Ironbark No.1 Coal Mine Project
Initial Development Plan

25 October 2017
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1 Introduction

The Ironbark No. 1 Coal Mine Project (the Project) is located in the northern Bowen Basin coalfields in Central Queensland, Australia, in close proximity to the regional town of Moranbah, (30km to the south-west) and serviced by the coastal city of Mackay (125km to the north-east), as shown in Figure 1.

Figure 1 - Project Area Location

The Project area is accessed from the Peak Downs Highway through the Carborough Downs and Broadlea Mines via an extension of existing haul roads. The Project area is situated within the Wotonga Pastoral Lease (cattle property) and is predominantly flat with sporadic rocky outcrops / hills. The land has been previously cleared for broad pasture cattle farming. Two ephemeral creek systems cross the Project area and flow during periods of heavy rain.

1.1 Objectives and Scope

The objectives of this Initial Development Plan (IDP) are to:

- provide an understanding of the nature and extent of the proposed development and production of mineral resources from the lease.
- allow an assessment of the proposed development and whether it is appropriate with respect to the area, resource, state and people of Queensland.
- assess the prospective resource utilisation and identify any resource sterilisation issues.
- allow appropriate resource management decisions to be made.
The scope of this IDP is based on the *Development Plan and Work Program* guide, by the Department of Natural Resources and Mines, 2016 (v1.02) and addresses, the following:

- relevant legislative requirements for development plans
- minerals that the Applicants’ will have the right to mine
- maps and figures of the resource and mining proposals
- states inter-relationship between multiple resources e.g. coal and coal seam gas

1.2 This Plan’s Period

The period for this IDP is five years from the date of grant of the MLA.

A Later Development Plan will be required to be submitted either within at least 40 business days before the end of the IDP period, or as soon as practicable after the Applicants propose a significant change to the nature and extent of the authorised activity that is not already dealt with under the IDP.

1.3 Legislative Requirements

The requirements of the IDP are set out in Sections 318DT, 318DU, 318DV and 318DW of the *Mineral Resources Act 1989 (MR Act)*, as detailed in Table 1 below. In preparing this IDP, the Applicants have relied on the guidance provided in the *Development Plans and Work Programs (DNRM, 2014)*.

<table>
<thead>
<tr>
<th>MLA Requirement</th>
<th>Short Description</th>
<th>This Document’s Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>318DT(1)(a)</td>
<td>Overview of the activities during the term of the MLA</td>
<td>Section 2 / Section 3</td>
</tr>
<tr>
<td>318DT(1)(b)(i)</td>
<td>The nature and extent of activities proposed for each year of the plan</td>
<td>Section 5</td>
</tr>
<tr>
<td>318DT(1)(b)(ii)</td>
<td>Where the activities are proposed</td>
<td>Section 6</td>
</tr>
<tr>
<td>318DT(1)(c)(i)</td>
<td>The location and estimate of the resource</td>
<td>Section 7</td>
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<td>318DT(1)(c)(ii)</td>
<td>Standards and procedures used to make the estimate</td>
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<td>318DT(1)(c)(iii)</td>
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<td>Section 9</td>
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<td>Section 10</td>
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<tr>
<td>318DT(1)(c)(v)</td>
<td>Schedule for the proposed mining during the plan period</td>
<td>Section 11</td>
</tr>
<tr>
<td>245(1)(o)(iii)(B)</td>
<td>Infrastructure</td>
<td>Section 4</td>
</tr>
<tr>
<td>318DT(1)(d)</td>
<td>Maps that show the matters mentioned in paragraphs (b) and (c)(i), (iii) and (iv)</td>
<td>Throughout this IDP</td>
</tr>
<tr>
<td>318DT(1)(e)</td>
<td>Any other information relevant to the criteria mentioned in section 318EF (i.e. the criteria for deciding whether to approve proposed plan)</td>
<td>Section 17</td>
</tr>
</tbody>
</table>
1.4 Structure of this Plan

The information presented within this report and its attachments provide the information required to support an approval decision for the MLA. Following this introduction, the structure of this report follows the order of information presented in Table 1.

2 Overview of the activities during the term of the ML

The Project will develop an underground coal mine which will utilise the longwall and bord and pillar mining techniques to extract the Leichhardt Seam. The Project includes the following components, as shown in Figure 2:

- An underground coal mine with a production capacity of up to 6.0 Mtpa ROM coal utilising the longwall and bord and pillar mining techniques;
- Drift entries via box cuts in the north of the MLA area for a trunk conveyor and men and materials;
- Construction of main ventilation shaft;
- A 65,000t live capacity ROM stockpile which will form the interface between the underground mine and the truck load-out (TLO) facility;
- Upgrade and utilisation of the existing haul road to link the Project to the Carborough Downs CHPP and Train Loadout Facility;
- Utilisation of the Carborough Downs CHPP ROM storage, coal processing and rail load out (RLO) facilities;
- Development of an Incidental Mine Gas (IMG) drainage network;
- Development of a dedicated 66kV transmission line to be constructed from the Carborough Downs Coal Mine (CDCM) main substation to the Project main substation providing construction power and redundancy;
- Construction of a gas-fired power plant (up to 20MW) and site electricity network;
- Realignment of the existing 132kV transmission line that crosses the Project subsidence area with the relocation of towers to unaltered areas;
• Construction of a pipeline along the haul road alignment from the Broadlea Mine raw water dam to the Project raw water dam, water holding dams and associated distribution network;
• Installation of both clean and waste water reticulation networks;
• Installation of a sewage treatment plant and irrigation infrastructure to reuse the treated effluent; and
• Development of a Mine Infrastructure Area (MIA) which will incorporate administration and operations buildings, fuel storage areas, equipment maintenance areas, hardstand areas, workshops, and associated facilities and services.

3 Project Phases

Following the grant of all necessary approvals, construction and mine development activities are planned to occur from Year 1. Underground development activities are anticipated to occur for the following three years, with longwall production planned to commence within five years from the grant of the ML. A construction workforce of approximately 160 contractors will be required at the peak of the construction period for the project. An operational workforce of approximately 350 employees will be employed over the LOM. The operational workforce will work on a seven day, two or three staggered shifts, rotating roster. There will be two to three shifts in a 24-hour period with approximately 80 to 120 persons per shift.

The life of the mine is estimated to be 20 years based on construction timing, underground development, and resource extraction. The balance of the term is for potential reserve increases and rehabilitation that will be carried out progressively over the term and on completion of mining. Rehabilitation of available areas will be undertaken progressively and once decommissioned, the site will be fully rehabilitated between Years 20 - 25.
Construction of the coal mine will be carried out progressively over the four-year period following grant of the ML. Construction works will comprise: site preparation, vegetation and topsoil removal, topsoil stockpiling, earthworks, civil works, construction of road access, and building of structures and plant. The Project will be a long-term operation, and will require buildings constructed to a standard commensurate with the mine life.
Semi-permanent construction will be required for the main administration building, with relocatable buildings proposed for facilities which are likely to be relocated at the end of the construction phase. All buildings will be designed and constructed to meet the local council and state government regulations, and will be fitted with portable fire extinguishers. General area lighting will be provided around buildings where night time access is required.

Transportable buildings will be used for the mine offices, ablution blocks and training rooms. All buildings for the mining operation will remain in place over the life of the Project.

