Appendix A
Modified Project Description

Boggabri Coal Mine Modified Project Description

BOGGABRI COAL MINE MODIFICATION 10
Boggabri Coal Operations Pty Ltd
May 2025

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1. Introduction

Boggabri Coal Mine (BCM) was originally granted approval under Development Application (DA) 36/88 on 22 August 1989. BCM currently operates under SSD 09_0182 which has been modified on nine occasions to date with one modification currently being considered by the State Government.

The Project Description provided in Section 3 of the *Continuation of Boggabri Coal Mine Environmental Assessment* (2010 Boggabri EA) (Hansen Bailey, 2010) which supports Project Approval (PA) 09_0182 (now SSD 09_0182) is provided herein as the main project description being modified over time.

2. Modification Key

The BCM Continuation Project was originally granted PA 09_0182 (now referred to as SSD 09_0182) on 18 July 2012.

SSD 09_0182 has been modified on nine separate occasions to date, with one modification (MOD 10) to be considered by the State Government. These modifications are as follows:

- MOD 1 – this application was withdrawn;
- MOD 2 – 17 February 2015;
- MOD 3 – 17 March 2014;
- MOD 4 – 23 March 2015;
- MOD 5 – 30 August 2016;
- MOD 6 – 7 July 2017;
- MOD 7 – May 2019;
- MOD 8 – January 2024;
- MOD 9 - 2 March 2023;
- MOD 10 – with the NSW Department of Planning, Housing and Infrastructure (DPHI) for consideration; and
- MOD 11 – July 2024.

The type colours above correlate with the changes made for each modification in the sections below.

This document seeks to provide a summarised description of the approved operations at the BCM that are authorised by SSD 09_0182 (as modified) as granted under the EP&A Act. This document does not intend to vary or replace the approvals documentation that supports SSD 09_0182 and has been prepared to account for the key changes to the BCM via modifications which have been granted. Accordingly, this document should not be relied upon or considered in the absence of a thorough review and consideration of the relevant planning approvals documentation applicable to SSD 09_0182.

3. Project Description

This section provides the 2010 Environmental Assessment Project Description from Section 4 of the Continuation of Boggabri Coal Mine Environmental Assessment (Hansen Bailey, 2010) and includes the parts that have been modified between 2010 to 2025 (inclusive of MOD 10).

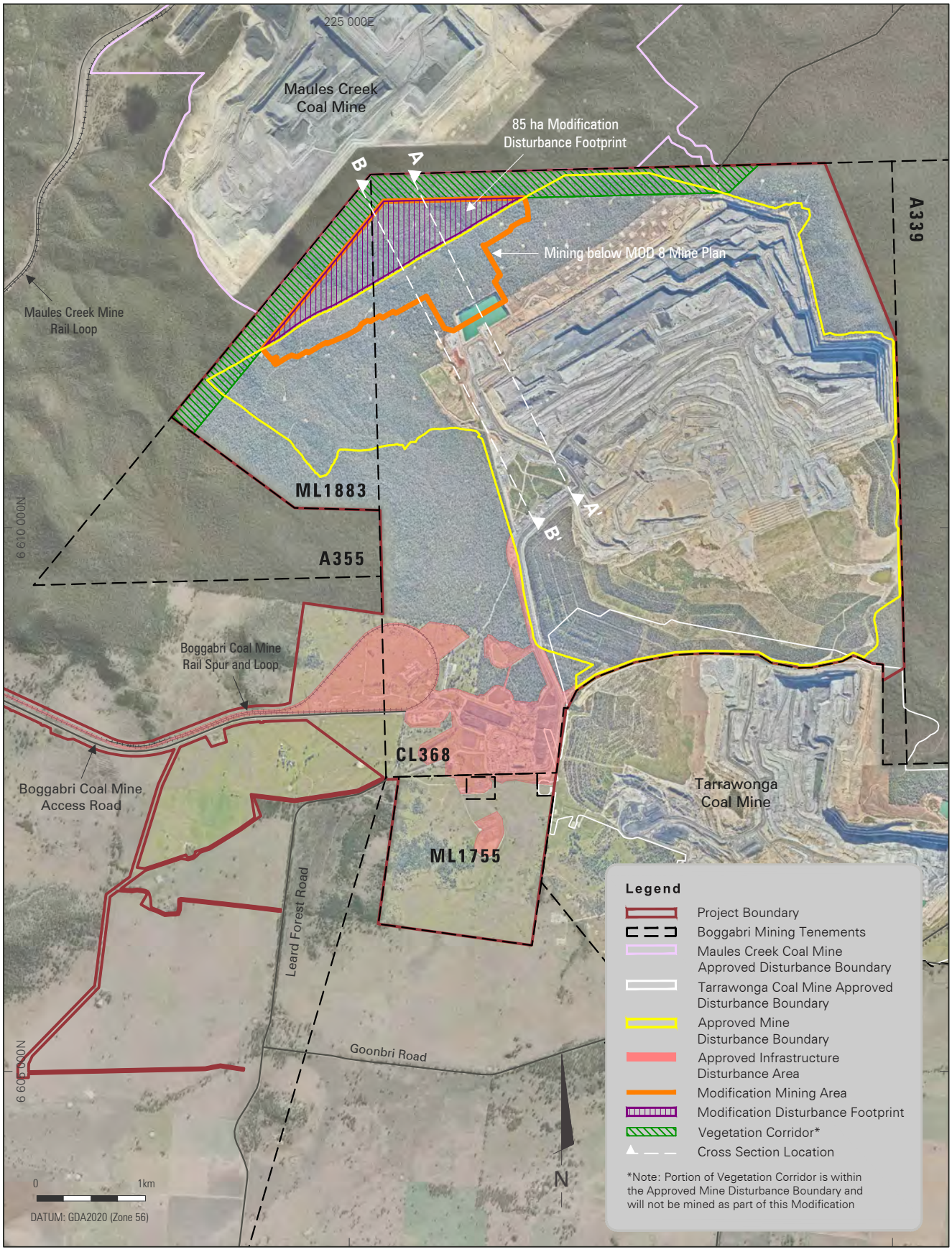
3.1 Summary

This section includes a detailed description of the Project including: the conceptual mine plan, equipment and manning requirements, a description of upgrades / modifications to existing infrastructure, waste strategy and indicative construction phases (see ~~Figure 7~~ Figure 1 and Figure 2). It also includes a discussion on the need for the Project and a Justification of the proposed mine plan.

Boggabri Coal is seeking a Project Approval under Part 3A of the EP&A Act to gain a single, contemporary planning approval for the continuation of its mining operations within its current mining tenements and on land listed in Appendix B for a further ~~21~~ 28 years (the Project).

In seeking Project Approval, Boggabri Coal also seeks to maximise operational flexibilities through staged additions and upgrades to infrastructure and an increase in approved coal production to enable it to be in a position to take advantage of any favourable market opportunities going forward. The Project generally comprises the following:

- Existing mining equipment, plant and infrastructure and additional works completed prior to November 2011 as described in Section 3 will form part of the Project;
- Open cut mining will continue using conventional shovel / excavator and truck fleets and as mining configurations and conditions warrant / allow, the potential introduction of a dragline. Mining will occur up to 7 days per week, 24 hours per day and excavate up to depths of approximately ~~180~~ 380 m to the base of the ~~Merriown~~ Templemore coal seam. Production will increase in stages to ultimately achieve ~~7~~ 8.6 Mtpa of product coal for the export market;
- Use of the Boggabri Coal Mine (BCM) infrastructure facilities to receive TCM coal, where it will be processed and transported off-site (subject to commercial agreement). Up to 4.2 Million tonnes per annum (Mtpa) of ROM coal will be processed via the BCM Coal Preparation Plant (CPP) facility, with the remaining ROM coal bypassing the CPP;
- Construction of a CPP and associated infrastructure including a 600,000 t product stockpile and reclaim system to meet market demands. An extension of the product coal stockpile will be constructed for coal received from TCM (subject to commercial agreement). BCM use of the stockpile area previously approved for TCM coal;
- Out of pit Overburden Emplacement Area's (OEA) will be created to the south and east of the mining excavation area and once there is sufficient space for in pit dumping, the open cut mine area will be progressively backfilled with overburden;
- The mine water management system will divert clean water around the mining and site infrastructure areas (wherever reasonably and feasibly practicable) and capture dirty water runoff and mine water in storage structures for reuse;
- Mine haul roads will be constructed as mining progresses, to connect the advancing open cut mining area to the ROM pad, CPP and mine infrastructure area. An extension of the ROM stockpile will be constructed for coal received from TCM (subject to commercial agreement). An additional ROM stockpile extension will also be constructed to provide for separation of different ROM grades and additional stockpiling. Temporary ROM stockpile(s) will be created within the open cut mining area to manage ROM coal;
- Light vehicle roads from the mine infrastructure area to the open cut mine area will be developed and extended as mining progresses;

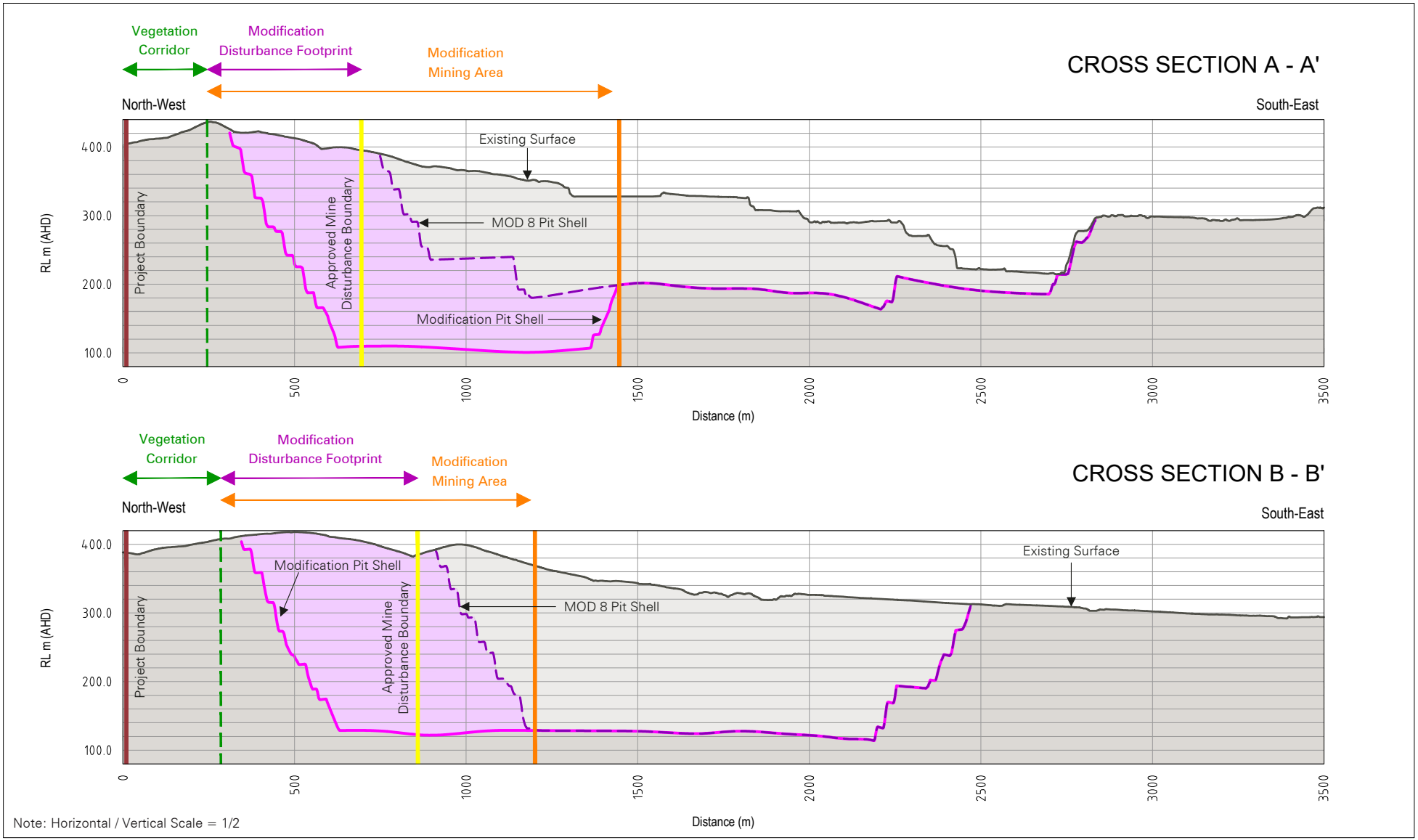


3115IDEM (BCM MOD10)_Conceptual Layout (16/05/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Modification Layout

FIGURE 1



(3115IDEM) BCM MOD10 - Cross Sections (10/04/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Modification Layout (Cross Sections)

