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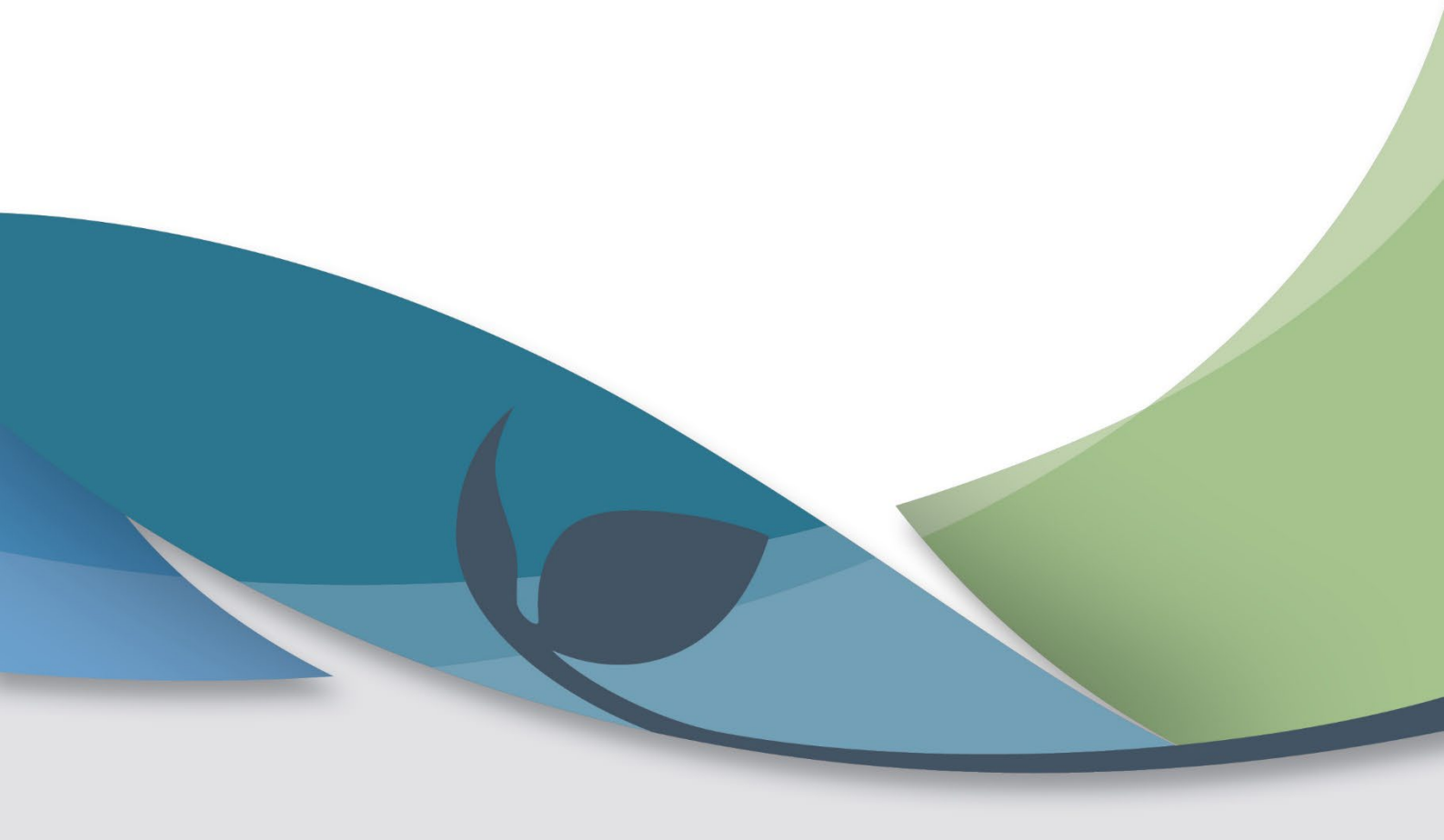
BOGGABRI COAL MINE MODIFICATION 9