The following infrastructure will be constructed on site:

- **Office buildings**
  - Administration buildings and carpark
  - Crib facilities
  - Ablution facilities and sewerage facility
  - Training rooms
  - Control room
  - First aid facilities

- **Mining facilities**
  - Mobile equipment workshop
  - Offices, crib rooms, and ablution facilities
  - Pre-start area
  - Wash down bays
  - Explosive magazine compound
  - Go-line
  - Laydown pads
  - Fuel storage facility
  - Lube storage facility
  - Fuel dispensing facility
  - Warehouse and storage yard for mobile and fixed equipment parts and consumables

- **Utilities**
  - Power connection point and distribution cables
  - Water connection point and distribution pipelines
  - Water supply dam
  - Information, communication, and telecommunication system

- **Civil works**
  - Site access/haul road
  - ROM pads
  - Security fencing
  - Drainage and sediment dams

Typical construction equipment will be used including, for example, excavators, haul trucks, dozers, graders and cranes. It is anticipated that construction of the surface facilities would extend for a period of 18 months from commencement with a construction workforce estimated at 160.

### 3.2 Mine Development

The target Leichhardt coal seam will be accessed via drift entries from the initial boxcuts in the north of the MLA area. There will be three access points into the seam: a conveyor portal, men and materials portal and a ventilation shaft.
Heavy earth moving equipment will be used for overburden removal for the initial boxcuts. The mine plan is depicted in Figure 2. The mine plan is based around 22 longwall panels with access via mains and gate roads driven by continuous miners. The longwall panels range from 205m - 340m wide.

The longwall panels have been refined in location, length, width and depth following the 3D seismic analyses and interpretation. The mine plan incorporates the geological faulting across the Project area to present an accurate location of the longwall panels to be mined. In areas where longwall mining is not practical, bord and pillar mining will be used to extract remaining resources where economically feasible.

The following underground equipment will be utilised in executing the mine plan (including but not limited to):

- Roof supports
- Shearer
- Armoured face conveyor (AFC)
- Beam stage loader (BSL)
- Crusher
- Bootend
- Monorail system
- Track mounted pump and tank stations
- Track mounted transformers
- Construction conveyors
- Continuous miners
- Shuttle cars (2 per panel)
- Track mounted feeder breakers
- Ancillary equipment – fans, ventilation ducting, pumps
- Load-Haul-Dump (LHD) loaders
- Graders
- Man transporters
- Bobcats
- Ramp conveyor and trunk conveyors (conveys ROM coal to surface ROM stockpile)
- Gate conveyors – development and longwall panels
- Main ventilation fans

### 3.3 ROM Production

The Project consists of an underground longwall coal mine with the capacity to produce up to 6Mtpa Run of Mine (ROM), however, this IDP contemplates an average production rate of 2.6Mtpa ROM with a peak of 4.0Mt in Year 5. This volume of ROM production will yield an average of 2.1Mt product coal per annum with a peak of 3.46Mt in Year 5. The mine will produce both export coking and thermal coals over the Project’s life of approximately 20 years. Table 2 shows an increase in production in Year 4 when longwall production commences.

Table 2 details the anticipated LOM production schedule for the Project assuming the commencement of underground development activities in Year 2. The mining sequence is also illustrated in Figure 3.
Table 2 - Coal Production and Waste Figures

<table>
<thead>
<tr>
<th>Mine Year</th>
<th>ROM (t)</th>
<th>Plant Feed (t)</th>
<th>Yield (%)</th>
<th>Product (t)</th>
<th>Rejects (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81,842</td>
<td>81,842</td>
<td>67.8%</td>
<td>55,485</td>
<td>26,357</td>
</tr>
<tr>
<td>2</td>
<td>214,045</td>
<td>214,045</td>
<td>84.3%</td>
<td>180,457</td>
<td>33,588</td>
</tr>
<tr>
<td>3</td>
<td>450,631</td>
<td>450,631</td>
<td>86.8%</td>
<td>390,970</td>
<td>59,662</td>
</tr>
<tr>
<td>4</td>
<td>3,211,010</td>
<td>3,211,010</td>
<td>86.6%</td>
<td>2,780,285</td>
<td>430,725</td>
</tr>
<tr>
<td>5</td>
<td>3,973,801</td>
<td>3,973,801</td>
<td>87.0%</td>
<td>3,455,690</td>
<td>518,111</td>
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<tr>
<td>6</td>
<td>3,874,660</td>
<td>3,874,660</td>
<td>87.2%</td>
<td>3,378,115</td>
<td>496,545</td>
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<tr>
<td>7</td>
<td>3,374,239</td>
<td>3,374,239</td>
<td>85.8%</td>
<td>2,893,440</td>
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<tr>
<td>8</td>
<td>2,563,673</td>
<td>2,563,673</td>
<td>87.7%</td>
<td>2,248,518</td>
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<tr>
<td>9</td>
<td>2,750,406</td>
<td>2,750,406</td>
<td>87.5%</td>
<td>2,406,734</td>
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<tr>
<td>10</td>
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<td>2,999,796</td>
<td>86.0%</td>
<td>2,578,899</td>
<td>420,897</td>
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<tr>
<td>11</td>
<td>2,549,268</td>
<td>2,549,268</td>
<td>82.6%</td>
<td>2,105,911</td>
<td>443,357</td>
</tr>
<tr>
<td>12</td>
<td>2,682,562</td>
<td>2,682,562</td>
<td>82.9%</td>
<td>2,223,433</td>
<td>459,129</td>
</tr>
<tr>
<td>13</td>
<td>2,382,704</td>
<td>2,382,704</td>
<td>83.8%</td>
<td>1,996,362</td>
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<tr>
<td>14</td>
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<td>3,029,338</td>
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<tr>
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<td>17</td>
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<td>2,727,027</td>
<td>75.6%</td>
<td>2,062,150</td>
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<tr>
<td>18</td>
<td>2,796,840</td>
<td>2,796,840</td>
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</tr>
<tr>
<td>19</td>
<td>2,288,324</td>
<td>2,288,324</td>
<td>83.3%</td>
<td>1,906,469</td>
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</tr>
<tr>
<td>Total</td>
<td>48,309,060</td>
<td>48,309,060</td>
<td>83.3%</td>
<td>40,247,688</td>
<td>8,061,372</td>
</tr>
<tr>
<td>Average</td>
<td>2,542,582</td>
<td>2,542,582</td>
<td>82.6%</td>
<td>2,118,299</td>
<td>424,283</td>
</tr>
</tbody>
</table>

The estimated quantities of products and wastes produced over the Project LOM are as follows:

- Approximate total run of mine (ROM): 48.3Mt
- Approximate total product coal: 40.2Mt
- Total waste: 8.1Mt
- Average yield: 82.6%
Figure 3 - Indicative Life of Mine Schedule
3.4 Coal Processing and Export Facilities

ROM coal from the Project will be transported to the Applicants’ Carborough Downs CHPP for washing and preparation. The ROM coal will be transported by truck over the existing connecting private haul road through the Applicants’ adjacent Broadlea Coal Mine. The Carborough Downs CHPP has the capacity to process this coal in addition to that expected to be produced from the combination of CDCM and Broadlea Coal Mines. The coal processing will be carried out in accordance with all CDCM controls and Environmental Authority (EA) conditions.

Two export products will be produced from the Project, a low ash coking fraction and a higher ash thermal fraction. An overall yield of approximately 82% is predicted, of which approximately 44% is expected to be coking coal and 38% thermal coal. After processing, the product coal will be stockpiled at the existing CDCM product coal handling facility and loaded onto trains using the existing rail load-out.