FIGURE 2

- Widening of the private haul road to transport up to ~~7~~ 10 Mtpa of product coal;
- Construction of a rail loop and 17 km rail spur line across the Namoi River and floodplain including overpasses across Therribri Road, the Namoi River and the Kamilaroi Highway, connecting the mine to the main north-west rail line adjacent the Boggabri Coal Terminal;
- Use of a Rock Quarry located west of the Kamilaroi Highway, to store fill during construction of the Boggabri Rail Spur. The Rock Quarry will be rehabilitated following extraction of the fill material;
- Operation of a mobile rock crushing facility and associated fleet within the approved Mine Disturbance Boundary at BCM;
- Construction of train loading infrastructure adjacent the rail loop for loading coal onto trains for rail transport;
- Installation of additional mine power supply including the construction of a supply line with a capacity of up to 132 kV from near the Boggabri Coal Terminal to the mine infrastructure area and a sub-station pad. Power lines will be extended into the mine area to service electric shovels (and dragline) as required;
- Transport of thickened fines and coarse rejects by truck or pumping to in pit emplacement areas where they will be co-disposed, covered by spoil material and progressively rehabilitated;
- Construction of new mine infrastructure facilities including workshop, offices, bath house complex, fuel and lubrication storage areas, vehicle hardstand and road network to support these facilities;
- Construction of a temporary contractor site accommodation complex, to house up to approximately 150 people;
- Closure of a section of the Leard Forest Road and the subsequent upgrade of the surrounding road network as deemed necessary;
- Construction of a new Pre-Shift Start-up Infrastructure (PSI) Site at a location closer to active mining operations and access to the new site via a closed section of the former Leard Forest Road;
- Construction of an overpass on Therribri Road across the existing haul road (if the rail spur is not constructed) when production reaches 5.5 Mtpa saleable coal;
- Construction of a water management system including sediment dams and other water holding dams and associated infrastructure including pipes and pumps;
- Realignment of the BCM Project Boundary to be consistent with both the approved TCM Project Boundary and the current mining tenements;
- Transportation of coal samples required for marketing and analysis purposes by road;
- The inclusion of a range of drilling and exploration activities to support mining activities; and
- Minor administrative changes to conditions of SSD 09_0182 relating to the management of rehabilitation activities to align requirements with recent amendments to the *Mining Regulation 2016.*
- The above described production increase and related infrastructure construction works will occur in a staged approach as can be justified by economic drivers. A summary of the status of works currently approved and relating to the Project are included in ~~Table 2.1~~ Table 1 and shown in ~~Figure 8~~ Figure 3.

The Project seeks to uncover via open cut mining methods up to ~~7~~ 8.6 Mtpa of product (thermal and metallurgical) coal from within its current mining tenements. The Project will extract coal resources down to the ~~Merriown~~ Templemore coal seam via a shovel and excavator operation, with the potential introduction of a dragline in later years as the mine progresses. The Project is a logical progression of mining of the available and previously identified coal resource within Boggabri Coal's mining tenements.

The conceptual mine plan layout for the Project is shown on ~~Figure 9~~ Figure 4 to ~~Figure 12~~ Figure 11, for Years 1, 5, 10, ~~21~~ 11, 14, 17, 20 and 22. The progression of mining operations at BCM may vary from that conceptually shown due to a range of factors such as localised geological features, coal market (volume and quality requirements), mining economics and ongoing detailed engineering design.

As indicated in the below figures, mining will continue on from the existing operations to the north-east before changing orientation and progressing in a north-westerly direction towards Leard Forest Road.

Mining will progress into the Willow Tree Range which surrounds the Project's open cut area to the east, north and west. Active mining areas will be shielded by the Willow Tree Range in these directions reducing any visual and lighting impacts.

An OEA will be located to the south within the lease area as mining progresses to the north with a maximum height of approximately RL ~~395~~ 400 m. An out of pit OEA will be positioned to the east of the mining void adjacent the Willow Tree Range. The entire mining area will be well shielded in all directions following the completion and rehabilitation of the southern slopes of the OEA. The Mine Disturbance Boundary is shown on ~~Figure 7~~ Figure 1 and summarised in ~~Table 7~~ Table 2.

A conceptual final landform design for the Project (upon completion of mining activities) has been developed to demonstrate that the orderly closure of BCM can be achieved following the extraction of the coal resource.

A discussion of the post-mining land use and management of the final voids is provided in Section 8.15. It should be noted that there is the potential for a further seven years of mining to the north beyond the Mine Disturbance Boundary and 21 year mine limit at ~~7~~ 8.6 Mtpa which would result in a smaller final void.

Further to this there is the potential for further open cut mining within the adjacent mining authorities (not held by Boggabri Coal) which could utilise any final void area left by Boggabri Coal. The surface catchment of the final void will be minimised as far as practical by the use of diversion drains and contour banks as required.

Table 1 Work Status

ASPECT	Existing	New Works (prior 2011)	~~Approved~~ PA 09_0182 (MOD 6)*	~~The Project~~ SSD 09_0182 (MOD 7)*	MOD 10
Mine Plan					
Water management structures	Yes	Yes	Yes	Yes	Yes
Haul roads	1	1	1	1	1
Dragline and construction pad	0	0	1	1	1
CPP					
ROM pad	1	1	1	1	1
ROM hopper	1	0	1	2	2
Crushing plant	1	0	2	2	2
CPP, conveyors and auxiliary equipment	0	1	1	1	1
Tailings dam	0	0	1	0	0

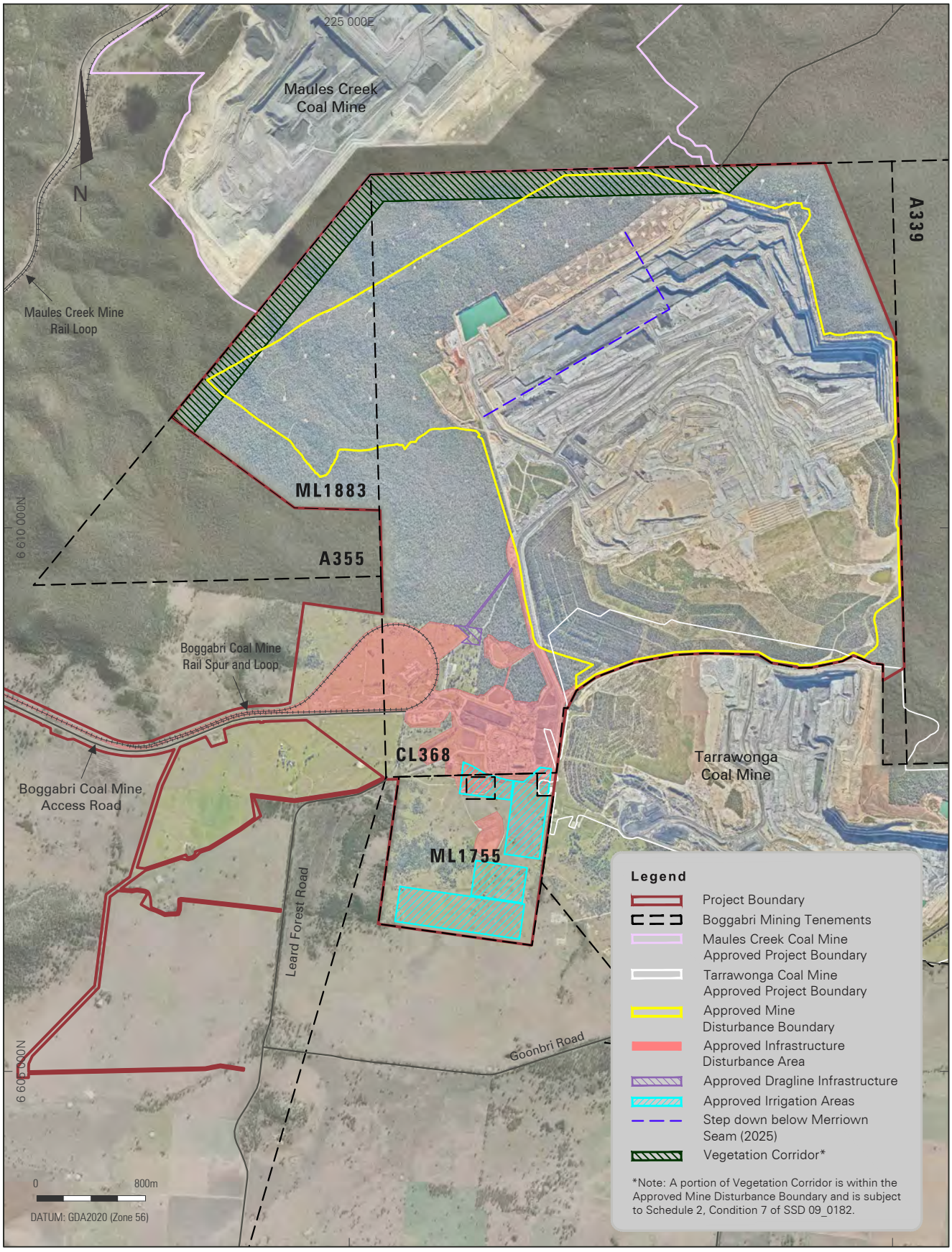
ASPECT	Existing	New Works (prior 2011)	~~Approved~~ PA 09_0182 (MOD 6)*	~~The Project~~ SSD 09_0182 (MOD 7)*	MOD 10
Product Handling					
Product coal stockpiles and reclaimer	0	1	2	2	2
Product receival and stacking and stockpile at Boggabri Coal Terminal	1	1	1	1	1
Second haul road loop	0	1	1	1	1
Infrastructure					
Power supply and substation	1	0	1	1	1
Fuel Farm tanks	2	3	3	10	10
Sewerage systems	2	1	2	1	2
Heavy and light vehicle wash bay	1	1	1	2	2
17 km rail spur and loop	0	0	1	1	1
Closure of a section of Leard Forest Road	No	No	Yes	Yes	Yes
17 km private coal haul road	Yes	No	Yes	Yes	Yes
Irrigation system	Yes	Yes	Yes	Yes	Yes
Rock Crushing Facility	Yes	No	Yes	Yes	Yes
Rock Quarry	Yes	No	Yes	Yes	Yes
Buildings					
Workshops, service bays, bathhouses, PSI facilities and office complex	1	1	2	2	2
Construction camp facility	0	0	0	1	1

**Prior to MOD 7, the BCM was considered a "transitional Part 3A project". The former Part 3A and associated Section 75W of the EP&A Act (i.e. the modification provision for Part 3A Projects) was discontinued in March 2018. Despite this, all previous modifications approved under this provision were deemed to be part of the authorised development. After March 2018, the provisions under Section 4.55 of the EP&A Act apply. The Boggabri Coal Project (PA 09_0182) was ultimately declared to be an SSD on 20 June 2019 subsequent to the grant of MOD 7.*

Table 2 Work Disturbance Areas

ASPECT	Existing (ha)	New Works Prior to 2011 (ha)	~~Approved Project (Boggabri EIS and SEE)~~ PA 09_0182 (MOD 6) (ha)*	~~The Project~~ SSD 09_0182 (MOD 7) (ha)*	MOD 10 (ha)
Rail Spur, Rail Loop and Private Haul Road	34.0	0.0	68.0	68.0	0.0
Mine disturbance area	385.0	88.0	1,176.0	1,835.0	85.0
Infrastructure areas including office, bath house, workshop, wash bays etc	35.0	8.0	45.0	51.0	0.0

**Prior to MOD 7, the BCM was considered a "transitional Part 3A project". The former Part 3A and associated Section 75W of the EP&A Act (i.e. the modification provision for Part 3A Projects) was discontinued in March 2018. Despite this, all previous modifications approved under this provision were deemed to be part of the authorised development. After March 2018, the provisions under Section 4.55 of the EP&A Act apply. The Boggabri Coal Project (PA 09_0182) was ultimately declared to be an SSD on 20 June 2019 subsequent to the grant of MOD 7.*