MODIFICATION REPORT

for Boggabri Coal Operations Pty Ltd

9 November 2022



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EXECUTIVE SUMMARY

INTRODUCTION

Boggabri Coal Operations Pty Ltd (BCOPL) operates the Boggabri Coal Mine (BCM) on behalf of Idemitsu Australia Pty Ltd (IA) and its joint venture partners. BCM is owned by the following joint venture partners:

- IA via its subsidiary Boggabri Coal Pty Ltd – 80%;
- Chugoku Electric Power Australia Resources Pty Ltd – 10%; and
- NS Boggabri Pty Limited – 10%.

BCM is an open cut mine located approximately 15 kilometres (km) north-east of the township of Boggabri in the North West Region of NSW. BCM is located wholly within the Narrabri Local Government Area and is part of the Leard Mining Precinct, which also includes the neighbouring Maules Creek Coal Mine and Tarrawonga Coal Mine.

The wet weather across the region in the past few years has resulted in numerous operational delays. In order to mitigate the impact of similar wet weather delays in the future, BCOPL has identified the opportunity to process rock materials encountered during the mining process to produce crushed materials for armouring of haul roads and for other purposes within the BCM Project Boundary. Further, BCOPL has identified the opportunity to construct new Pre-Shift Start-up Infrastructure (PSI Site) at a location closer to the active mining operations, which will improve shift changeover times and various other operational efficiencies at BCM.

BCM operates under State Significant Development (SSD) Consent 09_0182 which permits the production of up to 8.6 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal via open cut mining methods until 31 December 2033.

THE MODIFICATION

BCOPL (on behalf of IA and its joint venture partners) is a seeking a modification to SSD 09_0182 under Section 4.55 of the *Environmental Planning and Assessment Act 1979* to facilitate the opportunities described above and implement minor administrative changes.

The proposed Modification includes the following:

- Operation of a mobile rock crushing facility and associated fleet within the approved Mine Disturbance Boundary at BCM;
- Construction of a new PSI Site at a location closer to active mining operations and access to the new site via a section of the former Leard Forest Road (which has previously been closed to the public); 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*.

STAKEHOLDER CONSULTATION

Stakeholder consultation related to the Modification has been conducted with the BCM Community Consultative Committee, near neighbours, local council, regulatory authorities (including Forestry Corporation of NSW, Environment Protection Authority and Department of Planning and Environment) and other interested parties.

BCOPL will continue to consult with stakeholders throughout the Government review and assessment process.

IMPACT ASSESSMENT

Air Quality and Greenhouse Gas

The key component of the Modification from an air quality perspective is the mobile rock crushing facility and its associated mobile equipment. The other components of the Modification are expected to generate minimal dust.

Emissions of Total Suspended Particulates (TSP) due to the proposed crushing activities are predicted to be in the order of 26,570 kg/year (or approximately 26.6 tonnes/year). The approved mining operations at BCM are estimated to generate 7,219 tonnes/year of TSP. Therefore, the incremental impact of the Modification represents a 0.4% increase to the dust emissions of the approved development. An increase of this magnitude is unlikely to be discernible above existing dust levels (Airen Consulting, 2022). As such, the contribution of the Modification to cumulative impacts is expected to be immaterial.

Greenhouse gas (GHG) emissions attributable to the Modification will predominantly occur due to the fuel consumption of the mobile crushing equipment. The direct (Scope 1) emissions attributable to the Modification represents a 0.21% increase in the GHG inventory for the approved development (Airen Consulting, 2022).

The additional emissions due to the fuel consumption of the mobile rock crushing facility will be partially offset by the following:

- Reduced diesel fuel usage due to fewer truck trips from the mining area to the MIA for shift changeover and/or refuelling (which would instead occur at the PSI Site); and
- Use of solar panels to supply a portion of the energy requirement for the PSI Site.