The use of the Applicant’s existing CHPP and rail loadout facilities eliminates the need for construction of additional facilities providing cost reductions to the Project and reducing the footprint of the Project site.

3.5 Waste Rock Management

After processing at the Carborough CHPP, the Project rejects will be stored at the Carborough Downs CHPP Dry Reject Emplacement Area (DREA) facility. The DREA designated as Waste Emplacement Facility 1 (WEF1) has been sized appropriately and has the capacity to receive the rejects from the Broadlea Mine, CDCM, and the present Project for the life of mine (LOM).

A second Waste Emplacement Facility (WEF2) could be constructed to accommodate additional rejects if the CDCM or the present Project LOM volumes increase due to expansion opportunities. The CDCM WEF1 design and management are approved in the Carborough Downs Environmental Authority (EA).

3.6 Rehabilitation and Closure

The Queensland Department of Environment and Heritage Protection’s guideline for resource activities, “Rehabilitation requirements for mining resource activities,” provides guidance on the four prescribed rehabilitation goals, and outlines the potential for Project specific rehabilitation goals. These are presented below.

The four general rehabilitation goals require rehabilitation of areas disturbed by mining to result in sites that are:

- safe to humans and wildlife;
- non-polluting;
- stable; and
- able to sustain an agreed post-mining land use.

The Applicants recognise that specific additional goals may be indirectly identified by Government through requirements under other legislation dealing with matters such as endangered species, water, registered heritage places or regional or local planning. For example, there may be requirements to:

- Establish vegetation communities that are demonstrably similar to a pre-existing ecosystem (especially where native vegetation is the proposed land use);
- Establish or enhance the habitat of an endangered species (especially where the mining has affected such habitat);
- Restore stream patterns where there has been a temporary stream diversion;
- Achieve water quality that meets some specific beneficial use;
- Maintain or restore some specific aesthetic values;
- Preserve specific European and indigenous heritage that has been registered for the site (note that these values are managed under other legislation); or
• Achieve specific socioeconomic outcomes (e.g. restore high value agricultural land necessary to maintain a viable rural industry).

The Applicants’ intention is for all disturbed areas to be rehabilitated and maintained as mining progresses, rather than at the end of the mine’s life. Infrastructure areas will be decommissioned, dismantled and removed only once mining operations are complete.

The objective of rehabilitation plans for the Project is to return the land to cattle grazing or revegetate areas of remnant vegetation, thus closely mirroring the existing land use. No final void is proposed. The Applicants will demonstrate that the land is safe to humans and wildlife, non-polluting and geotechnically stable before relinquishing the mining tenement at the end of the mine’s life. The final rehabilitation requirements will be detailed in a Rehabilitation Management Plan, as provided for by the Project’s Environmental Authority. Specific rehabilitation strategies will be applied to the mine domain, as appropriate.

4 Infrastructure

4.1 Raw Water Supply

A new pipeline will be constructed along the haul road alignment from the Broadlea Mine raw water dam to the Project raw water dam. The Broadlea Mine raw water dam is currently supplied by an offtake from the Sunwater raw water pipeline. The Applicants have sufficient existing spare raw water allocation under existing contracts with Sunwater to supply all Project raw water demands (approximately 405MLpa).

4.2 Surface Catchment and Storages

Figure 6 and Figure 7 show locations of the dams that will manage mine water. This is a separate system from the sediment basins which will contain and manage the uncontaminated surface run-off (from both disturbed and undisturbed areas).

The sediment basins will treat the run-off water from the catchment. These are different from a sediment dam which would be considerably larger and would be designed to contain the run-off from an entire storm event and would typically be 300% - 400% of the size of a sediment basin.

The catchments of the sediment basins are:

• the compacted gravel lay down hardstand area;
• the paved areas around the workshop, wash bay go-line, dead-line, and the compacted gravel warehouse hardstand; and
• the paved and gravel roads leading to and from the diesel storage area.

The sediment basins have been designed as Type C basins using the International Erosion Control Association (Australia) guidelines with a design flow rate of 0.5 - the peak flow discharge for a 1 in 10-year storm. The dams will be provided with riser pipe outlets to release the water trapped in the basin over a 10-day period.

4.3 Sewage Treatment

The Project will construct sewage treatment facilities to treat the foul and domestic water generated by the operations (kitchens, showers and toilets). Based on planned employee numbers, assumed rainfall on the sewage dam and estimates of cleaning water, it is estimated that the sewage loading on the sewage treatment plant (STP) will be 5.5kL/day plus a further 67kL/day of grey water (this is made up from domestic, housekeeping and rainfall). These volumes equate to 7.6% sewage with the remainder being grey water. The STP specification for a facility of this type requires a plant capable of handling 80kL/day. The irrigation assessment has been carried out on the basis of the higher 80kL/day figure using the same ratio of sewage to grey water as calculated above (i.e. 7.6% sewage).
The proposed locations of the two sewage dams are depicted in Figure 6. Both dams have been sized (at 1ML each) to have capacity to store 13 days’ worth of STP outflow (i.e. providing 26 days’ worth of total storage); this gives sufficient buffering for any interruption to irrigation (e.g. to extend the irrigation grid in order to alleviate ponding).

4.4 Telecommunications

It is anticipated that a fibre optic cable will be run from the Project via the Broadlea and Carborough Downs mines to the Applicants’ existing fibre optic cable connection to the Telstra internet and telephony network. This connection will be used to run fleet management, maintenance, and plant control systems. Telephone systems will be provided to administration buildings and workshops.

Radio communication will be required on the site for communication between heavy vehicles and light vehicles within the pit, and between the pit and the workshop. A radio tower will be constructed if there is insufficient reception available locally.

4.5 Power Supply

The power supply for the Project involves a staged approach as follows:

- initial diesel powered generation for construction activities;
- construction of a 66kV line between CDCM and the Project which will temporarily replace the diesel-powered generation as the primary source of site power; and
- Subject to the resolution of the overlapping Petroleum tenure discussed in Sections 13 and 14 of this IDP, the Project may seek to construct an onsite 20MW gas-fired power station to utilise coal seam methane from the gas pre-drainage system. This will then form the primary source of power for the Project, with backup provided by the 66kV line from CDCM and diesel generators, as required. The electricity generated by the gas-fired power station will be for onsite use only.

Area lighting will be provided around the administration buildings, the mobile equipment workshop area, and fuel tanker unloading area.

4.5.1 Power Plant Configuration

It is estimated that the Project will require approximately 15 containerised generation units ranging in size from 1MW to 3MW. The site will include the following:

- containerised generation units – up to 15 units ranging from 1 – 3 MW
- bulk diesel fuel storage facilities
- IMG handling equipment including flaring system
- a containerised workshop facility sufficient to enable minor overhauls and servicing (major overhauls will be conducted off site)
- oil storage and waste oil storage
- water storage tanks for the storage of demineralised water
- lay-down area sufficient to operate and maintain the facility

The initial installation of a diesel generation capacity is required in order to permit the commencement of construction prior to the availability of the 66kV connection to CDCM.

A diesel generation capacity will also be required in the long term for permanent emergency stand-by generation capacity. This permanent diesel generation capacity will be sized to the critical loads necessary for the safe evacuation of the mine.

The load profile is represented in Figure 4 with the maximum demand occurring approximately 3.5 years into the development.
Figure 4 - Electrical Demand Load Profile (to peak requirement)

For safety reasons, the power generation facility will incorporate a gas flaring system to safely manage methane during normal operation and in the event of a failure of one or more of the gas generation units. The flare system will be located within the area designated for the generation facility.