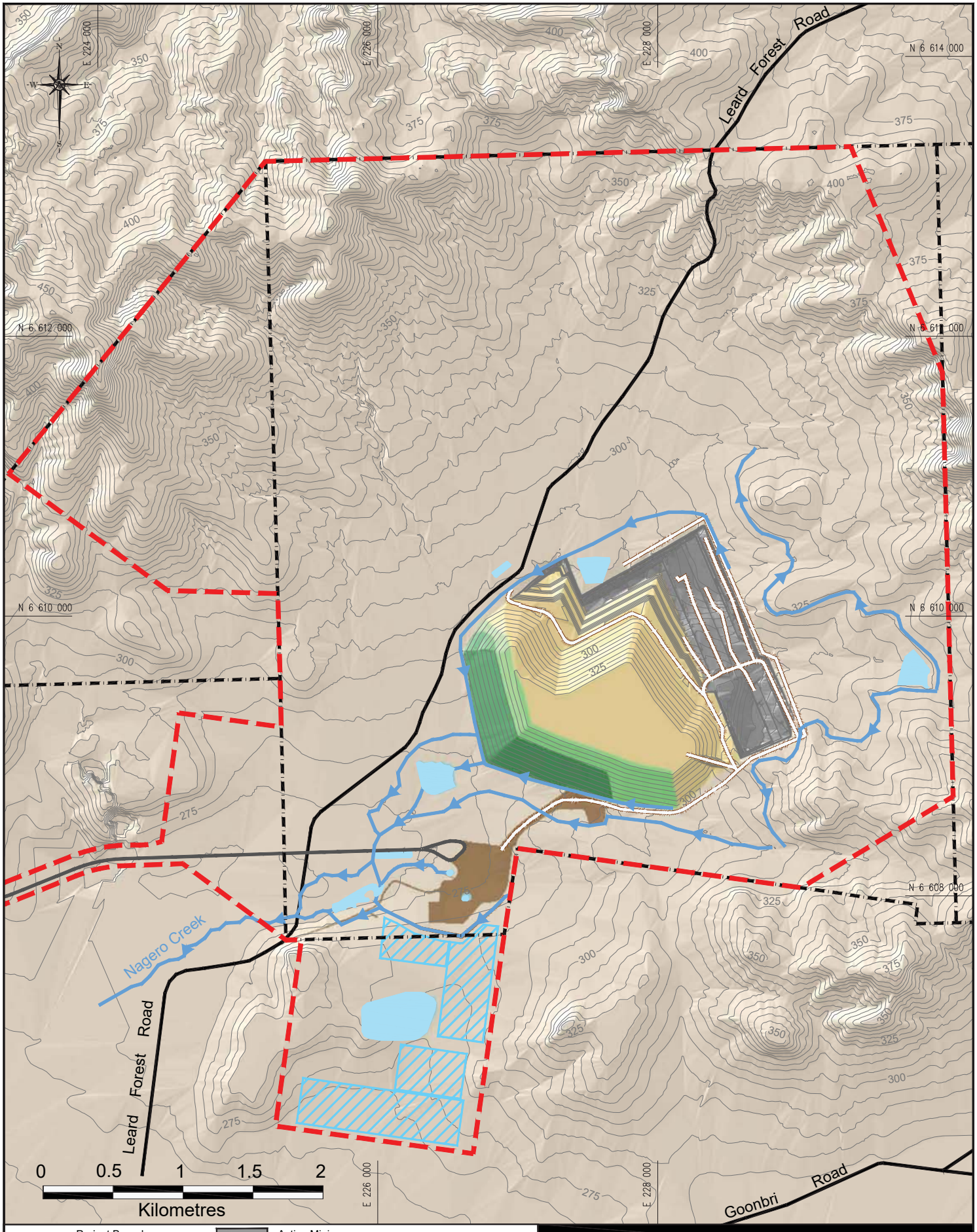


3115IDEM (BCM MOD10)_Approved Operations (23/05/2025)

BOGGABRI COAL MINE MODIFICATION

Approved Operations

FIGURE 3



Project Boundary
Boggabri Mining Tenements
Roads
Drainage
Private Haul Road
Indicative Haul Routes
Proposed Infrastructure Area
Active Mining
Spoil
Water Storage
Irrigation Areas
Existing Rehabilitation
Proposed Rehabilitation

Hansen Bailey

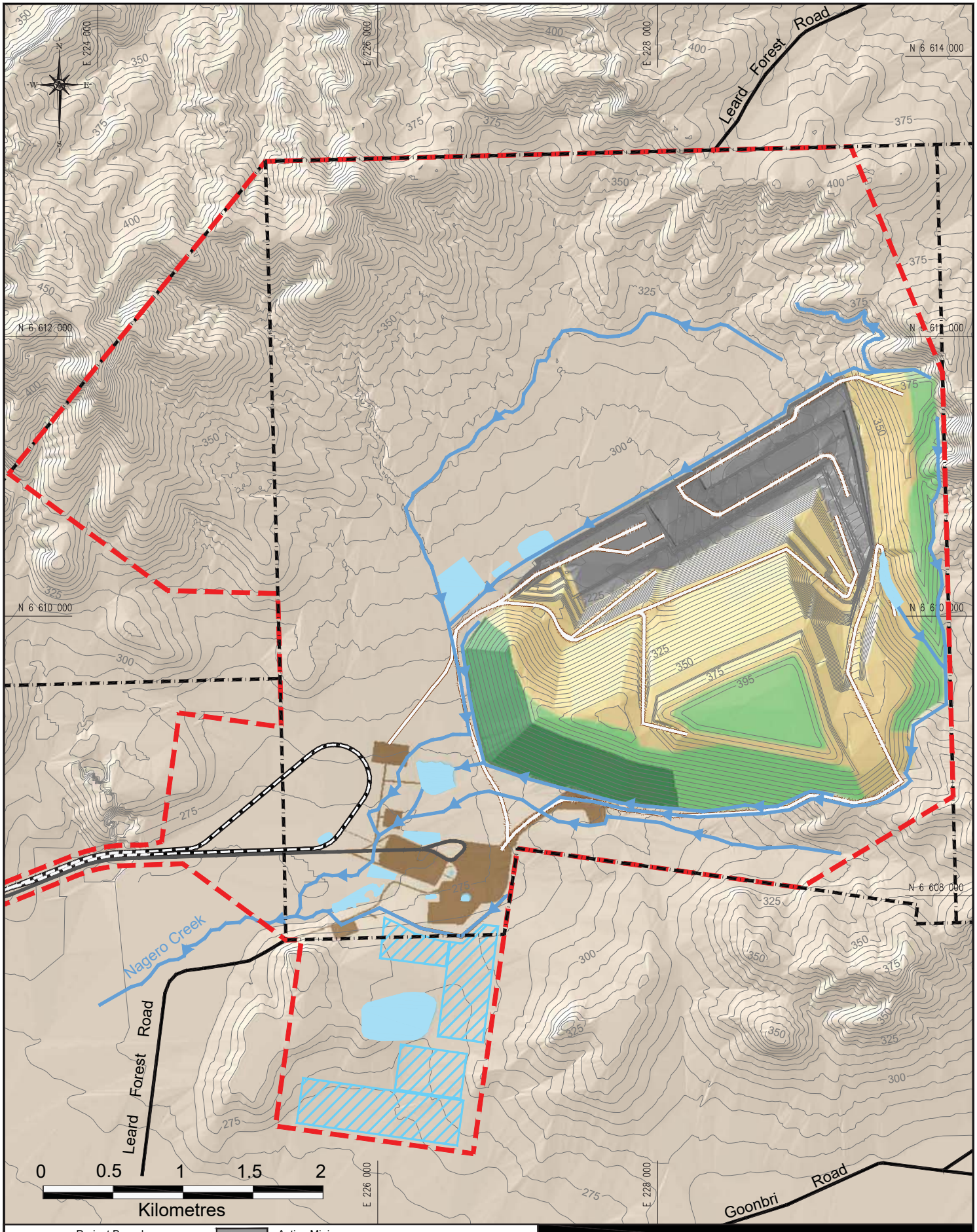
IDEMITSU
BOGGABRI COAL

Source: Boggabri Coal (2010)

BOGGABRI COAL MINE

Conceptual Year 1 Mine Plan

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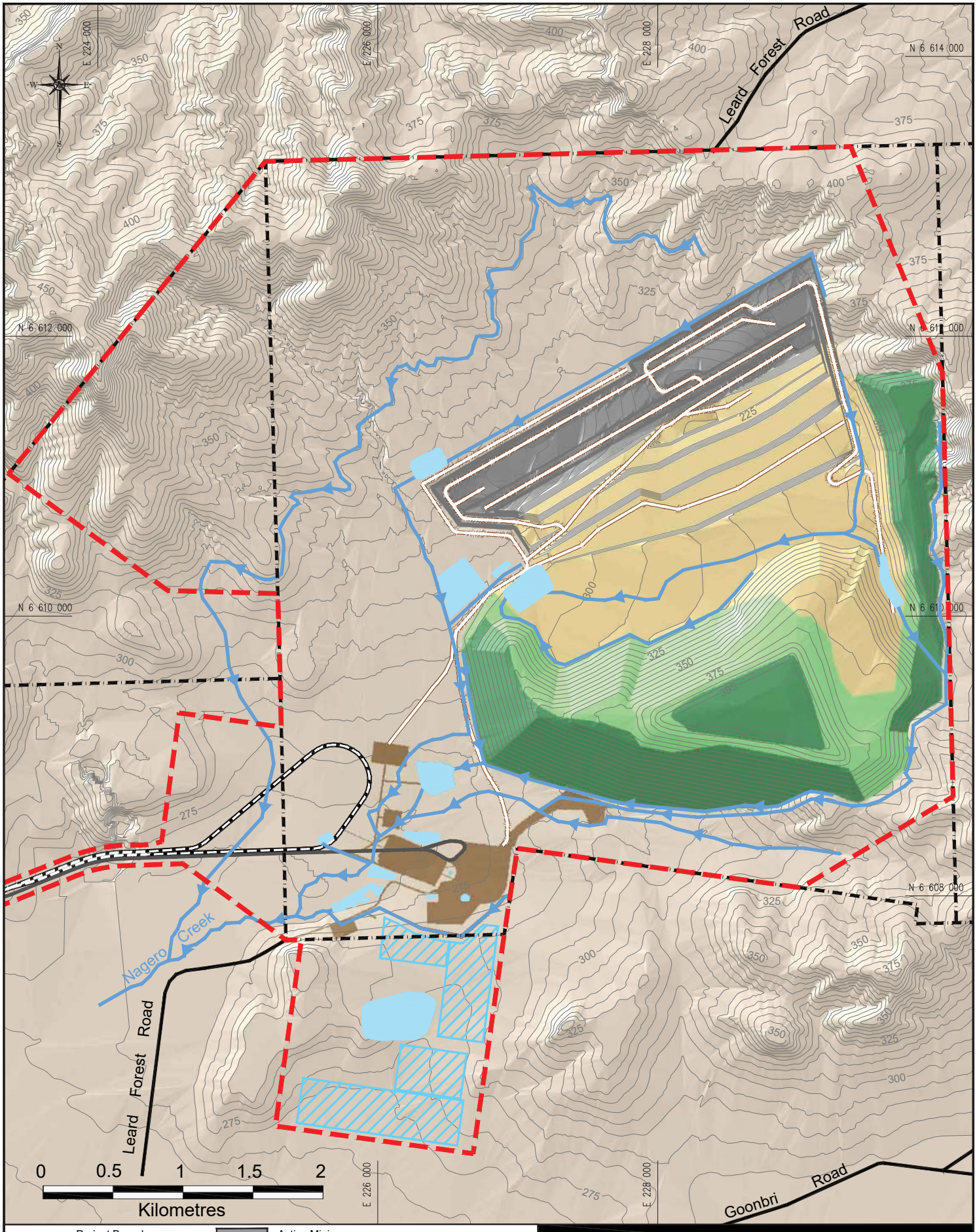


Source: Boggabri Coal (2010)