Acoustics

The equipment associated with the mobile rock crushing facility is predicted to produce a combined sound power level (SPL) of 122 dBA. In comparison, the combined SPL of the approved mining operations is approximately 140 dBA. The noise levels generated by the mobile rock crushing facility are predicted to be at least 8 dBA below the relevant criteria at the nearest sensitive receptors (Bridges Acoustics, 2022).

The additional equipment required for construction of the PSI Site is predicted to generate a combined SPL in the order of 100-110 dBA. Given that this combined SPL is between 10 to 20 dBA less than the SPL generated by the approved mining activities, construction of the PSI Site will not contribute to noise generated by the development (Bridges Acoustics, 2022). Operational noise associated with the PSI Site in conjunction with the approved mining operations is expected to comply with the relevant noise criteria at all sensitive receptors. The contribution of the Modification to cumulative noise impacts is therefore expected to be immaterial.

Ecology

The mobile crushing facility and PSI Site will be located within the approved Mine Disturbance Boundary under SSD 09_0182. The necessary upgrades to the former Leard Forest Road (to facilitate access to the PSI Site) will occur within the existing road corridor. For these reasons, the Modification will not result in any additional vegetation disturbance.

WSP conducted an assessment to consider the potential impact of the incremental increase in vehicle movements on the section of the former Leard Forest Road (as proposed by MOD 9) on fauna which may utilise the fauna movement crossing as proposed by MOD 8 to SSD 09_0182 (currently being assessed by DPE).

WSP concluded that the incremental increase in light vehicle movements has the potential to increase wildlife-vehicle collisions along the former Leard Forest Road in vicinity of the proposed fauna movement crossing and add incrementally to noise, dust and lighting pollution in its near vicinity. However, it is considered unlikely that the Modification will add substantially to wildlife-vehicle collisions or inhibit animals from making east-west movements in the southern margin of the Leard State Forest.

WSP also found that separate to the incremental increase on this road during the two shift change over periods, it is probable that local fauna will still undertake crossings of this section of the former Leard Forest Road.

To mitigate the potential impacts, BCOPL has proposed the installation of wildlife signage, reduce speed limit for vehicles travelling along the section of the former Leard Forest Rad and to monitor and report on incidences of wildlife collisions within the Annual Review. BCOPL will also carry out awareness training to inform the workforce of the sensitivities with travelling on the section of the former Leard Forest Road and the potential interactions with fauna.

Visual and Lighting

The proposed infrastructure will not be visible from receptors to the south or west of the site due to screening provided by intervening topography and the dense vegetation in the Leard State Forest. Similarly, receptors to the east and north will be screened by existing topography (i.e. the Willow Tree Range).

There will be negligible direct lighting impacts on surrounding receptors due to screening provided by intervening topography and vegetation.

The lighting for the Modification will be insignificant in the context of existing night lighting in the Dark Sky Region and will not have any discernible effect on the Siding Springs Observatory. To minimise diffuse lighting impacts, external lighting at the PSI Site will comply with Australian Standard *'AS4282 (INT) 2019 – Control of Obtrusive Effects of Outdoor Lighting'*.

Other Impacts

Other potential environmental, social and economic impacts have been assessed to be minimal and will continue to be appropriately managed in accordance with BCM's approved environmental management system.

MERIT EVALUATION

The Modification will facilitate the following improvements to operations at BCM:

- Lining of haul roads with crushed rock, which may enable greater operability under wet weather conditions and reduced maintenance costs;
- Reduced reliance on external gravel suppliers, thus reducing risk of interruptions due to external factors and fewer deliveries to the site; and
- More efficient shift changeovers by enabling this to occur closer to the active mining area.

These operational efficiencies have the potential to result in greater resource production, which leads to greater economic benefits to the local community and NSW more generally.

The environmental impact assessments conducted for the Modification have determined that it will not significantly increase the impacts of the currently approved development under SSD 09_0182. The potential environmental costs of the Modification are outweighed by its benefits and as such, the Modification is in the public interest.