4.5.2 Flare Requirements

A minimum of two flares will be required; one flare located within the generating plant and a second flare (or flares) located in close proximity to the IMG drainage equipment (the number and locations may vary).

4.5.3 Subsidence impacts on existing transmission line

A 132kV transmission line currently crosses the proposed underground mine workings. Consequently, a number of transmission line towers will need to be relocated to non-affected ground. This will be required prior to the longwall mining of the third longwall block based on the current mine plan.

4.6 Roads

The existing dedicated turn-off lane from the Peak Downs Highway onto the Carborough Downs site will be used to prevent road accidents between vehicles entering and exiting the site and local traffic, particularly at the peak times of shift change. The access road then loops round and passes under the highway which avoids any risks to public road users, relative to a right hand turn off from the highway north towards the MLA.

An all-weather site access road will be constructed as an extension from the existing haul road to the main administration building. The carparks for employees and for visitors at the main administration building will also be all-weather construction. All site roads will be high standard gravel roads with high visibility delineators, suitably sized windrows, and graded and drained to ensure all weather access.

4.7 Security

Site security will be maintained by installing fencing around the site and by provision of a security gate between the public access road and the administration building. Employees and permanent contractors will be issued with smartcards to control and record access. All visitors will be required to sign in at the security gate on arrival.
4.8 Workforce and Accommodation

4.8.1 Construction Phase

A construction workforce of approximately 160 contractors will be required at the peak of the construction period. Where practical, the construction workforce will be sourced locally. The construction workforce will be accommodated in camps at Coppabella.

4.8.2 Operational Phase

An average operational workforce of 271 full-time equivalent roles (peaking at 350) will be created over the LOM. Where possible these roles will be filled with people living in the local regional catchment area.

During longwall moves, approximately 30 contractors will be employed for an 8-week period. The operational workforce will be either accommodated at Coppabella or in Moranbah. The camp will be operated and managed by an independent third party.

The operational workforce will work on a seven day, two or three staggered shifts, rotating roster. There will be two or three shifts in a 24-hour period with approximately 80 to 120 persons per shift. The majority of the operational workforce will be transported between the camp and site by bus.

4.9 Mine Infrastructure Area

The MIA is shown in overview in Figure 5 and further detail is depicted in Figure 6 and Figure 7.
Figure 6 - Mine Infrastructure Area Plan 1
Figure 7 - Mine Infrastructure Area Plan 2
4.10 Off-Lease Infrastructure

No new off-lease infrastructure is required by the Project. The Project will utilise the existing CHPP and rail loadout facilities at the Applicants’ Carborough Downs mine and thereby eliminate the need for the construction of additional facilities.

5 The nature and extent of activities proposed for each year of the Plan

The following section describes the nature and extent of the activities proposed for each year of the IDP, accounting for the initial five years of the ML. These activities are provided according to the current mine plan and further refinement of the activities will occur during detailed design. The activities are divided into the construction phase and the commencement of mining and production phase. The timing of each activity is detailed in Table 3 and Figure 3.

A. Construction and Mine Establishment Phase (Year 1) –
   1. Mobilise personnel and equipment to site for initial works
   2. Clear vegetation and strip topsoil and subsoil from the area for the construction build pad, temporary workshop and office, and initial site roads
   3. Construct a build pad and temporary workshop and office for the assembly of mining equipment
   4. Start assembly of construction and ancillary equipment
   5. Construct diversion drains and bunds to keep clean water off the site; and construct drains, sumps, sedimentation ponds, and silt traps to manage water on the site
   6. Clear vegetation and strip topsoil and subsoil from the box cuts, ROM pad, initial waste rock dump, and haul road footprint
   7. Construction of the box cuts and drifts
   8. Construct laydown pads, and haul roads
   9. Commission production equipment and ramp-up of mining activity

B. Mining and Production Phase (Years 2 to 5) –
   1. Start mining advancing from the north of the MLA
   2. Construction of additional infrastructure required to commence longwall operations
   3. Ramp up extraction and production year on year
   4. Operation of Project

Construction and mine establishment works are planned to commence in surface areas simultaneously in Year 1. The development of the mine will commence in Year 1 with extraction of overburden. ROM coal will be extracted in Year 2 with product coal also being produced that year. An indicative schedule is provided in Table 3.

Table 3 - Indicative Project Schedule

<table>
<thead>
<tr>
<th>Mine Year</th>
<th>ROM (t)</th>
<th>Plant Feed (t)</th>
<th>Yield (%)</th>
<th>Product (t)</th>
<th>Rejects (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81,842</td>
<td>81,842</td>
<td>67.8%</td>
<td>55,485</td>
<td>26,357</td>
</tr>
<tr>
<td>2</td>
<td>214,045</td>
<td>214,045</td>
<td>84.3%</td>
<td>180,457</td>
<td>33,588</td>
</tr>
<tr>
<td>3</td>
<td>450,631</td>
<td>450,631</td>
<td>86.8%</td>
<td>390,970</td>
<td>59,662</td>
</tr>
<tr>
<td>4</td>
<td>3,211,010</td>
<td>3,211,010</td>
<td>86.6%</td>
<td>2,780,285</td>
<td>430,725</td>
</tr>
<tr>
<td>5</td>
<td>3,973,801</td>
<td>3,973,801</td>
<td>87.0%</td>
<td>3,455,690</td>
<td>518,111</td>
</tr>
</tbody>
</table>
6 Where the activities are proposed

All activities are proposed within the Project area i.e. the MLA for the coal mine and the access corridor.

Table 4 outlines the timing and location of activities to be carried out, including the proposed activities during the term of the IDP. The nature, extent and location of the Project’s activities are presented in Figure 2.

The locations of the Project’s activities have been selected to:

- maximise coal recovery;
- optimise operations;
- commence mining where lower costs and higher economic returns are possible;
- avoid and minimise environmental impacts; and
- avoid resource sterilisation.

<table>
<thead>
<tr>
<th>Nature and Extent of Activities</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1 Construction as per sequence above in Section 4</td>
<td>See Figure 3</td>
</tr>
<tr>
<td>Year 2 Mining and production as per sequence above in Section 4</td>
<td>See Figure 3</td>
</tr>
<tr>
<td>Year 3 Mining and production as per sequence above in Section 4</td>
<td>See Figure 3</td>
</tr>
<tr>
<td>Year 4 Mining and production as per sequence above in Section 4</td>
<td>See Figure 3</td>
</tr>
<tr>
<td>Year 5 Mining and production as per sequence above in Section 4</td>
<td>See Figure 3</td>
</tr>
</tbody>
</table>

7 The location and estimate of the resource

This section describes the location and estimate of the resource proposed to be mined. It sets out the extent and tonnage of the resource area, an estimate of tonnage and volume of resources within each of the resource areas on a seam by seam basis. The following section is largely adapted from JB Mining Services report titled, *Ellensfield Coal Resources* (July 2017), as attached to this document Appendix 7.1.