BOGGABRI COAL MINE

Conceptual Year 5 Mine Plan

Cad File: 06045G.dwg	Date: 21.06.2010	Drawn: CP	Figure 5



Hansen Bailey

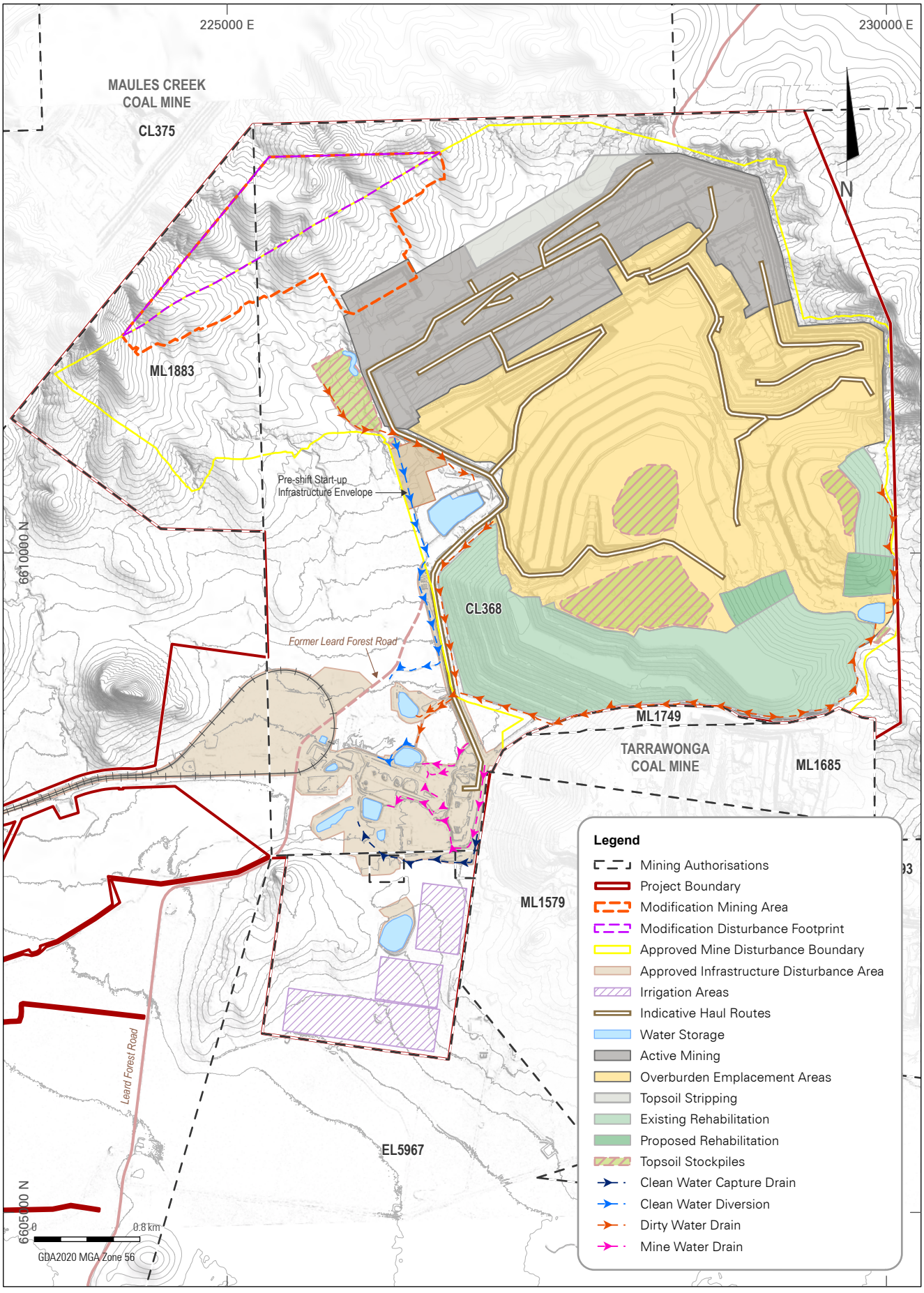
IDEMITSU BOGGABRI COAL

Source: Boggabri Coal (2010)

BOGGABRI COAL MINE

Conceptual Year 10 Mine Plan

Cad File: 06046G.dwg	Date: 21.06.2010	Drawn: CP	Figure 6

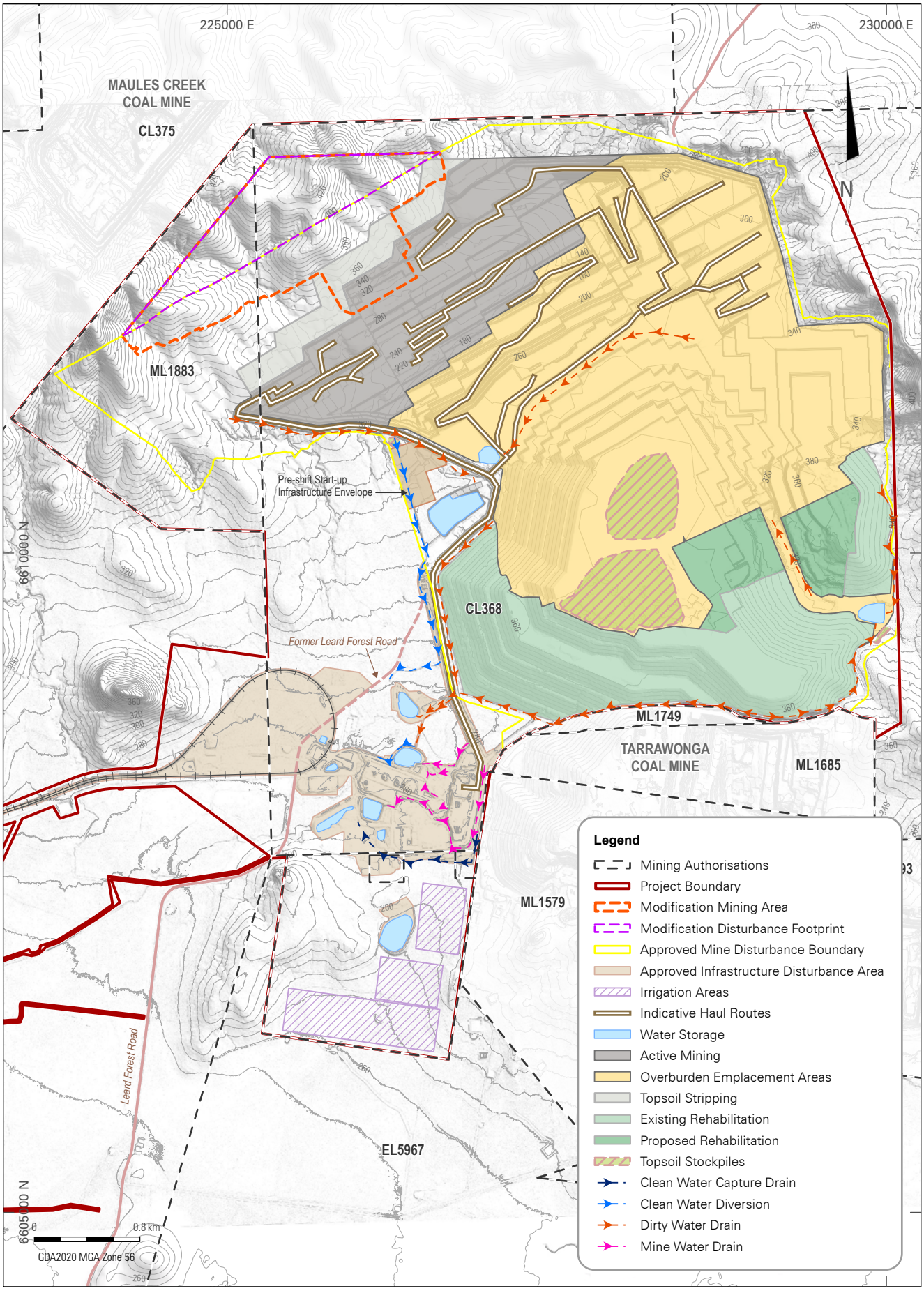


3115\DEM (BCM MOD10)_Mine Stages.aprx (16/05/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Mine Plan (Year 2025)

FIGURE 7

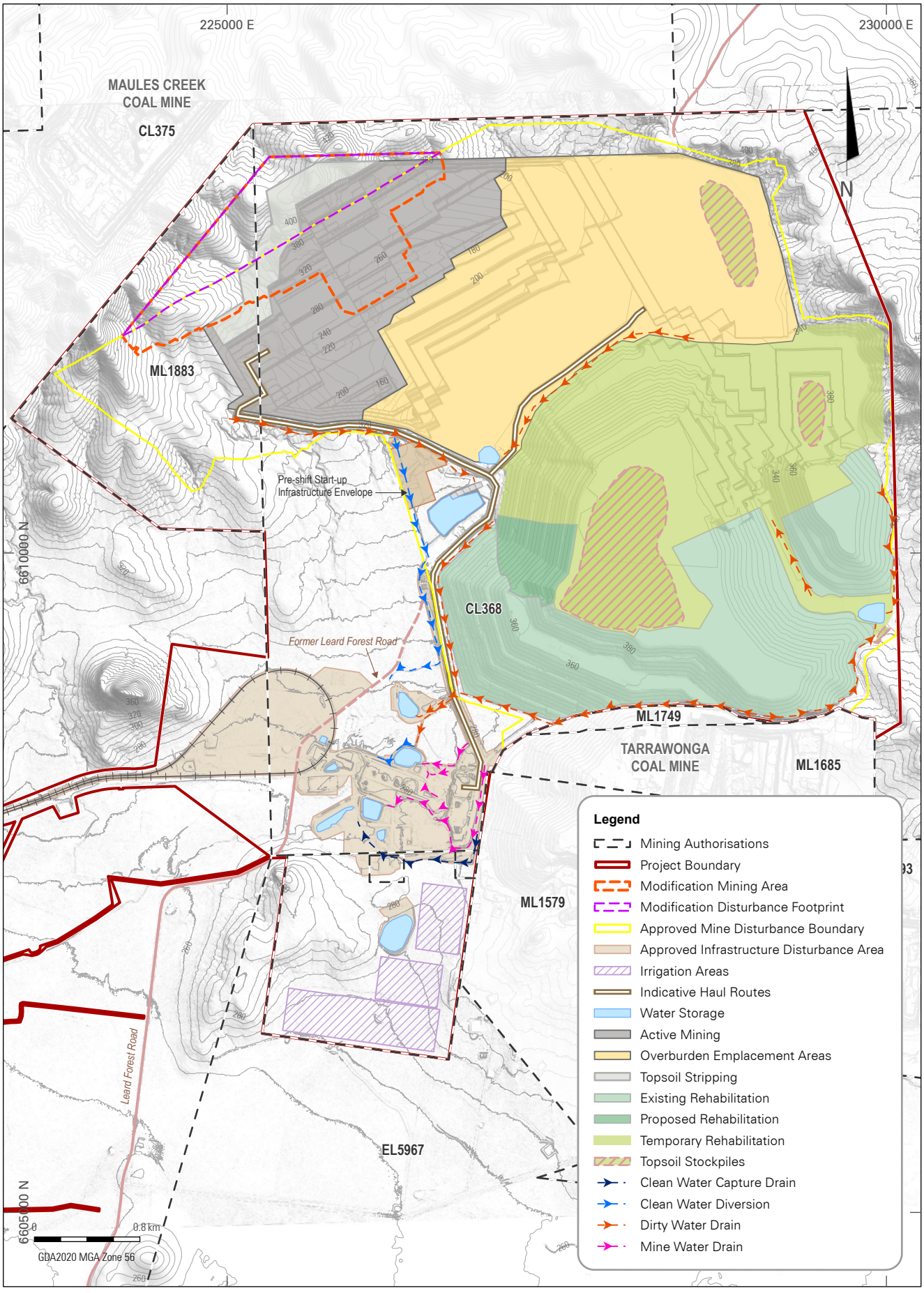


3115\DEM (BCM MOD10)_Mine Stages.aprx (16/05/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Mine Plan (Year 2028)

FIGURE 8

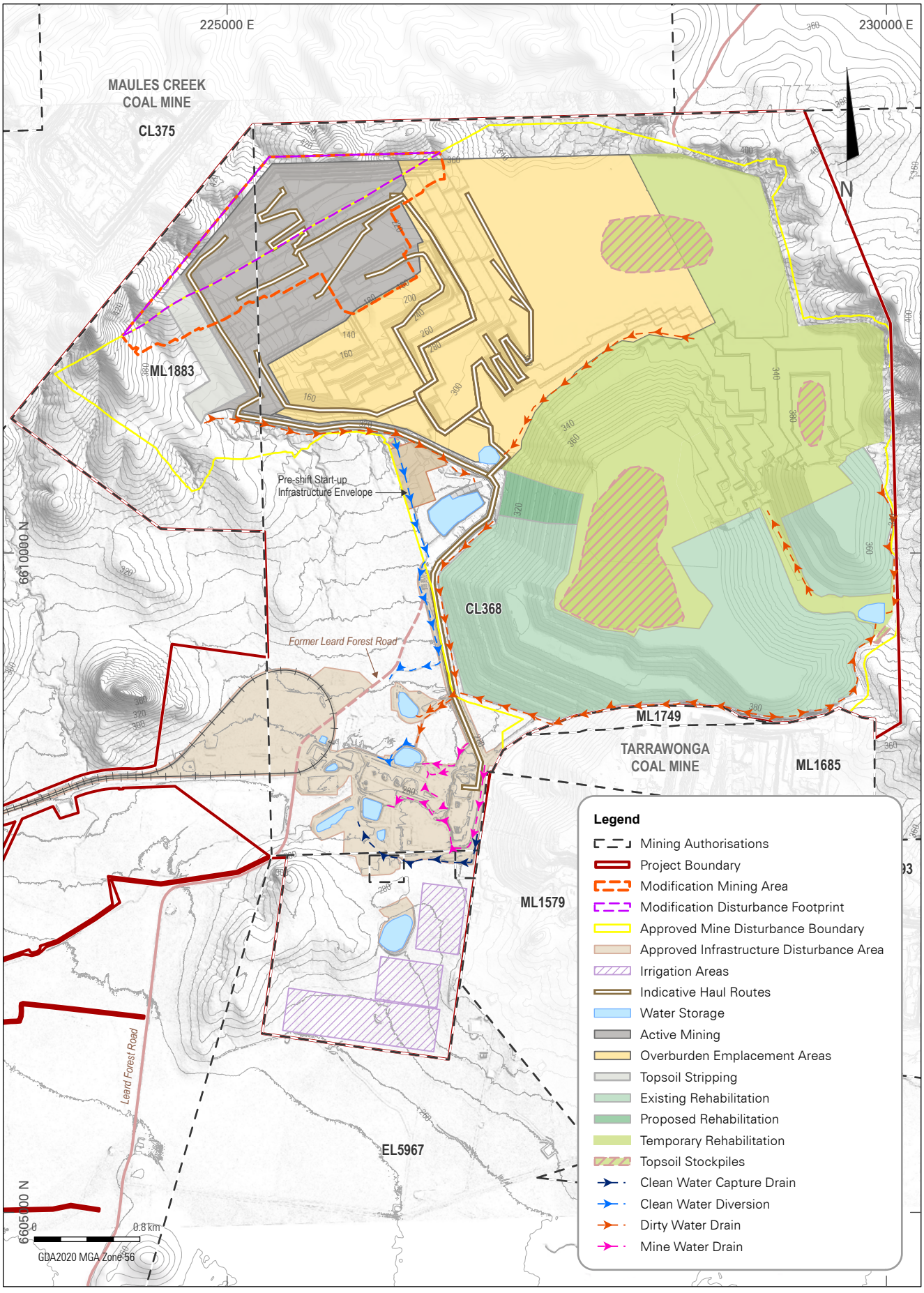


3115\DEM (BCM MOD10)_Mine Stages.aprx (16/05/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Mine Plan (Year 2031)