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APPENDICES

1. INTRODUCTION

This section provides an overview of the Boggabri Coal Mine, the modifications sought to the approved development. It also introduces the proponent of the modification application, and outlines the purpose and structure of this Modification Report.

1.1 BACKGROUND

Boggabri Coal Operations Pty Ltd (BCOPL) operates the Boggabri Coal Mine (BCM) on behalf of Idemitsu Australia Pty Ltd (IA) and its joint venture partners. BCM is owned by the following joint venture partners:

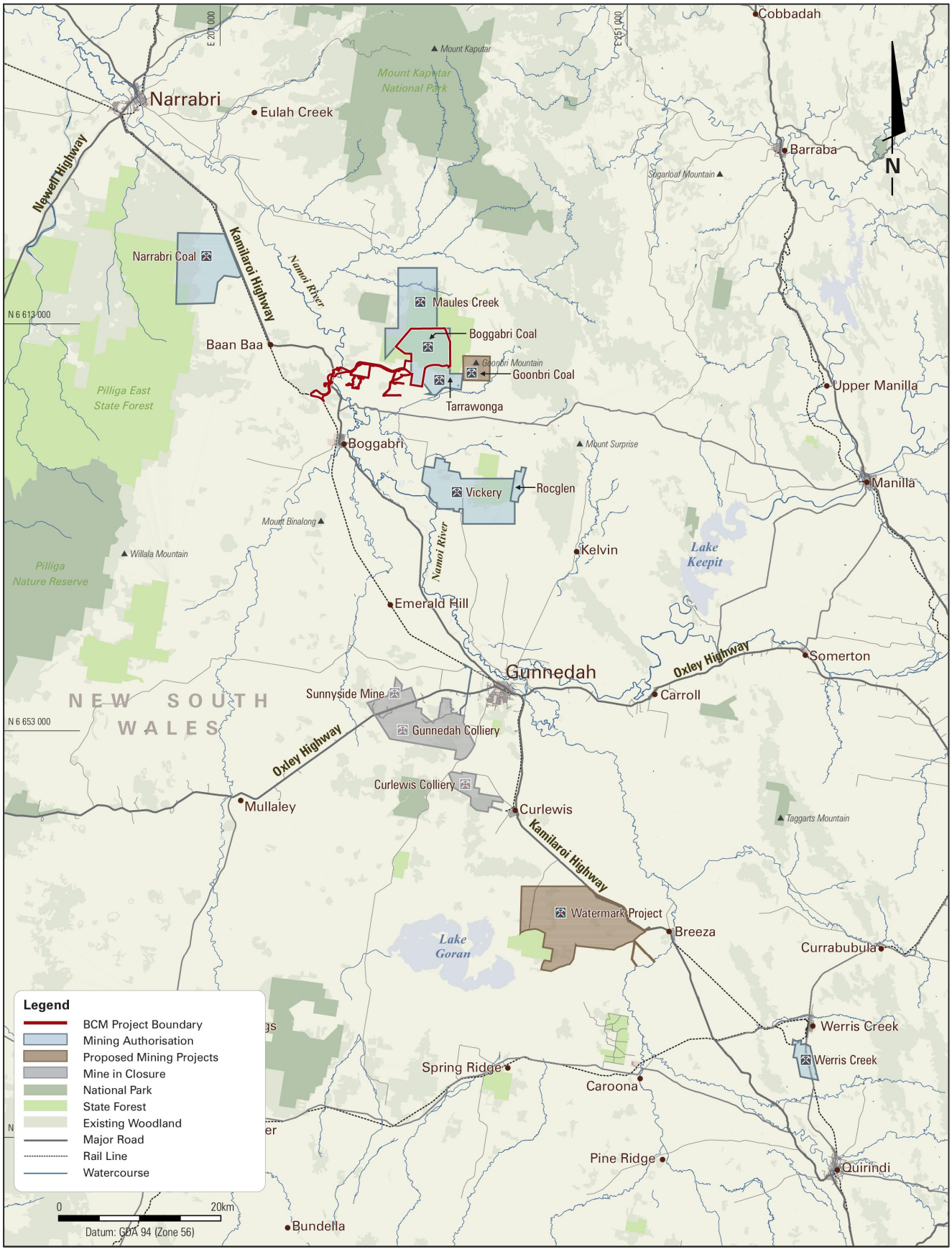
- IA via its subsidiary Boggabri Coal Pty Ltd – 80%;
- Chugoku Electric Power Australia Resources Pty Ltd – 10%; and
- NS Boggabri Pty Limited – 10%.