At a regional scale, the target Rangal Coal Measures sub-crop to the north-west of the Project area. The Rewan Formation covers the Project area with the overlying Clematis Group outcropping in the Carborough Range to the east (Figure 8). The underlying Fort Cooper Coal Measures and the upper Yarrabee Tuff marker band occur below the Rangal Coal Measures at mineable depths. The Moranbah Coal Measures are identifiable through the area by seismic interpretation, however no borehole intersections have been recorded in the Project area.
7.1 Rangal Coal Seam Geology

The Leichhardt and Vermont Seams of the Rangal Coal Measures form the principal economic coal resources in the Project area. A high gamma marker occurs immediately below the floor of the Vermont Upper Seam and it is interpreted to be the Yarrabee Tuff. The Yarrabee Tuff averages 0.5m thick. This tuff marks the interpreted top of the Fort Cooper Coal Measures in Figure 9.

Figure 8 - Regional Stratigraphic Section (Fielding et al 2001)

Figure 9 - Typical Borehole Section
7.1.1 Leichhardt Seam

The Leichhardt Seam is typically 4.5 - 5.0m thick, thinning towards the southern boundary of the deposit. Figure 10 depicts a histogram of whole seam thickness variability in the Project area from borehole interpretation.

![Leichhardt Seam Thickness Histogram](image)

The Leichhardt Seam has typically been divided into four plies, Q1 to Q4, however up to seven plies have been logged in some holes. The uppermost ply, Q1, is dull and high ash (30% - 40% ash) and often has calcite veining and is noted to be comparatively strong. This ply is planned to be left as roof due to coal quality and strata control benefits.

The coal below the Q1 is the principal target working section (LHDWS). For modelling and economic evaluation, the Leichhardt Seam is modelled in two sections, Q1 and LHDWS. The LHDWS is defined from cored holes and the thickness variation of the LHDWS is shown in Figure 11.

![Leichhardt Seam Working Section Thickness Distribution](image)
A typical Leichhardt Seam brightness profile and density and gamma curves are depicted in Figure 12.

Figure 12 - Leichhardt Seam Profile (EF130C)
In the eastern portion of the Project area, a minor seam occurs 40 - 50m below the Leichhardt Seam named the Leichhardt Lower. The seam has been identified in only three holes in the Project area.

7.1.2 Vermont Seam

The Vermont Seam in the Project area has three plies; the Vermont Upper (VU), the Yarrabee Tuff (YT) and the Vermont Lower (VL). The Vermont Seam occurs 55 - 65m below the Leichhardt Seam.

The Vermont Upper ranges from 1.5 - 3.5m and averages 2.4m thick. The VU is typically the better quality of the Vermont Seam plies with an average raw ash of 24%.

The Yarrabee Tuff is viewed as the regional stratigraphic marker delineating the base of the Rangal Coal Measures. The tuff is often described as a weak claystone or tuff also containing bands of carbonaceous siltstone. Its strong gamma response is a useful correlation aid. However, it should be noted that the Fort Cooper Coal Measures has many strong gamma units.

The Vermont Lower ranges from 0.8 - 1.7m and averages 1.3m thick. The VL has an average raw ash average of 36%.

A typical Vermont Seam brightness profile and density and gamma curves are shown in Figure 13.

7.1.3 Girrah Seam

Coal seams below the Yarrabee Tuff exhibit a significant content of tuffaceous material, high inherent ash and low yielding washability characteristics. In the Project area, the Girrah Seam lies close to the VL and has a thickness greater than 15m.
Figure 13 - Vermont Seam Profile (EF130C)

Vermont Upper Seam

Yarrabee Tuff

Vermont Lower Seam

Girrah Seam
7.2 Structure and Faulting

The regional N-NW trending Jellinbah Thrust fault system (locally known as the Burton Range Thrust) intersects the western edge of the Project area. As a result, the area is reasonably structurally deformed. To the east of the resource is a large syncline and the regional Yarrabee Thrust. 2D and 3D seismic surveys contribute significantly to the understanding of the structure in the area.

The 3D seismic survey indicates that the throw of the Jellinbah Thrust is approximately 200m in the north-west portion of the lease, with throw decreasing rapidly to the south. In conjunction with the decrease in throw, another splay develops 3km to the west with increasing throw to the south.

The 3D seismic data shows the Leichhardt Seam dipping to the south at 1 to 9 degrees. Dips often steepen near faults. In the 3D survey, 68 faults were picked and correlated at the Leichhardt Seam level. The principal fault trend is the NW-SE trending thrust faults. A large proportion of these are west over east back thrusts. The NE sector of the area shows east side down terraces.

Orthogonal to the thrusts are a discontinuous set of steep, WSW-ENE trending faults interpreted as strike slip faults.

Overall the fault types and directions are consistent with the regional ENE compression events of the late Triassic. There appears to be more deformation in the Leichhardt Seam than the Vermont – consistent with the “thin skinned tectonics” concept.

Leichhardt Seam structure roof contours and major faults are depicted in Figure 14. Detailed faulting with confidence interpretation and section locations are depicted in Figure 15 and the corresponding drill hole cross sections are depicted in Figure 16.
Figure 14 - Leichhardt Seam Roof Contours, Faults and Dykes
Figure 15 - Section Locations (refer Figure 16)
7.3 Igneous Geology
Regional aero-magnetic data indicates that a small magnetic anomaly exists in the southern portion of the Project area. Igneous material logged in two holes in proximity to the magnetic anomaly is interpreted as sills in the Vermont and Girrah Seams. 3D seismic surveys have identified a major north-south dyke in that area as depicted in Figure 14.

7.4 Tertiary
The majority of the Project area has no unconsolidated Tertiary sediments. However, the sporadic mesa-like steep-sided hills are remnant lateritized Tertiary material.

7.5 Weathering
Depth of weathering is variable ranging from 5m to 44m. The average depth of weathering over the Project area is 15m.

There are no distinct trends in depth of weathering with the exception that deeper weathering is generally associated with laterized topographic highs.

7.6 Strata Properties
The distribution of tested rock strength from strata bounding the Leichhardt Seam demonstrates a normal distribution, with the majority of samples between 15 and 45MPa. The median Uniaxial Compressive Strength (UCS) is 26.6MPa and 10% of samples are less than 9.5MPa.

7.6.1 Roof Strengths
Using the Carborough Downs sonic to UCS relationship equation (as a reasonable local approximation), it is possible to assess spatial variation in roof strength across the deposit. The inferred strength of the immediate 2m roof typically ranges between 10MPa to approximately 30MPa. Closer to the top of the
seam, the 0 to 0.5m horizon shows weaker strata, typically in the range 0 to 25MPa. The majority of rock tests above the seam were logged as siltstones.

Above 2m, the roof strengths are generally stronger and appear relatively consistent. The strata in these ‘upper roof’ horizons should be suitable for long tendon secondary support anchorage but may require reasonably high reinforcement densities in view of their strength range (and potential for high stiffness layers to occur), especially under high stress loading.

7.6.2 Floor Strengths

In a similar manner to the roof, the average floor strengths for the immediate 0 to 0.5m and 0.5 to 1.0m below the Leichhardt Seam can be inferred from the sonic data.

This shows that the immediate Leichhardt floor strength is typically in the range 10 to 30MPa. An area of weaker floor (<15MPa) is located in the vicinity of Longwalls 1 to 3 take-off roads. As this will be sub 200m depth of cover, it is not perceived to be an issue to the operation.

Below 0.5m, the average floor strength appears to increase. Based on the immediate weaker floor and the Slake Durability testing, the floor in some areas of the mine may be prone to degradation and as such appropriate operational water management practices will be required to maintain floor trafficability.

However, in general, the floor environment is considered to be significantly more competent than many other Australian longwall mines contend with.