FIGURE 9

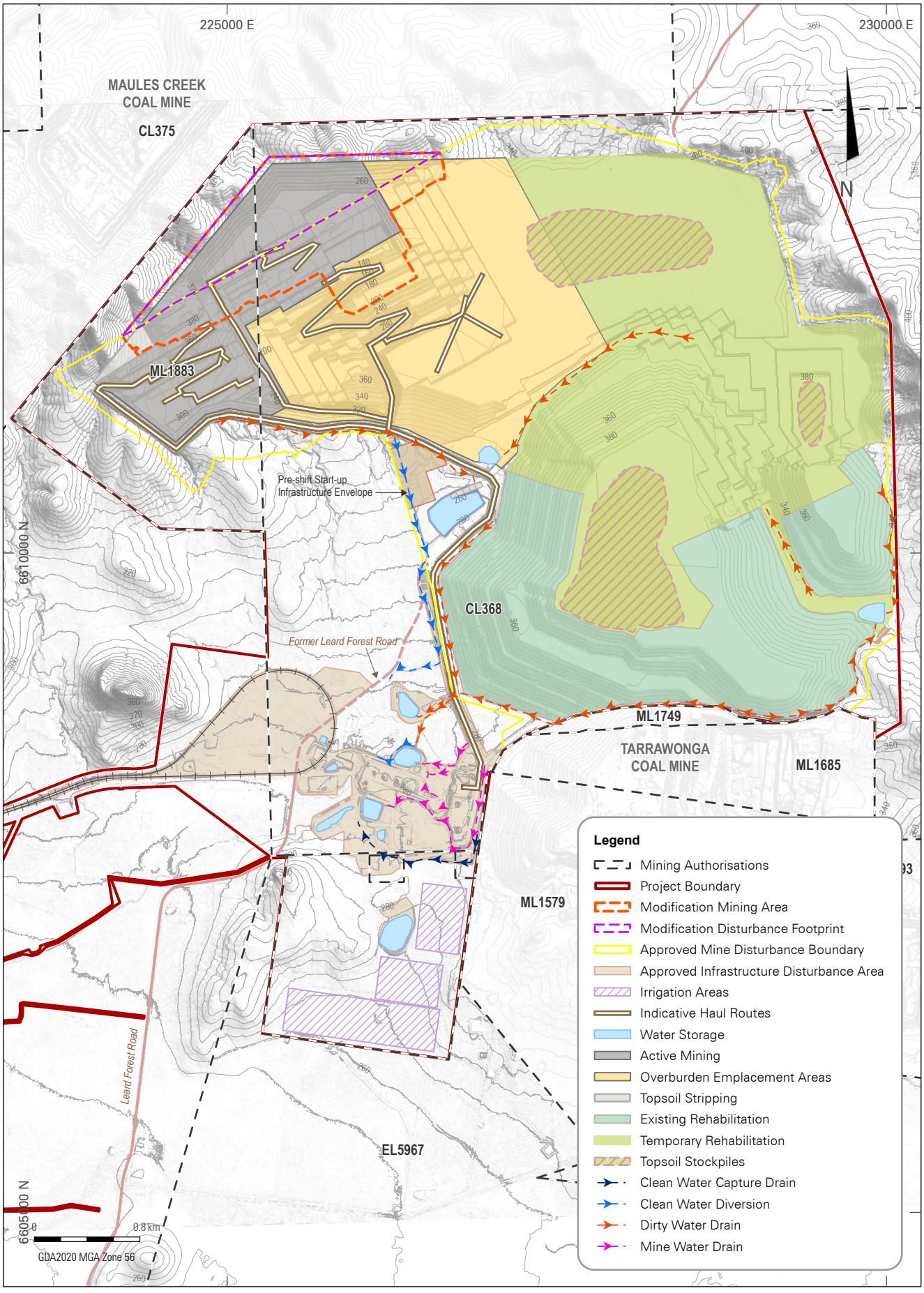


3115\DEM (BCM MOD10)_Mine Stages.aprx (16/05/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Mine Plan (Year 2034)

FIGURE 10



3115\DEM (BCM MOD10)_Mine Stages.aprx (16/05/2025)

BOGGABRI COAL MINE MODIFICATION

Conceptual Mine Plan (Year 2036)

FIGURE 11

3.1.1 Mining Schedule and Method

An indicative open cut production schedule for the Project is outlined in Table 3. The conceptual open cut mining schedule for the Project involves a gradual increase in product coal levels until maximum production rates (i.e. 8.6 Mtpa) are achieved. The Project will remove up to ~~145~~ 203.1 Mt of ROM coal and produce up to ~~145~~ 184 Mt of product coal over the ~~21~~ 28 year approval period. Up to ~~980~~ 1,007 Million bank cubic metres of overburden will be moved and approximately ~~10~~ 17.5 Mt of coal reject material will be produced from the CPP over the ~~21~~ 28 year approval period. The production schedule ultimately realised will be dependent on market drivers over time.

The Project will continue to involve a shovel and excavator operation supported by a truck fleet to transport coal to onsite coal processing and transport facilities. In approximately Year 10 or when economically viable a dragline may be introduced to increase productivity.

Minor infrastructure associated with day to day mining operations, including topsoil stockpiles, sediment control, power supply sub-lines and sub-stations will be constructed ahead of mining within the Project Disturbance Boundary as required.

3.1.2 Blasting

Overburden and interburden will require blasting to achieve satisfactory fragmentation for optimum productivity of digging equipment. Overburden and interburden typically comprise conglomerates (69%), sandstone (22%) and siltstones (9%). Experience to date indicates that a powder factor of 0.62 kg/m^3 will be required for buffer blasting.

Cast blast powder factors for a dragline operation may vary from this.

3.2 Infrastructure

3.2.1 ROM Coal Handling

ROM coal will be delivered by haul trucks from the mining area directly to the ROM stockpile for later feeding to the crushing system by front end loader.

The ROM stockpile will enable flexibility to manage variations in coal quality and / or the production schedule. A temporary ROM field stockpile within the open cut mining area may be utilised for temporary storage from time to time as required. It is anticipated that less than five percent of ROM coal would be temporarily stored in a ROM field stockpile.

Following the construction of the CPP (discussed further in Section 3.2.2) uncrushed ROM coal will be delivered by haul trucks to one of the following:

- The ROM coal stockpile for processing through the CPP;
- A ROM coal field stockpile adjacent to active mining;
- The bypass ROM coal hopper; or
- The ROM coal stockpile for later rehandling through the bypass ROM coal hopper.

The management of ROM coal will depend on coal quality and the production schedule requirements at the time of mining. Any coal delivered to the ROM coal field stockpile will be rehandled to the ROM coal stockpile for later processing through the CPP or direct to the Bypass ROM coal hopper and loaded onto product coal haul trucks and / or product stockpile.

Table 3 Indicative Production Schedule

Project Year	Total Overburden (Mbcm)	ROM Coal Total (Mt)	Product Coal (Mt)	Course Reject (Mt)	Tailings (Mt)
Year 1	18.87	2.50	2.50	0.00	0.00
Year 5	59.89	8.57	6.97	1.28	0.32
Year 10	45.42	7.89	7.00	0.71	0.18
~~Year 21~~	~~47.08~~	~~7.89~~	~~7.00~~	~~0.24~~	~~0.047~~
Year 11	64.27	8.22	7.00	1.30	
Year 14	73.51	8.35	7.50	0.90	
Year 17	62.91	8.27	7.40	1.00	
Year 20	61.55	8.50	7.50	1.00	
Year 22	60.5	7.92	6.90	1.10	

3.2.1.1 Crushing Plant

The existing coal crushing plant located adjacent the ROM coal pad will continue to be used as part of the Project to crush ROM coal. Following construction and commissioning of the bypass crushing plant, the existing coal crushing plant will be modified to be the feed system for the CPP. Further, the truck loading bin will be modified to act as a surge bin to control feed into the CPP.

3.2.1.2 Bypass Crushing Plant

A bypass crushing plant will be constructed to the south of the ROM coal pad. The bypass crushing facility will receive coal direct from the mining area, ROM coal field stockpile or ROM coal pad.

The bypass crushing plant will provide for higher grade ROM coal with coal quality characteristics consistent with product coal to be loaded directly onto haul trucks or trains without passing through the CPP.
The crushing plant will comprise the following:

- A ROM coal hopper of at least 350 t capacity with a 1,000 mm grizzly for receiving coal direct from haul trucks;
- A nominal 1,250 tph feeder for delivering ROM coal to the primary crusher;
- A nominal 1,250 tph secondary / tertiary crushing system producing a 50 mm product;
- A nominal 1,250 tph product conveyor;
- A Coalscan, belt weight measure and metal detectors located on the product conveyor;
- A bypass product bin of at least 550 t capacity suitable for loading over size road trains; and
- An overflow stockpile for stockpiling product coal as required.

A diversion arrangement will be installed within the bypass crushing plant circuit to divert high ash product detected by the Coalscan unit to the CPP ROM coal handling system for processing and washing.

3.2.2 CPP

A CPP will be constructed to improve coal quality enabling Boggabri Coal to meet market demands.

The CPP will add value to the resource and provide further overall operational flexibility to the mine enabling alternative markets to be considered. This will in turn ensure the long term viability of the Project.

After ROM coal has passed through the coal crushing system as described in ~~Section 4.2.1~~ Section 3.2.1, the CPP feed conveyor will receive crushed coal from the feed surge bin at a nominal rate of up to 500 tph. The feed conveyor will deliver raw coal into the CPP feed hopper. The CPP will process coal at a rate of up to 4.2 Mtpa.

The CPP will ~~be~~ comprise a heavy medium cyclone module and spirals technology for processing coal. The nominal plant feed rate will be approximately 500 tph. All capacities will be validated during detail design of the CPP.

Coal will be fed from the CPP feed hopper to the desliming screen feed box. Feed coal will then be slurried in the desliming screen feed box and fed onto a desliming screen. Material will be collected and flushed to a dense medium cyclone (DMC) feed sump. Mixed dense medium and coarse coal from the DMC feed sump will be pumped into a single DMC.

Product coal and coal medium will overflow from the cyclone and discharge directly to a screen feed box that will distribute the flow onto a product drain and rinse screen. Product coal will be discharged from the end of the drain and rinse screen into the product centrifuges for dewatering and then discharged onto the product conveyor.

Reject and medium will underflow from the cyclone into the reject drain and rinse screen feed box from where it will be distributed onto the reject drain and rinse screen. Reject material will discharge onto the rejects conveyor for transfer to the rejects bin.

The desliming screen undersize (-1.4 mm) will gravitate to the desliming cyclone feed sump and will be pumped to the desliming cyclone cluster. The cyclones will classify the fine coal feed at approximately ~~0.125~~ 125 mm and the underflow will gravitate to the triple start spirals banks.

Desliming cyclone overflow will gravitate to the tailings thickener for process through a band press filter system. The spirals product will be collected in the spirals product sump and pumped to the spirals thickening cyclone cluster. The thickened underflow will be fed into the fine coal centrifuges, which will dewater the fine product and discharge onto the product conveyor.