BCM is an open cut mine located approximately 15 kilometres (km) north-east of the township of Boggabri in the North West Region of NSW (see **Figure 1**). BCM is located wholly within the Narrabri Local Government Area (LGA) and is part of the Leard Mining Precinct, which also includes the neighbouring Maules Creek Coal Mine (Maules Creek) and Tarrawonga Coal Mine (Tarrawonga).

BCM currently operates in accordance with State Significant Development (SSD) Consent 09_0182 granted on under the former Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) on 18 July 2022. SSD 09_0182 permits the production of up to 8.6 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal until 31 December 2033.

To date, there have been eight applications to modify SSD 09_0182. The MOD 1 application was withdrawn and the MOD 8 application remains under assessment. The other six modifications were approved, as summarised below:

1. MOD 2 – Transportation of up to 10 Mtpa of coal on the Boggabri Rail Spur Line including up to 3 Mtpa from Tarrawonga Mine (subject to agreement between mine owners), increasing the throughput of the Coal Preparation Plant from 3 to 3.5Mtpa, the relocation of the existing haul road to the open cut and disposal of additional reject material generated from processing of Tarrawonga Mine coal;
2. MOD 3 – Construction of two permanent access roads linking the Kamilaroi Highway to the BCM private haul road, use of the Daisymede Laydown Compound for vehicle equipment and material storage and temporary storage of overburden at a former quarry to reuse the material during construction of the rail spur;
3. MOD 4 – Additional mine infrastructure and revision to the Project Boundary;
4. MOD 5 – Construction and operation of a bore field and increase to the Coal Handling and Preparation Plan (CHPP) throughput from 3.5 to 4.2 Mtpa;
5. MOD 6 – Transport up to 8.6 Mtpa from BCM by rail with the capacity of the Boggabri Rail Spur Line capped at 10 Mtpa; and
6. MOD 7 – Allows for road transportation of coal samples required for marketing and analysis purposes, make further long term security mechanisms available and increases the time limit for the BCM biodiversity offset areas, facilitates drilling and exploration activities under the PA and realignment of the Project Boundary to ensure consistency with Tarrawonga approvals and to facilitate implementation of an integrated final landform.



JBA 2167 MOD 8 APPROVALS - F 01 REGIONAL LOCALITY (5/09/2022)

BOGGABRI COAL MINE

Regional Locality

FIGURE 1

A further modification application (MOD 8) was lodged in July 2021 and is currently under assessment. MOD 8 seeks approval to increase the depth of mining within the approved Mine Disturbance Boundary and to construct a fauna movement crossing of the existing haul road to facilitate the movement of fauna between the Leard State Forest and the BCM Mine Rehabilitation. The MOD 8 application has been placed on public exhibition and is currently being assessed by the Department of Planning and Environment (DPE).

1.2 OVERVIEW OF THE MODIFICATION

BCOPL is seeking a further modification to SSD 09_0182 under Section 4.55(1A) of the EP&A Act to facilitate the following activities and administrative changes (collectively referred to as "the Modification"):

- Operation of a mobile rock crushing facility and associated fleet within the approved Mine Disturbance Boundary at BCM;
- Construction of new Pre-Shift Start-up Infrastructure (PSI Site) at a location closer to active mining operations and access to the new site via a section of the former Leard Forest Road (which has previously been closed to the public); 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*.