7.7 Stress

Like much of the Bowen Basin, the Project area was expected to have a general north-east to south-west maximum horizontal stress direction. This general orientation has been confirmed from borehole breakout analysis. However, many of the boreholes analysed for breakout have shown a more east north-easterly orientation and a number appear to have been influenced by the proximity of geological structure. Stress reorientation can occur about major structural features, such as faults or syncline/monoclines.

The magnitude of the in-situ horizontal stress at the Project has been estimated from borehole breakout analysis and also measured using the downhole Sigra overcore technique. This acoustic scanner data indicates that the horizontal stress in the coal increases from approximately 5MPa at 150m to ~10MPa at 450m depth. This general increase in stress with depth is consistent with anticipated trends.

7.8 The Resource Area and Recoverable Reserves

The Leichhardt Seam in the Project area is classified as a medium volatile bituminous coal (ASTM Classification) with a reflectance in the order of 1.1% to 1.25%. The coal can be beneficiated to produce a coking primary and thermal secondary product. The seam has a characteristic thin, dull high ash tops section.

The Vermont Upper Seam in the Project area is classified as a medium volatile bituminous coal with a reflectance in the order of 1.25% to 1.35%. The coal can be beneficiated to produce a coking primary and thermal secondary product at moderate yields. The Vermont Seam washed product has attributes that could add value to the Leichhardt or other coking coal products due to its higher vitrinite content, higher rank and lower basicity index.

Despite a fair degree of structural deformation, the Leichhardt Seam in this Project area shows reasonably consistent trends in quality as demonstrated by the raw ash contours.
### 7.9 Resource Tabulation

The following tables detail the resources by; working section and cover depth (Table 5), raw coal quality (Table 6).

#### Table 5 - Resources by Working Section, Depth and Status (Mt In Situ)

<table>
<thead>
<tr>
<th>Seam</th>
<th>Depth</th>
<th>Measured</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>&lt;100m</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Q1</td>
<td>100-200m</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Q1</td>
<td>200-300m</td>
<td>-</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Q1</td>
<td>300-400m</td>
<td>-</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Q1</td>
<td>400-500m</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Q1</td>
<td>500-550m</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Q1</td>
<td>Sub total</td>
<td>-</td>
<td>15</td>
<td>5</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seam</th>
<th>Depth</th>
<th>Measured</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LHDWS</td>
<td>&lt;100m</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>LHDWS</td>
<td>100-200m</td>
<td>10</td>
<td>2</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>LHDWS</td>
<td>200-300m</td>
<td>25</td>
<td>14</td>
<td>1</td>
<td>41</td>
</tr>
<tr>
<td>LHDWS</td>
<td>300-400m</td>
<td>22</td>
<td>47</td>
<td>11</td>
<td>80</td>
</tr>
<tr>
<td>LHDWS</td>
<td>400-500m</td>
<td>-</td>
<td>23</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>LHDWS</td>
<td>500-550m</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LHDWS</td>
<td>Sub total</td>
<td>61</td>
<td>87</td>
<td>40</td>
<td>187</td>
</tr>
<tr>
<td>LHD</td>
<td>Total</td>
<td>61</td>
<td>102</td>
<td>44</td>
<td>207</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Seam</th>
<th>Depth</th>
<th>Measured</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>VU</td>
<td>100-200m</td>
<td>-</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>VU</td>
<td>200-300m</td>
<td>-</td>
<td>4</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>VU</td>
<td>300-400m</td>
<td>-</td>
<td>6</td>
<td>27</td>
<td>33</td>
</tr>
<tr>
<td>VU</td>
<td>400-500m</td>
<td>-</td>
<td>13</td>
<td>26</td>
<td>40</td>
</tr>
<tr>
<td>VU</td>
<td>500-550m</td>
<td>-</td>
<td>2</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>VU</td>
<td>Sub total</td>
<td>-</td>
<td>29</td>
<td>71</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seam</th>
<th>Depth</th>
<th>Measured</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL</td>
<td>100-200m</td>
<td>-</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>VL</td>
<td>200-300m</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>VL</td>
<td>300-400m</td>
<td>-</td>
<td>4</td>
<td>15</td>
<td>19</td>
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<tr>
<td>VL</td>
<td>400-500m</td>
<td>-</td>
<td>9</td>
<td>14</td>
<td>23</td>
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<tr>
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<td>-</td>
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<td>6</td>
<td>7</td>
</tr>
<tr>
<td>VL</td>
<td>Sub total</td>
<td>-</td>
<td>18</td>
<td>36</td>
<td>54</td>
</tr>
</tbody>
</table>
### Table 6 - Weighted Average Raw Coal Qualities (adb) by Seam*

<table>
<thead>
<tr>
<th>Seam</th>
<th>RD (%d)</th>
<th>IM (%)</th>
<th>Ash (%)</th>
<th>VM (%)</th>
<th>TS (%)</th>
<th>Phos (%)</th>
<th>Chlorine (%)</th>
<th>Fluorine (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>1.67</td>
<td>1.2</td>
<td>34.0</td>
<td>22.9</td>
<td>0.25</td>
<td>0.2412</td>
<td>0.03</td>
<td>364</td>
</tr>
<tr>
<td>LHDWS</td>
<td>1.43</td>
<td>1.7</td>
<td>16.0</td>
<td>21.8</td>
<td>0.31</td>
<td>0.1312</td>
<td>0.03</td>
<td>179</td>
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<tr>
<td>VU</td>
<td>1.51</td>
<td>1.5</td>
<td>24.0</td>
<td>18.6</td>
<td>0.32</td>
<td>0.180</td>
<td>0.03</td>
<td>367</td>
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<tr>
<td>YT</td>
<td>1.75</td>
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<td>390</td>
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<tr>
<td>VL</td>
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<td>1.6</td>
<td>36.8</td>
<td>16.3</td>
<td>0.23</td>
<td>0.149</td>
<td>0.02</td>
<td>299</td>
</tr>
</tbody>
</table>

* All qualities are on an air-dry basis
* LHDWS weighted average of Measured and Indicated resources
* VU Seam weighted average of Indicated and Inferred resources

### 7.10 Resource Maps and Sections

The following figures and table present:

- Figure 17 - JORC Resource Categorisation for the target coal seam
- Figure 18 - Depth of Cover for the target coal seam
- Figure 16 - Resource Cross-sections of target coal seam
- Table 5 - JORC resources for each coal seam
Figure 17 - Leichardt Working Section Resource Classification
8 Standards and Procedures used to make the estimate

A Resource Statement has been prepared in accordance with the “Australian Guidelines for Estimation Reporting and Classification of Coal Resources” (December 2014), and is reported in compliance with the “Joint Ore Reserves Committee’s Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves” (December 2012) by Mal Blaik of JB Mining Services in May 2017.
8.1 Exploration Data

Initial exploration in the area was limited to regional 2D Seismic lines conducted in the early 1990’s for coal seam gas.

Scout drilling commenced in mid-2005 within EPC722 and EPC951 continuing through to March 2007. The program included 91 chip holes and 12 partially cored holes to test the extent of the potential resource in the area and obtain preliminary coal quality information. 26km of 2D mini-sosie seismic survey were also acquired in 2006.