Desliming cyclone overflow will gravitate to the tailings thickener. Flocculants will be added to the thickener feed launder to assist settling of the tailings prior to discharging into the feed well of the tailings thickener. Clarified water will overflow the thickener into the clarified water tank and will be recirculated through the plant as required. The tailings thickener underflow will be combined with the spirals reject and pumped to the tailings disposal hopper and transported back to the mining area for disposal.

The installation of an ultra fines plant as part of the CPP construction will facilitate the reprocessing of fines to further minimise waste and increase water recycling in the plant.

The above description is a general representation of the CPP that will be constructed as part of the Project.

While the overall description of the coal process is accurate the specific details of the process may vary following detailed design and the emergence of new technologies.

3.2.3 Product Coal Handling

A product coal stockpile will be constructed adjacent the ROM coal pad with a nominal capacity of up to 600,000 t. A product stockpile will allow for greater flexibility in the handling and managing of coal demands within the "Coal Chain" for delivering product coal onto ships at the Port of Newcastle.

Extensions to the product coal stockpile and ROM coal stockpiles will be constructed to accommodate the coal from the Tarrawonga Coal Mine (subject to commercial agreement). These new stockpiles for Tarrawonga Coal Mine will also be available for use by BCM. The stockpiles will allow for loading coal directly onto trains following the construction of the rail spur and loop. Dozers would be used to manage coal on the stockpile.

The reclaim system will comprise the dozer(s) on the stockpiles and an underground reclaim feeder system within a reclaim tunnel. The reclaim feeders will feed a conveyor with a nominal capacity of 5,000 tph.

Product reclaimed from the product stockpile will report to a Truck Loading Bin or to the Train Loadout facility following the construction of the rail spur and loop.

The CPP product conveyor will have a nominal capacity of 500 tph and will transfer washed product to a washed coal bin with a nominal 575 t capacity. The washed coal bin will be located adjacent to the CPP feed bin. The bin will have a bypass chute to facilitate stockpiling of coal as required. Any coal reporting to the stockpiles will be retrieved by front end loader for loading into the over size haul trucks.

Following the construction of the product stockpiles and rail spur and loop, CPP product will be delivered to the 600,000 t capacity stockpile.

3.2.4 Mobile Rock Crushing Facility

Boggabri Coal will operate a mobile rock crushing facility, crushing suitable rock materials encountered during the mining process to produce materials for construction of haul roads and hardstand areas. There may also be opportunities to utilise crushed rock in mine rehabilitation activities, such as for armouring drainage lines or sections of the final landform design.

The facility will consist entirely of moveable units including crushers, screens and conveyors. As such, no construction work is required to commission the facility. Raw and crushed rock is transported to and from the rock crushing facility using existing haul trucks, and existing excavators / loaders will be utilised to feed the crusher units. The facility contains stockpiles of both raw rock and crushed rock (separated into various size fractions).

The rock crushing facility is located within a compound that is approximately 200 m x 200 m. The mobile rock crushing facility is sited within or immediately adjacent to the active mining area. The facility will periodically be relocated to accommodate the progression of mining. All locations of the mobile rock crushing facility will be within the approved Mine Disturbance Boundary (i.e. no additional disturbance from approved disturbance).

The rock crushing facility is used to process overburden and interburden materials encountered by the approved mining operations. The crushed product is used for purposes within the BCM Project Boundary approved under SSD 09_0182.

The approximate maximum production rates for the rock crushing facility are estimated at:

- Maximum daily production of 1,800 tonnes per day; and
- Maximum monthly production of 25,000 tonnes per month.

The mobile rock crushing facility is approved to operate seven days per week during the 'day period' (according to the definition of "day" under SSD 09_0182). The facility will remain operational throughout the remainder of the approved mining at BCM.

The crusher is equipped with dust controls, including water sprays. The peak daily water demand for the facility is approximately 20,000 L/day (or around 7.3 ML/year). Recycled mine water is used for dust suppression, where practicable with external water supplies (if required) will be sourced under Boggabri Coal's existing water access licences (i.e. from the BCM bore field or the Namoi River) consistent with the approach described in the approved Water Management Plan.

3.2.5 Rail Spur and Loop

A rail spur linking the mine to the main rail line adjacent the Boggabri Coal Terminal will be constructed when production levels increase. Various factors including the economic viability to confirm the feasibility of hauling coal via rail compared to truck haulage to the Boggabri Coal Terminal will be assessed.

The rail spur will be approximately 17 km in length and aligned in a generally east to west direction. The rail easement is located on property owned by Boggabri Coal and crosses the Namoi River floodplain, as well as the National Stock Route, Kamilaroi Highway and Therribri Road. Coal would continue to be transported by truck haulage from the site until the rail spur, loop and associated infrastructure are operational.

The location of the connection point will enable faster entry and exit turnout speeds for locomotives and minimise track length as far as practical.

The rail spur will be designed to meet Australian Rail Track Corporation (ARTC) standards. The rail spur will connect to the main north-west rail line adjacent the existing Boggabri Coal Terminal. A high speed turnout from the main line has been incorporated (enabling exit from / entry to the main line at 60 kph).

Of the total volume of overburden material to be processed at the crushing and screening area in the Mine Infrastructure Area (MIA) for use as fill during rail spur embankment construction activities, approximately 180,000 t will be stockpiled at the highly disturbed Rock Quarry located to the west of the Kamilaroi Highway. Some fill materials have already been processed and stockpiled at the Rock Quarry in this regard. The additional processed material will be transported via the existing private haul road and stockpiled at the Rock Quarry for use during the construction of the Boggabri Rail Spur. The Rock Quarry will be rehabilitated following extraction of the fill material.

A maximum grade for loaded trains travelling uphill of 1% has been targeted and 2% for unloaded trains. Curves in the track have been maximised with the loop diameter of 500 m, noting that a train will be travelling through this portion of the line at less than 10 kph.

The horizontal alignment of the track has been developed to balance cut and fill requirements and drainage. The vertical alignment has been developed similarly and ensures adequate drainage structures below the track and formation.

The most significant feature of the rail link will be the Namoi River floodplain crossing, which is approximately 1.4 km long. A rail gantry will span the length of the floodplain and has been designed above the 1 in 100 year flood level.

Signalling on the main line as well as in the spur line will be controlled (centrally) from the Broadmeadow control centre. All signalling is designed to meet ARTC guidelines and the Boggabri yard signalling will also accommodate the new mainline turnout.

The private haul road (which now forms part of the Mine Access Road from the Kamilaroi Highway) will be used as a service corridor for the rail line where practical and will be maintained for mining related activities.

The Namoi River floodplain is approximately 1,400 m wide where the rail spur crosses the floodplain and Kamilaroi Highway. Based on flood studies undertaken it was determined that an opening of 1,100 m would be required to minimise potential impacts during flood events. As such, the design of the viaduct supporting the rail line across the floodplain has taken this into consideration. The freeboard height of the deck structure of the viaduct is designed to be at least 0.5 m above the 100 year floor level.

The viaduct will cross the Kamilaroi Highway, Namoi River and Therribri Road which are all located on the Namoi River floodplain and within the 1 in 100 flood level.

The design of the bridge over the Namoi River will be a triple span bridge design and will form part of the viaduct. Spillage trays or equivalent design features will be incorporated below the bridge to provide for a suitable environmental outcome where the rail line crosses the Namoi River.

3.2.6 Buildings and Services

3.2.6.1 Workshop

An additional ~~two bay workshop~~ four workshop bays will be constructed taking the total number of workshop bays to eight for the Project. Workshop bays will be designed with sufficient height to allow the raising of the tray of the largest rear dump truck envisaged (CAT 797 size). The stores area will also be extended to facilitate the project. A heavy vehicle workshop will also be constructed as part of the facilities for the PSI Site. A hardstand area will also be formalised within the MIA to service bulldozers and other earthmoving equipment. The reuse of the existing Daisymede laydown compound is proposed as a laydown area for vehicle storage, and the stockpiling and use of materials and/or equipment during both the construction and operational phases of the Project.

3.2.6.2 Bathhouse and Office

Additional bathhouse and office facilities will be constructed in a manner consistent with previously established buildings to meet increased demand as production increases. There will also be a bathhouse constructed as part of the PSI Site.

3.2.6.3 Fuel Farm

Diesel fuel will continue to be delivered to site by road transport. Additional self bunded fuel tanks will be installed adjacent the fuel bay to accommodate increased demand as production increases. Self bunded fuel tanks will be installed adjacent the Boggabri Coal Terminal and proposed rail loop for the purpose of refuelling trains and auxiliary equipment. The PSI Site will also include a diesel storage and dispensing facility. In addition, temporary fuel storage facilities are proposed to be used throughout Boggabri Coal Mine at strategic locations along haulage runs to optimise the efficiency and utilisation of the existing fleet.

3.2.6.4 Vehicle Wash Bay

Heavy vehicle wash bays to accommodate mining vehicles will be constructed and form part of the Project. Wash bays are used to prepare vehicles for entry to the workshops as well as reduce their 'dead load'. This facility will accommodate the haul trucks (both overburden and coal haulage), dozers, graders, and rubber tyred loaders.

Mud, grease and oils removed from the vehicles will be caught by a drive-in sump capable of being cleaned out by a front end loader. Following settlement and separation of the mud from the hose down water, the water will then be put through an oil separator unit and reused onsite. Water used at the heavy vehicle wash down bay will be treated water or dirty (coal contact) water.

3.2.6.5 Sewerage

Sewerage system upgrades will be required to accommodate the additional permanent and construction workforces. In addition, an onsite sewage treatment plant will be installed at the PSI.

3.2.6.6 Power

The Project will include electricity demands of up to 38 Megavolt-amperes with the introduction of electric shovel(s) and a dragline. The preferred required additional power supply is from the TransGrid 132 kV line passing to the west of the Project Boundary. The Project will include the construction of a 132 kV line to provide the increased power requirements to the mine.

The easement for the power line will be located within the Project Boundary where environmental assessments have been completed. The general alignment of the power line will follow the existing haul road and rail spur from the Kamilaroi Highway to the mine infrastructure area.

The detailed design of the power line will avoid placing footings in environmentally sensitive areas that contain any known archaeological sites.

3.2.6.7 Substation

The mine substation will be located adjacent the mine infrastructure area to compliment the upgraded power supply. This will provide ready access for power to mining equipment including the dragline and electric shovel. The substation will have the capacity to transform the supply power voltage down from 132 kV to 11 kV for distribution onsite in the mine infrastructure area. The substation area will be fenced for security and will have earth matting installed.

3.2.6.8 Communications

An optical fibre cable or radio communications will be installed to improve access to communications networks. An onsite communications tower will be constructed to provide a base for localised site communications networks such as two way radios and automated vehicle tracking systems. The tower will be located to provide line of site between the mining and infrastructure areas.

3.2.6.9 Fire Services

Fire services will be incorporated in the CPP in the form of stand pipes and hose reels. A deluge system will be included for the main switchyard transformer and will form part of the Project.

Water storage tanks will be installed to supply the water requirements for the fire suppressant services which will include dedicated pumps and diesel backup power to provide the flow and pressure for the system.

3.2.7 Leard Forest Road Closure / Relocation

Consistent with DA 36/88, a section of Leard Forest Road will be intersected by mining activities. Any relocation works or upgrades required as compensation for the closure of Leard Forest Road will be undertaken prior to its closure in consultation with the Narrabri Shire Council (NSC).

3.3 Indicative Equipment Fleet

~~Table 9~~ Table 4 includes the indicative equipment fleet required for Years 1, 5, 10, 11, 14, 17, 20 and ~~21~~ 22 of the Project.

3.4 Coal transportation

The Project will require additional coal transport and loading infrastructure to manage the transport of up to ~~7~~ 10 Mtpa, with the construction of a Rail Spur and Loop and associated loading conveyor systems (discussed in ~~Section 4.2.4~~ Section 3.2.5).

All export product coal will continue to be transported via truck haulage along the existing private haul road until the construction of the rail spur, loop and associated infrastructure is completed. The rail spur and loop will be constructed to increase coal transportation capacity and efficiencies when commercially viable.

3.4.1.1 Rail Transportation

A rail spur and loop may be constructed for the transportation of coal from the mine site to the Werris Creek Mungindi Railway Line as discussed in ~~Section 4.2.4~~ Section 3.2.5. It is anticipated that there will be an average of five to six train movements per day at full production (note: each train entering and exiting the Rail Loading Facility is classified as two train movements). Tarrawonga product coal will be transported off-site via the Boggabri private rail spur.

This will result in up to an additional 10 to 11 coal trains per week (on average) being dispatched on the Boggabri private rail spur and Werris Creek Mungindi Railway to the Port of Newcastle.

