, capped and rehabilitated in accordance with the EA.

Given the proximity between the Project and the existing Saraji Mine, the ability to dispose of mineral wastes in existing open-cut spoil dumps at the Saraji Mine reduces the need for ground disturbance and the creation of spoil dumps at the Project Site. Further, as Saraji Mine includes a series of open cuts operating since the operational life of the Saraji Mine is expected to continue into the 2040s, there will be ongoing capacity within Saraji Mine open cut pits (once exhausted) to accept mineral wastes from the Project. Dewatered tailings and mineral wastes will be transported from the Project to the

Saraji Mine disposal pits via dump truck on mine haul roads located within both the Saraji Mine and the Project Site.

As ROM coal from the Project would not increase the maximum annual product tonnage output from the Saraji Mine, waste volumes attributed to the Saraji Mine CHPP would be adequately managed through existing site practices. The management of mineral waste between the Project and the Saraji Mine is discussed further in **Chapter 15 Waste Management**.

### 3.8.4 Water management

Under normal operating conditions, the Project mine water system will operate independently of the existing Saraji mine water system. However, should sufficient MAW not be available for CHPP process and dust suppression at the Project, this may be imported from the existing Saraji Mine water system, following water quality testing to confirm that water is of an appropriate quality for the intended use. Similarly, where additional water demands at the existing Saraji Mine need to be met, water that satisfies water quality testing may be exported from the Project.

A water inventory will be established for the Project with a respective Trigger Action Response Plan (TARP) that identifies excess and insufficient water inventory levels and corrective actions to prevent an impact to mine production.

## 3.9 Project decommissioning and rehabilitation

### 3.9.1 Mine and associated infrastructure

The decommissioning of the Project Site will occur on a staged basis over several years prior to closure. A comprehensive assessment of waste will be undertaken in line with the waste management hierarchy to identify the most appropriate measures to manage the remaining waste on the Project Site.

The following decommissioning strategies will be implemented for the Project:

- All mine roads will be rehabilitated, unless otherwise agreed with the subsequent landowner and in accordance with the EA.
- All water dams not required for long term water management will be decommissioned and removed, unless otherwise agreed with the subsequent landowner and in accordance with the EA.
- All major infrastructure, including the CHPP, will be decommissioned and removed offsite.
- Concrete pads will be covered with benign waste rock or ripped and removed, then topsoiled and re-vegetated.
- Other facilities, including workshops and warehouses, will be decommissioned and removed, unless otherwise agreed with the subsequent landowner and in accordance with the EA.

An assessment of infrastructure requirements associated with the post mining land use will be undertaken in consultation with the landholder to determine the extent of removal. If required, infrastructure will be decommissioned and demolished and removed from site. Materials such as heavy gauge steel and non-ferrous scrap will be cut to size and trucked to offsite for recycling. Concrete and non-recyclable waste including light steel will be disposed off-site.

BMA in consultation with relevant parties will review all infrastructure assets towards the close of the Project and assess which structures will be retained, sold for recycling or relocation or disposed of as general or regulated waste. BMA will assess the need to dispose of benign demolition waste within the existing open-cut pit.

Transport requirements for the decommissioning phase of the Project will be minor compared to the other Project phases and will mainly involve rehabilitation and infrastructure removal-based tasks. Transport off-site during the decommissioning phase of the Project will involve the removal of

infrastructure for re-sale or recycling (if considered cost effective) and the removal of waste material by a licensed waste contractor.

BMA in consultation with the post mine landholder will determine which mine roads are to be retained for ongoing access purposes. All roads not retained will be rehabilitated to the required standard outlined in the final rehabilitation and decommissioning plans.

BMA will determine which of the Projects water management structures will be retained as water sources for use by the subsequent land holder. BMA will ensure that all water management structures agreed for retention are operating in an acceptable manner and are considered to be in an acceptable condition by the regulator. Any water management structure not retained will be decommissioned and the area rehabilitated.

The construction accommodation village will be decommissioned as soon as practical after the construction phase is complete.

During the decommissioning phase, BMA will ensure all 'notifiable activities' conducted within the Project site will be investigated for in-situ soil contamination and as required under the *Environmental Protection Act 1994* (EP Act) will either:

- be released from the Department of Environment and Science (DES) Environmental Management Register (EMR)
- be remediated, confirmed by follow-up investigation(s) and released from the DES EMR
- remain on the DES EMR with an agreed site management plan.

### 3.9.2 Workforce and accommodation

Personnel working on the rehabilitation and decommissioning program will travel to and from the Project Site based on their working arrangements. The maximum amount of people travelling to and from the Project site will be minimal compared to the other Project phases. The workforce would decrease from up to 500 people to approximately 260 employees and contractors in the two years prior to Project closure. After FY 2042, if no extensions are sought and approved, the Project's workforce would decrease to a staff of approximately 20 personnel to manage decommissioning and rehabilitation.

### 3.9.3 Rehabilitation

BMA has prepared a Rehabilitation Management Plan (**Appendix K-1**) in line with the *Mined Land Rehabilitation Policy* (DES, 2018a). In accordance with the policy, land will be progressively rehabilitated.

The Project will comply with the *Mineral and Energy Resources (Financial Provisioning) Act 2018.* A Progressive Rehabilitation and Closure Plan (PRCP) will be developed prior to construction commencing and will demonstrate that the proposed Project will:

- be rehabilitated to a safe and stable landform
- not cause environmental harm
- sustain post mining land uses

BHP's *Queensland Coal Rehabilitation Completion Criteria* (BHP, 2018c) outlines the completion criteria for meeting satisfactory rehabilitation for a number of post mining land uses. Post mining land uses may include:

- grazing land
- dryland cropping

- woodland habitat
- watercourses
- water storage.

The completion criteria set out objectives, indicators and criteria for achieving acceptable rehabilitation in the post mining land uses. The completion criteria consider goals of safety, stability, minimal pollution and the ability to sustain an agreed post mining land use. **Chapter 5 Land Resources** describes these completion criteria and rehabilitation goals in further detail.

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. Land disturbed by the Project's mining activities will be developed to a condition that is self-sustaining or to a condition where maintenance requirements are consistent with an agreed post mining land use.

Rehabilitation monitoring will be undertaken in accordance with the BHP monitoring program current at the time of rehabilitation. Monitoring will focus on the following rehabilitation factors:

- erosion
- vegetation
- soil
- landform.

The data from the monitoring program will be used to determine whether the final rehabilitation outcomes have been met. BMA rehabilitation activities will be designed to ensure the final agreed post mining land use and surrender of the Project EA and surrender of mining leases are achieved.