Follow-up drilling from March 2007 to May 2009 aimed to support a pre-feasibility Project study. The program consisted of:

- 100mm diameter partly cored holes to the Vermont Seam at 1,000m nominal drillhole spacing to achieve indicated status
- 100mm diameter partly cored holes to the Leichhardt Seam at 500m nominal spacing to achieve measured status for first ten years of planned operations
- HQ 61mm diameter partly cored holes for gas and geotechnical purposes
- LOX (Limit of Oxidation) program within the recently granted EPC1036 to determine the subcrop of the Leichhardt Seam and investigate the potential for open cut resources
- Structural definition drilling (500m x 500m) with additional seismic and fault delineation drilling

13.3km of 2D mini-sosie seismic surveys were completed in 2007 to supplement the 2006 survey. Stage 1 of the 3D seismic survey was completed in 2008 over the shallower western portion of the Project area.

Drilling recommenced in early 2011 to support a full-feasibility Project study. 83 holes were drilled consisting of:

- 100mm diameter partly cored coal quality holes and associated open hole pilot drilling
- HQ 61mm diameter partly cored holes for geotechnical purposes

Stage 2 of the 3D seismic survey was completed in 2011 over the remainder of the Project area.

The Project area is extensively explored and well-understood, facilitating advanced Project feasibility and design within the Leichhardt seam. There is potential for economic extraction from the Vermont seam however this is not the focus within the immediate term of this Project. Conceptual studies are planned during the plan period, to evaluate the economics of the Vermont seam.

8.2 Drilling Data

Drilling statistics for the Project to date are presented in Table 7.

<table>
<thead>
<tr>
<th>Hole Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Core (100mm)</td>
<td>132</td>
</tr>
<tr>
<td>Part Core (61mm)</td>
<td>48</td>
</tr>
<tr>
<td>Open</td>
<td>404</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>584</strong></td>
</tr>
</tbody>
</table>

Total meterage of core drilling is 5,640m and 173,950m of chip drilling. The Table 8 categorises holes by primary purpose.

Figure 19 charts the number of holes drilled per year.
Table 8 - Drill Hole Totals by Primary Purpose

<table>
<thead>
<tr>
<th>Hole Purpose</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal Quality</td>
<td>130</td>
</tr>
<tr>
<td>Gas</td>
<td>14</td>
</tr>
<tr>
<td>Geotech</td>
<td>31</td>
</tr>
<tr>
<td>Spon Com</td>
<td>1</td>
</tr>
<tr>
<td>Stress testing</td>
<td>3</td>
</tr>
<tr>
<td>Structure</td>
<td>405</td>
</tr>
</tbody>
</table>

Figure 19 - Annual Borehole Totals
Figure 20 depicts all bore hole locations and coal quality data points.
8.3 2D Seismic Surveys

Gas exploration tenement holders had undertaken extensive 2D dynamite surveys in the area during the early 1990’s. As the remnants of these lines still existed, it was decided in 2006 to conduct a 2D mini-sosie survey along these lines. In total 26 line-km were surveyed and the subsequent processing and interpretation of the results showed the Leichhardt Seam to have a strong continuous signature and clearly showed the location of fault discontinuities.

In late 2007, an additional 13.3 line-km of mini-sosie survey was undertaken. Existing drilling was used to calibrate the seismic sections and provide confirmation of interpreted structure.

8.4 3D Seismic Surveys

A large portion of the target mining area is covered by 3D seismic surveys. In Figure 21, the positions of the 3D seismic surveys conducted by Velseis Processing Pty Ltd in 2008 (western side) and Terrex Seismic in 2011 (eastern side) are shown.

An audit of the 2011 3D seismic work was performed by GeoSolve Pty Ltd. It was surmised that the data quality was very good and there were no fatal flaws in the work.

The two 3D seismic surveys have been merged and a Leichhardt Seam elevation model generated (8x8m centres). The 3D seismic surveys are successful in identifying major fault structures within the Leichhardt Seam and therefore largely supersede the 2D seismic data. Interpretation of the 3D surveys have identified faulting within the Leichhardt Seam down to a throw resolution of 3m. The positional error on these identified faults is +/- 2m vertically and +/- 16m laterally.
Figure 21 - Seismic Surveys Plan
9 Rate and amount of proposed mining

The Project consists of an underground longwall coal mine with the ability to produce up to 6Mtpa Run of Mine (ROM) at its peak, however, the initial forecast is to produce an average of 2.6Mtpa ROM yielding approximately 2.1Mtpa of export coking and thermal product over the Project’s life of mine (LOM) of approximately 25 years. Project peak production will occur in Year 5 of 4Mt ROM and 3.46Mt of product.

Table 2 shows an increase in production in Year 4 when longwall production commences and details the anticipated LOM production schedule for the Project. The mining sequence is also illustrated in Figure 3. This information is current as at September 2017. An update of the ROM coal and saleable coal per year will be undertaken as part of the Bankable Feasibility Study.

10 Proposed mining start date

The proposed mining start date is during Year 2. This is further detailed in Section 3. This allows for a 12-month construction period prior to the commencement of production.

11 Schedule for proposed mining during the initial five-year period

The timing of proposed mining, as detailed in Section 3.3 is depicted in Figure 3.

12 Appropriateness of the Plan

This Plan is considered appropriate because:

- The MLA is sufficiently mineralized with coal;
- The mineralization is economically recoverable;
- The Plan allows for the Project to be developed so that the coal will be extracted in the most efficient and economically viable way;
- The proposed production commencement date is considered appropriate due to the period of construction required to bring the mine into operation;
- The Project will not adversely impact on the development of current or future petroleum resources (refer to Section 13 for further details);
- The Plan includes measures to avoid and reduce the potential impacts of the Project on the environment; and
- The Plan complies with the relevant requirements for IDPs.

12.1 Project Need

The Project will produce both coking and thermal coal for export. Coking and thermal coals are in demand globally. The key drivers for the ongoing development of coal projects in Queensland are:

- Sustained global demand for coking coals for production of steel. Current market expectations are for Australian exports of coking coal to continue steady growth over coming years as economic resources in other jurisdictions are depleted and demand in the Asia Pacific region grows, particularly in India.
- Low ash coking coals, (such as that proposed to be produced by the Project) have deep market acceptance, penetration and need as a blending coal in steel production.
- Increasing demand for high quality thermal coals to replace lower energy, high ash products to support the transition to lower emission economies.
• Proximity of the Project to key consumer markets of Asia as well as excellent logistics infrastructure through the Goonyella and DBCT networks provides a differential freight benefit compared to more distant producers.

• The Project provides regional employment opportunities and economic activity to support local communities.

The Project will contribute to the objectives of the Queensland Government’s Resources Plan (2014) by:

• demonstrating international investment into the state’s coal resources;
• making use of strategic resource infrastructure capacity including power, water, communications, rail and port services;
• providing jobs for the coal sector’s workforce, as well as providing training opportunities for apprentices and indigenous Australians; and
• contributing to the state’s economic growth.

The environmental impact assessment process has been applied to the Project’s formulation to date, and will continue more formally via the EA application process through the Department of Environment and Heritage Protection. Through this process, the environmental, social, health and safety, economic constraints and opportunities of the Project will be examined and measures proposed to manage beneficial and adverse impacts respectively.

12.2 Economic Benefits

An economic impact assessment of the Project was completed as part of the Project’s EIS. This assessment established that the Project will generate significant economic, employment and income benefits at regional, state and national frames of reference. In summary, the key benefits of the Project include:

• an increase in State export revenues
• an increase in direct royalty and payroll tax payments to the Queensland Government
• direct and indirect increases in employment and industry activity in the region, Queensland and Australia over the life of the mine
• a construction workforce of approximately 160 contractors, all accommodated in existing camps (and avoiding social impacts)
• an average operational workforce of 271 full-time equivalent roles (peaking at 350)
• benefits to business, employment and supply chain development in the regional economy as a result of the goods and services required
• direct skills development and training opportunities in the region via Project apprenticeships, traineeships and capacity building
• increased company tax and income tax payments to the Australian Government

Refer to Attachment 8 of this MLA for further detail on economic benefits.