Total rail capacity may be increased by track upgrading, improved rail network over the Liverpool Ranges and additional passing loops. This will permit an increase in wagon axle load capacity up to 30 t (8,500 t train size) from the current 25 t axle load limit (6,000 t train size).

The introduction of larger capacity trains would also reduce the number of movements. Ongoing investigations and assessments to improve rail transport capacities are being undertaken by ARTC to increase the capacity of the Werris Creek Mungindi Rail Line. ~~Table 10~~ Table 5 shows the anticipated train sizes and movements per day for the Project. This assumes the rail capacity is available for the transport of up to ~~7~~ 10 Mtpa and relevant track upgrades are completed to provide access for larger capacity trains.

At a production level of 8.6 Mtpa, there will be an average of ~~five~~ seven to ~~six~~ eight train movements through Boggabri per day (inclusive of Tarrawonga coal). However, the number of train movements is proportional to train size and will be dependent on relevant track upgrades as discussed above. The estimated average train length would vary from 1.45 km up to 1.53 km in length.

Table 4 Indicative Mobile Equipment List

Equipment	Year 1	Year 5	Year 10	Year 11	Year 14	Year 17	Year 20	Year 22
Dragline	0	0	1	0	0	0	0	0
Electric Face Shovels	0	1	1	0	0	0	0	0
Excavators	4	6	6	9	9	8	8	8
Trucks	14	36	35	58	58	57	58	52
B-double Trucks	3	8	8	8	8	8	8	8
Front End Loader	1	3	2	4	4	4	4	4
Graders	2	6	5	4	4	4	4	4
Bulldozers	8	16	15	17	16	16	15	16
Rubber Tyre Bulldozers	1	3	2	1	1	1	1	1
Watercarts	2	5	4	5	5	5	5	5
Drills	2	8	7	5	5	4	4	4

Table 5 Train Movements

Year	Product Coal (Mtpa)	Train Movements / day*	No. of Carriages	No. of Locomotives	Train Length (m)
Current	1.5	1.5	72 (5,400 t)	3	1,275
Approved	5	2.6	84 (4,500 t)	3	1,487
Year 1	2.5	2.4	72 to 80 (5,400 t to 6,000 t)	3	1,275 to 1,300
Year 5	7	5.5	80 (7,000 t)	3	1,300
Year 10	7	4.5	91 (8,500 t)	3	1,450 to 1,530
Year 21	7	4.5	91 (8,500 t)	3	1,450 to 1,530

**365 days per year, includes loaded and empty train movements*

Note: Table 5 excludes updated numbers reflecting the increase in product coal to 8.6 Mtpa due to MOD 6. Additionally it does not include additional rail movements associated with transporting up to 3 Mtpa of product coal from the Tarrawonga Coal Mine.

3.5 Reject and Tailings Disposal

The coarse reject conveyor will deliver dewatered coarse rejects from the heavy medium cyclone circuit to the coarse rejects storage area. The coarse reject storage area will provide a storage buffer prior to loading into CAT 785 size rear dump trucks. The reject storage area will be accessible by a haul road connected to the mine haul road network for transport to the open cut mining area.

Tailings will have increased viscosity following treatment in a thickening unit and the possible installation of an ultra-fines plant. Belt filter press technologies will be utilised as and when required to assist in dewatering and conditioning slurry prior to transporting to the temporary tailings emplacement area for co-disposal.

Thickened tailings will be pumped or trucked to a tailings emplacement area which will be located within the open cut mining area. The tailings emplacement area will migrate over time with the advancing open cut operations and co-disposed with spoil material facilitating the regular rehabilitation of tailings emplacements. Temporary evaporation ponds may also be constructed to dry tailings waste prior to it being transported and for co-disposal within the mining area.

The proposed coarse reject and tailings disposal strategy provides adequate disposal options and capacity for all coal waste produced throughout the life of the Project whilst contributing to mine rehabilitation outcomes.

3.6 Water Management

The existing water management system will be progressively augmented as water management requirements change over the Project life. ~~Figure 9, Figure 10, Figure 11 and Figure 12~~ Figure 4 to Figure 11 illustrate the indicative drainage requirements for the Project and proposed catchment dams to reduce runoff and runoff velocity.

Water from coarse and fine reject material will be reclaimed for re-use in the water management system. Water recovered from the open cut operation will continue to be pumped to mine water storages and will also be used in the CPP and for dust suppression.

During abnormally wet periods leading to an excess of water being generated onsite (when the total water storage is in excess of what is required for usage) water will be used for irrigation purposes prior to further excess water being held in the mine void. During abnormally dry periods water will be pumped from the Namoi River via a pumping station and pipeline between the Namoi River and infrastructure area (see Figure 6).

Water will be extracted in accordance with conditions of water access licenses (WAL): WAL2571, WAL2595, WAL2596 and WAL2572. In addition to the Namoi River licences, ~~two~~ seven groundwater extraction bores will also be available for mining operations and dust suppression operations. The groundwater extraction bores will require ancillary infrastructure such as powerlines, access tracks and water transfer pipelines.

Runoff from haul roads, hardstand and pre-strip areas will either be directed to existing mine water storages (where feasible) or will be captured in sediment retention storages sized to trap silt and other material which easily settle. The capacity of the proposed Sediment Dam 3 (SD3) and Sediment Dam 12 (SD12) will be increased to negate the need for construction of the proposed new dam (SD13). Water in the sediment dams may be used for dust suppression around the mine. Sediment dams will be generally sized in accordance with the *Managing Urban Stormwater Guidelines,* Landcom (2004).

Runoff from workshop, industrial and vehicle re-fuelling areas, which has the highest potential to contain elevated hydrocarbons, will continue to be captured in downslope dams and recycled within the mine water management system. Treated sewerage effluent will be reused onsite.

Runoff from rehabilitated and revegetated areas will be directed to mine water storages or be directed to sediment retention storages prior to being reused or allowed to drain to local natural drainage lines. These areas will be allowed to free drain as the landform becomes sustainable.

3.7 Hours of operation and employment

A total workforce of up to ~~500~~ 876 full time equivalent employees will be required at the Boggabri Coal Mine at peak production.

In addition workforce requirements for the construction of site infrastructure are unlikely to exceed 150 full time equivalent employees. Construction activities will be undertaken in a staged approach and therefore the construction workforce numbers will be staggered. Maximum levels of full time equivalent employees will not be reached whilst a substantive construction workforce is onsite.

Construction, coal mining and associated activities relating to the Project will be undertaken up to 24 hours per day, seven days a week.

3.8 Leard Forest Road Closure

The southern and northern sections of Leard Forest Road would remain open for public use. The section of Leard Forest Road proposed to be closed would remain open until mining activities intercept the road. The Project will require the permanent closure of a section of Leard Forest Road in its current location as mining progresses to the north-west.

It is anticipated that a 6 km section of Leard Forest Road would be permanently closed from the intersection with the mine office entrance gates to the northern limit of the Project Boundary. The road would be closed when the risk to public safety was identified as being too high through a public risk assessment process.

In the mean time, Leard Forest Road will be closed on a temporary basis as a consequence of blasting and other mine related construction activities in accordance with the Boggabri Coal road closure procedure which will form part of the Blast Management System. Temporary road closures will vary on a daily basis depending on the mine schedule and construction works program.

A traffic impact assessment for the Project was completed which has concluded that there would be no adverse impacts relating to the capacity or safety of the road network due to the closure of a section Leard Forest Road, this is discussed further in Section 8.19.

3.9 Drilling and Exploration Activities

In order to successfully undertake ongoing activities, it will be necessary for the Boggabri Coal to undertake further exploration activities to refine the understanding of geological structures, geotechnical and coal quality characteristics, understanding of hydrogeological conditions and also to improve the understanding of the overlying or underlying strata, within the Project Approval area. There are a number of geophysical exploration techniques, as well as drilling and sampling techniques that may be required, including:

- Seismic, gravitational, magnetic, electrical and electromagnetic testing;
- Cored and open-hole drilling to the basement of the coal basin;
- In-fill drilling;
- Limit of oxidation drilling;
- Down-hole testing including gas sampling and testing;
- Geotechnical investigation and testing techniques; and
- The establishment of access tracks.
- Exploration activities have previously been undertaken subject to the requirements of the *Mining Act 1992* (NSW) and in accordance with the conditions of the relevant Mining Leases and Exploration Licences held for BCM.

3.10 Construction Phase

The construction of Project related infrastructure will occur in a staged approach generally over the first 10 years of the Project and is shown in ~~Table 11~~ Table 6.

Table 6 Indicative Construction Schedule

Aspect	Before Year 1	Year 1	Year 5	Year 10	Year 21
MINE PLAN					
Mine haul road extensions					
Water management structures					
Introduction of a dragline					
Dragline construction pad					
In pit ROM pad					
CPP					
Expansion of existing ROM pad					

Aspect	Before Year 1	Year 1	Year 5	Year 10	Year 21
Bypass ROM hopper					
Bypass Crushing Plant					
Bypass Product Bin and Stockpile					
Modification of truck loading bin to a surge bin to control feed to CPP					
CPP Feed Conveyor					
CPP					
Coarse Reject Conveyor					
Coarse Reject buffer storage area					
Tailings Emplacement					
PRODUCT COAL HANDLING					
Rail Spur and Loop					
Washed Product bin and Stockpile					
CPP Product Conveyors					
Product coal stockpile up to 600,000 t capacity					
Product stockpile reclaim					
Product Stockpile at Boggabri Coal Terminal					
Second haul road loop					
Product loadout modifications					
INFRASTRUCTURE					
Mine substation					
Upgrading mine power supply to 132 kV					
Fuel Farm					
Sewerage system upgrade					
Heavy Vehicle Wash Bay					
Light Vehicle Wash Bay					
Main water storage dam					
Closure of Leard Forest Road					

Aspect	Before Year 1	Year 1	Year 5	Year 10	Year 21
Therribri Road overpass					
Upgrading / widening of private coal haul road					
Additional bores and ancillary infrastructure					
BUILDINGS					
Workshop extension					
Service Bay					
Contractor Camp Facility					
Bathhouse and Office Upgrade					
PSI Site					

3.11 Interactions with Existing Approvals and Operations

The Project is the continuation and extension of the existing approved mining operations at Boggabri Coal Mine. The major interactions of the Project with existing, approved operations include:

- Continuation of the same approved mining method (including approved but not yet implemented flexibilities such as the rail spur and loop, CPP and a dragline described in the Boggabri EIS) utilising additional equipment and personnel to achieve an increased rate of production;
- Logical progression of the mining area from the approved open cut disturbance boundary;
- Use of existing infrastructure facilities with additional upgrades and modifications proposed to accommodate the increased production levels sought. Interactions with approved infrastructure will include the upgrade and ongoing use of the product coal haul road, coal storage, handling and transport systems, road infrastructure, water management systems, workshops, storage and administration facilities;
- Utilisation of the existing ~~Boggabri Coal Terminal~~ BCM Rail Spur with increased stockpile capacity to allow increased export of coal (up to ~~7~~ 10 Mtpa) to the Werris Creek Mungindi Railway Line. ~~This will be on sold or decommissioned following the construction of the rail spur and loop as or when required~~;
- Use of the existing water management system which will be upgraded to support the Project; and
- Closure of a section of the Leard Forest Road as discussed in Section 3.2.7.

On 20 November 1978, the Boggabri Project was designated by the Commonwealth Minister for Trade and Resources pursuant to the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act).

Development Consent for the Boggabri Coal Project was originally issued by the Minister for Planning under Part 4 of the EP&A Act on 25 August 1989 (Boggabri Existing). Boggabri Existing is described in the original planning approval and supporting Boggabri EIS and forms part of the Project (see ~~Figure 6~~ Figure 1).

The Minister for the Environment advised by letter dated 8 March 2005 that the transitional provisions of the *Environmental Reform (Consequential Provisions) Act 1999* (ERCP Act) applied meaning that the Boggabri Project which was assessed under the EPIP Act did not require assessment under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

By letter dated 10 December 2009, the Assistant Secretary of the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) advised that *"referral and approval of the existing Boggabri Coal Project is not required under the EPBC Act"* (see Appendix D). The area of the Project that falls outside 'Boggabri Existing' (and was not assessed under the EPIP Act and therefore where the ERCP Act does not apply) requires assessment under the EPBC Act. This area is referred to as 'Boggabri Extension' throughout this EA (see ~~Figure 6~~ Figure 1).

3.12 Project Need

Project Approval is required to maximise the recovery of the additional coal reserves known to occur within Boggabri Coal's existing mining leases, whilst minimising environmental and social impacts resulting from the Project.

An additional opportunity to produce saleable coal at an increased production rate will provide Boggabri Coal the flexibility and confidence to invest in substantive capital enhancements to the Project so that it is able to respond to unpredictable economic circumstances while maintaining the effective management of impacts. This will improve general operational and energy efficiencies.

The Project is a logical progression of the existing mining operation which will maximise the viable recovery of the known coal resource.

The existence of the already established mining operation facilitates this natural progression of mining in the area. This is consistent with the intent of the original Development Consent which came into force following the issuance of a Mining Lease in 1990 for a period of 21 years. It is forecast that demand for steaming coal will remain strong in the medium term at least.

To support enhancements to the NSW coal chain users were required in commit to 'take or pay' contracts in early 2010. These contracts have provided certainty to the utility owners for billions of dollars of much needed investment in the NSW rail and coal port facilities. Boggabri Coal has had no alternative but to enter into port contracts for the supply of coal to meet the forecast production for the Project. The Project Approval is required so that Boggabri Coal can meet this commitment.

The importance of future coal mining and the Project in the Narrabri Shire is recognised in the Narrabri Shire Growth Management Strategy (GMS), and considerations provided for in the revised Local Environmental Plan (LEP).

The GMS has recognised opportunities associated with the emerging mining industry and has recommended that provisions within the LEP encourage the development of coal projects within the Narrabri Local Government Area (LGA). As such, the revised LEP provides for the rezoning of lands to 2 (a), 2 (b) and 2 (c) surrounding the township of Boggabri for additional housing developments to support the accommodation needs anticipated from future mining developments.

Further to the above, the need for the Project is demonstrated by the substantial net economic benefit it will realise to the local community, Narrabri Shire, along with the State and Federal Government.

Boggabri Coal will employ a total workforce of up to ~~500~~ 876 full time employees for the operation~~, with a further 150 full time equivalent contractors required during the construction phase of the Project.~~

The recovery of an additional ~~135~~ 184 Mt of export quality coal from the continuation of mining at Boggabri Coal Mine will also result in a significant increase in royalty payments to the State of NSW and export earnings for Australia.

In summary, the need for the Project exists in two broad groups of issues which:

- Arise from the inherent need for the economic benefits which the Project brings to the immediate and broader community; and
- Constitute incremental need arising from the efficiencies and benefits to be derived from the continuation of and extension of an existing large scale mine.

3.12.1.1 Inherent Need

The international demand for coal is now strong and is projected to remain strong for many years to come.

Coal is one of Australia's main export industries. It brings wealth and prosperity to the community in the immediate locality of the Project (via jobs, economic benefits and other direct benefits to the local community). These benefits are set out in detail in Section 8.13 and Appendix Q.

The need for the Project is to satisfy the demand for coal internationally and to provide economic benefits to the local community and also to the state of New South Wales.

3.12.1.2 Incremental Need

As described in Section 3 the existing operations of the Boggabri Coal Mine are extensive. They have involved the construction and development of an open cut coal mine and associated mining and coal transportation infrastructure. The need for the Project is to maximise the development of the resources which have already been committed to the Boggabri Coal Mine.

Additionally, an increase in the scale of operations associated with the Project will bring further efficiencies to the Boggabri Coal Mine (thus reducing, per tonne, the total environmental impact of coal recovered from the Project area).

It will also assist in bringing efficiencies to the entire NSW coal industry by providing part of the throughput for increased capacity in rail and port services.

The Project satisfies the need to satisfactorily remediate and rehabilitate existing mine workings and to improve the ecological biodiversity and environmental outcomes (which are provided for under this Project). In short, the long term environmental outcomes from the Project as proposed will be superior to those which would be experienced from the existing operation under the existing approval.

3.13 Project Alternatives

Through extensive planning, assessment and operational experience, Boggabri Coal has developed a thorough understanding of the environmental and social constraints to mining. Prior to the finalisation of a detailed mine plan for the Project, several alternatives were considered in satisfaction of the requirements set out in the Director-General's Requirements for the Project. The preferred mine plan was then developed with these constraints in mind, as discussed below.

3.13.1 Option 1

Option 1 involved utilising various combinations of excavator and truck fleets to produce up to 1.5 Mtpa product coal. This option was rejected due to the limited production capacity and higher anticipated market demands failing to satisfy the needs for the Project as described in Section 4.11.

3.13.2 Option 2

Option 2 involved the introduction of a dragline supported by an excavator and fleet of trucks from the achievement of 2.5 Mtpa product coal. This option was rejected as it was identified that a dragline would add maximum value to resource extraction at production levels of 5 Mtpa and more. This alternative did not satisfy efficient use of available resources to undertake the Project as referred in Section 4.11.

3.13.3 Option 3

Option 3 involved the reliance on the Nagero and the Tarrawonga / Templemore seams as alternative basal seams to the current and approved Merriown seam. This option was rejected due to the significant changes required to the mine plan with little or no economic returns.

This alternative failed to take advantage of efficiencies available from utilisation of the existing mine plan and therefore used resources in an inefficient manner.

3.13.4 Option 4

Option 4 included mining within the 'limit of surface mine' as described in the Boggabri EIS. This option was rejected as further drilling identified additional open cut minable reserves to the north-west of CL368. This alternative failed to maximise resource recovery and therefore was not considered to be in satisfaction of the object of encouraging the proper development of natural resources for the purpose of promoting the social and economic welfare of the community.

3.13.5 Option 5

Option 5 involved a larger mining footprint that included the area to the north-west of CL368 and north of A355 which is outside the 21 year mining limit as shown in Figure 12. This additional area would include a further 7 years of open cut mining within Boggabri Coal's mining tenements. This option was not progressed as it provided for mining approval for more than 21 years beyond what is seen as appropriate for determining consistency with the objects of the EP&A Act. Approval for access to this resource will be applied for as and when required in the future by subsequent application supported by further environmental assessment as required.

3.13.6 Option 6 Underground Mining

3.13.6.1 Introduction

WDS Consulting was commissioned to complete a conceptual study to assess the feasibility of progressing Boggabri Coal Mine from November 2011 as an underground coal mine thus reducing the level of surface disturbance. The study developed a conceptual design and evaluation for the recovery of the targeted resource area. Future deeper underground mining areas were not considered as part of the study as they are independent. The Underground Concept Study, 2009 is presented in Appendix C with a summary of the report provided below.

3.13.6.2 Description of Resource

The Boggabri coal resource as described for the Project in Section 2.2.3 consists of eight mineable coal seams. Of these, three were identified as having economic potential for underground mining including the upper Braymont, Jeralong and Merriown each averaging 4.9 m, 2.5 m and 2.2 m in thickness respectively. A combined total ROM coal reserve of 94.6 Mt (as opposed to 200 Mt via open cut methods) is estimated to be available for underground mining from all three seams. The remaining five seams were not considered economically viable using underground mining methods due to a combination of low seam thickness, safety issues and lack of physical area.

3.13.6.3 Method of Mining

The underground mine access strategy was developed on the basis of using the projected 2011 face position of the open cut highwall. Three underground mining methods were investigated including, Longwall, Place Change and Wongawilli. The retreat longwall method of mining was identified as the preferred mining method. Conceptually, longwall mining at Boggabri offers the highest resource recovery rate, consistent production rates, is inherently safe and is widespread across Australia. The main downfall to longwall mining is the large initial capital cost required to establish and the significant lead time necessary prior to production achieving economic levels.

Three options for underground mine access were examined including an independent open box cut, establishment of drifts and the utilisation of the existing open cut highwall.

The negatives associated with the construction of a box cut or drift were considered too great when compared to the advantages associated with the highwall access option, therefore the study has been confined to open cut highwall access only.

3.13.6.4 Limitations of Underground Mining

While it has been determined that underground mining may be technically and economically viable under certain market conditions, a number of disadvantages have been identified including:

- Only three seams of the proposed eight target seams would be viable for longwall extraction;
- Less efficient deployment of resources in developing the mine;
- The sterilisation of more than 100 Mt of coal resource due to the multi seam nature of the deposit;
- Lower production levels with an average of 5.3 Mtpa ROM coal would provide less social and economic benefit to the community;
- Requirement of all ROM coal to be washed would result in a poorer environmental outcome than open cut mining; and
- The construction of a large tailings dam to manage coal fines and rejects would be a poorer environmental outcome.

A comparison to open cut mining was required to determine the most economically and environmentally sustainable method of mining.

3.13.6.5 Underground Opposed to Open Cut Mining

Open cut mining can recover a significantly greater proportion of the coal including the thinner seams that are not viable for underground mining. Open cut mining methods will extract coal from ~~eight~~ 15 identifiable seams consisting of numerous splits from the Herndale to the ~~Merriown~~ Templemore seam with an estimated total coal resource of 200 Mt. Production levels obtained using the current open cut mine plan will reach a maximum of 8.6 Mtpa of product coal and employ up to ~~500~~ 876 full time equivalent personnel.

While the concept study identified that the utilisation of underground mining can be technically viable in part of the Boggabri resource, it does not provide the highest recovery of resources at the lower seam depths. In addition, a number of other limitations have been identified above that have resulted in the decision to continue and develop the open cut mine.

The extent of the Boggabri Coal reserves, do however, contain deeper resources where underground mining methodologies could be considered for future operations.

3.13.7 Option 7 - Project Mine Plan

The mine plan as presented in the EA (see ~~Figure 9, Figure 10, Figure 11 and Figure 12~~ Figure 4 to Figure 11) has been developed through a series of Studies and Environmental Constraints Analyses.

Boggabri Coal completed a detailed Pre-Feasibility Study for the Project which considered numerous mine plans and operational technologies. The primary objective of the Pre-Feasibility Study was to minimise environmental and social impacts, whilst maximising resource recovery and operational efficiency.

The alternative mine plans generally included production capacities of 2.5 Mtpa to greater than 8 Mtpa. The mine plans were assessed using a range of mining equipment including excavators, truck and shovels and a dragline operation.

3.13.7.1 Preliminary Environmental Assessment

A preliminary environmental risk assessment was conducted as part of the *Boggabri Coal Mine Preliminary Environmental Assessment* (PEA) September 2009 for the Project.

The PEA also presented the conceptual mine plan and scope in preparation for the EA. As a result of the preliminary risk assessment it was determined that additional studies into the potential noise impacts associated with the Project required further investigation. Recommendations resulting from the additional noise modelling and risk assessment were incorporated by Boggabri Coal into the design criteria for the final mine plans to minimise environmental and social impacts as presented in Section 4.

3.13.7.2 Additional Mine Plan Changes

The mine plan for the Project (see Section 4.1) has continually evolved from that presented in the PEA to address environmental, economic and social issues. In particular, the mine plan has since been modified by Boggabri Coal to address the following:

- The proposed clean water diversion drain around Merriown Mountain to the west of the mining area has been removed to avoid known stands of Box-Gum Woodland Endangered Ecological Community (EEC);
- The proposed cutting through a ridgeline to the south-east of the mining area to ensure a free draining final land form has been avoided. The original mine plan as described in the PEA would have required a cutting approximately 15 m deep by 25 m wide to enable clean water to drain freely around the mining area from the east. The final landform was redesigned to minimise any additional disturbance, potential visual impacts and ensure a free draining final landform;
- Mine scheduling was organised to achieve maximum flexibility so as equipment could avoid operating in high or exposed areas during noise enhancing weather conditions particularly during some night time periods;
- Haul roads, where appropriate, were relocated over previously disturbed areas to minimise any additional disturbance, in particular the haul road to the west of the mining area;
- The construction of a new standalone infrastructure complex was not included as part of the Project as this would have created additional disturbance areas. Upgrading existing infrastructure facilities was a natural progression that has significantly reduced the disturbance footprint by approximately 80 ha;
- Increasing the area of rehabilitation to reduce exposed ground where practical and minimising the area of surface disturbance in advance of mining;
- The deletion of a tailings dam from the Project by committing to place all coal washery waste back in pit for burial and then rehabilitation;
- Construction of additional sedimentation dams to capture and allow settling prior to water flowing offsite; and
- The implementation of best-practice noise and air quality mitigation measures and technologies where practical.

The Project presented in the EA has continually evolved with a balanced consideration of all potential environmental, social and economic impacts, consistent with Ecologically Sustainable Development (ESD).

In recognition of the substantive impacts on the areas ecological values the Project proposes a wide ranging ecological offsets package.

Detailed mine planning, engineering investigations and conceptual studies have identified that the recovery of the coal resource within the Mine Disturbance Boundary, shown on ~~Figure 7~~ Figure 1, via open cut mining methods on balance provides the best alternative in terms of the objects of EP&A Act, by:

- Enabling the most efficient utilisation of resources to extract the coal;
- Maximising the coal recovery so as to promote the social and economic welfare of the community; and
- Minimising the need for washing all coal thus reducing water use which creates a better environmental outcome.

The Project proposes to upgrade existing infrastructure, staying largely within the existing infrastructure area to minimise land disturbance where possible (~~Figure 8~~ Figure 1).

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