12.3 Efficient Extraction and Economic Viability

Underground mining is considered to be the most appropriate extraction method for the coal within the MLA area because the depth of cover ranges from 70m to 450m. Where possible, advanced technology longwall mining techniques will be deployed to deliver the most cost efficient extraction of the resource. The Applicants have significant operational expertise in this mining method and have confidence in its suitability for this resource. Where not technically feasible due to geological or technical reasons to utilize longwall mining, the Project will utilize bord and pillar methodologies. The economic viability of the Project is further enhanced by the utilization of existing CHPP and rail facilities at Carborough Downs and thereby eliminating the necessity for additional capital expenditure.
13 The effect on, and the interests of Petroleum Holders

13.1 Overlapping Petroleum Tenements

Currently the Project is covered by an Authority To Prospect (ATP) 1103 with no current PL’s. The current holder of ATP1103 is CH4 Pty Ltd, a subsidiary of Arrow Energy Pty Ltd (Arrow).

The information required for the CSG Assessment Criteria is provided in Attachment 10 CSG Statement and CSG Assessment Criteria, which accompanies the MLA. In summary, the conclusions to Attachment 10 are that the Applicants will enter into a coordination agreement with the overlapping ATP holder to enable extraction of petroleum resources be undertaken concurrently.

The Applicants are currently parties to a Co-Development and Coordination Arrangement with CH4 Pty and Arrow Energy Pty Ltd for extraction of the gas reservoir in the Petroleum Tenure that overlaps the Carborough Downs mine. The working relationship between the parties at Carborough Downs is strong and productive with a collaborative approach to gas drainage design to assist with coal mining and maximizing coal seam gas extraction for both parties respectively.

Currently there is a Joint Interaction Management Plan between both parties for the Project area covering exploration works. Preliminary discussions have begun about the co-development agreement for these mining activities using the existing agreement between Arrow Energy and Carborough Downs as a template. Both parties have executed Confidentiality Agreements and data sharing is ongoing to facilitate clear knowledge of both parties’ intentions and understanding of their resources respectively.

13.2 Statement of Consideration of Effects

The information required for the CSG Assessment Criteria is provided in Attachment 10 CSG Statement and CSG Assessment Criteria, which accompanies the MLA. In summary, the conclusions to Attachment 10 are that:

- Any potential effects of mining operations on petroleum activities and interests can be fully controlled.
- Development of the Project is unlikely to affect any matter of public interest.

14 Requirement to optimise use of Incidental CSG

The Applicants consider the extraction and utilisation of incidental coal seam gas (IMG) to be an important component in the development of the Project.

In addition to the gas extraction activities that may be undertaken by holders of any PL, it is a regulatory and safety requirement that gas drainage of a specific area be completed prior to mining. Any drainage of incidental gas that will need to be undertaken for the Project will utilise either SIS (surface to in-seam) or the UIS (underground to in-seam) gas drainage wells. The SIS method is employed when there is considerable lead time between draining activity and mining activity. This method is preferred by entities wanting to utilise the gas resource. UIS method will be used to further accelerate drainage in problematic areas or where access on the surface will not be permitting of the SIS method.

Both methane and water is extracted from the SIS and UIS extraction wells. Initially, there is a higher proportion of water to gas. As pressures reduce, the quantity of associated water extracted reduces and the quantity of gas increases. Figure 22 shows an indicative pattern of associated water and methane production for a typical coal seam gas (CSG) well. Timeframes can differ significantly from site to site as this is highly dependent on permeability, groundwater potential, and depth of the coal seam.
Subject to Co-Development Coordination arrangements that may be entered, initial pre-drainage is planned to be via SIS wells. Wells will be sited in alignment with planned gateroad and longwall panel orientation. Branch density is based on past drainage performance at CDCM and local permeability and in-situ gas content results.

The gas extraction wells will be connected to water and gas pipelines to allow water and gas to be transferred to central locations for management. Each well will also require power supply and road access.

14.1.1 Management of Incidental Mine Gas

The Mineral Resources Act 1994 prescribes the use of IMG produced from a mining lease. Under a mining lease, IMG can be:

- put to beneficial use under the mining lease (e.g. power generation) or
- where there is an overlying petroleum lease (PL), the gas can be exported to the PL owner.

The Applicants will pursue gas drainage and management strategies in relation to any incidental CSG to meet the objectives of the State and optimise the economic benefits that can be achieved.

15 Consistency with Petroleum Lease Development Plan and relevant Coordination Agreement

Arrow and the Applicants already have an existing relationship and a co-development agreement and coordination arrangement at Carborough Downs underground mine. The working model and arrangement between both parties will form the building blocks for the utilisation of incidental coal seam gas at the Project site. Discussions have already begun between both parties with exchange of data, including but not limited to:

- Project Area mining schedule
- Project Area mining rates
- Arrow SIS pilot program production results
- Exploration data
16 Any other matter prescribed by a Regulation

There are no other matters relating to an IDP prescribed by regulation.

17 Criteria for deciding whether to approve proposed Plan

17.1 Criteria under Section 318EA

a) Potential of the area of the proposed mining lease for mining and each other purpose for which the lease is sought

This document has demonstrated that the proposed mine has good potential prospects of economic extraction over a 25-year timeframe for underground mining of the targeted coal seams. This is based on:

- A prefeasibility mining study on the deposit, inclusive of long-term coal price forecasts and USD conversion rates
- The cost savings associated with using the existing infrastructure and CHPP at Carborough Downs – an adjacent operation owned by the Applicants

The MLA is sufficiently mineralized with coal to warrant extraction over a mine life that provides a reasonable assurance of financial return on the Applicants’ investment in the Project.

This document also demonstrates that all activities associated with coal extraction, such as construction and operation of mining infrastructure, coal handling and preparation, access, and associated infrastructure requirements can be realized across the MLA without any significant constraints in principle.

b) Nature and extent of activities

The nature and extent of activities has been set out in Section 5. This document has demonstrated that the areas required by the Project are appropriate in size and intensity.

c) When and where the activities are proposed to be carried out

Sections 5 and Section 6 have stated when and where the activities are proposed to be carried out. Detailed information is provided for the timing of activities during the period of this IDP (5 years) as well as the term of the ML sought (25 years). All activities will be carried out on the MLA by the Applicants’.

d) Whether the mining of minerals that, under s243, are sought to be specified in the lease will be optimised in the best interests of the State, having regard to public interest

The target mineral being sought is coal. Section 12 demonstrates that the Project satisfies a public interest test by having a positive impact overall in terms of government policy, value of commodity production, employment creation, total return to the State and Australia, and social benefits.

e) The CSG Assessment Criteria

The information required for the CSG Assessment Criteria is provided in Attachment 9 CSG Statement and CSG Assessment Criteria, which accompanies the MLA. In summary, the conclusions to Attachment 9 are that:

- The Applicants’ will enter into a Coordination Arrangement and a Co-development Agreement with the overlapping ATP holder, should petroleum resources be developed concurrently.
- Development of the Project is unlikely to affect any matter of public interest.