Further details of the activities proposed by the Modification are provided in **Section 3**.

1.3 THE PROPONENT

The proponent for the Modification is BCOPL on behalf IA and its joint venture partners. The contact details for the proponent are:

Boggabri Coal Operations Pty Ltd
PO Box 12
BOGGABRI NSW 2382
Phone: (02) 6749 6000
Email: boggabricoal@idemitsu.com.au

1.4 DOCUMENT PURPOSE

James Bailey & Associates has prepared this Modification Report on behalf of BCOPL to support the modification application under Section 4.55(1A) of the EP&A Act. In accordance with '*State Significant Development Guidelines – Preparing an Modification Report*' (DPIE, 2021), this Modification Report provides a description of the Modification, assesses the potential environmental impacts, and proposes mitigation and management measures (where required).

1.5 DOCUMENT STRUCTURE

This Modification Report is structured as follows:

- **Section 2** describes the strategic context relevant to the Modification, including the environmental setting and the relevant policy considerations;
- **Section 3** describes the activities proposed by the Modification;
- **Section 4** provides a brief discussion on the relevant statutory framework;
- **Section 5** summarises the stakeholder consultation conducted for the Modification;
- **Section 6** assesses the potential environmental impacts of the Modification and recommends measures to manage and mitigate these impacts;
- **Section 7** provides a justification and evaluation of the Modification.

2. STRATEGIC CONTEXT

This section of the Modification Report provides an overview of the strategic context of BCM within the existing environment and land use.

2.1 ENVIRONMENTAL CONTEXT

2.1.1 Climate

The climate in the North-west Region of NSW is characterised by generally low precipitation (which can culminate in droughts), although short periods of high intensity rainfall can occur during the summer months. The summer months are the hottest and wettest months of the year. The winter periods are relatively short, and frosts are prevalent.

The nearest meteorological station that provides long-term climate statistics is the Bureau of Meteorology's (BoM) station at Gunnedah Pool (Station 055023). This station is located approximately 40 km to the south south-east of BCM and has been operational since 1876.

BCOPL maintains an Automated Weather Station (AWS) at BCM which continuously monitors temperature, lapse rate, wind speed and direction, rainfall, and solar radiation.

Temperature

Records from the BoM meteorological station at Gunnedah Pool indicate that January is the warmest month (mean maximum temperature of 34.0°C) and July is the coldest month (mean minimum temperature of 3.0°C).

Temperature inversions are most common in the winter months. Inversions generally form in the late afternoon and reach maximum resistance at dawn.

Rainfall and Evaporation

Rainfall records from the BoM meteorological station indicate that the summer months are the wettest months of the year. The highest monthly rainfall occurs in January (mean rainfall of 70.7 millimetres (mm)) whereas the lowest monthly rainfall occurs in April (mean rainfall of 36.9 mm). The average annual rainfall recorded at the Gunnedah Pool BoM station is approximately 618 mm.

The average annual evaporation is generally greater than annual precipitation.

Wind Speed and Direction

BCOPL monitors weather conditions at its BCM AWS which complies with the requirements of the '*Approved Methods for Sampling of Air Pollutants in New South Wales'* (EPA, 2016). The AWS also records temperature lapse rate in accordance with the '*NSW Noise Policy for Industry'* (EPA, 2017) (which supersedes the former Industrial Noise Policy).

Data collected by the BCM meteorological station indicates that prevailing winds occur predominantly from the south and south-east from January to April and from the north to north-west from May to December. The average monthly wind speed is generally less than 3 metres per second (m/s).

2.1.2 Topography and Natural Features

The topography surrounding BCM is dominated by the Willow Tree Range which wraps around the north, east and west of the currently approved BCM. The lower lying floodplains associated with the Namoi River and its tributaries are located to the south and south-west of the BCM. The Willow Tree Range includes steep slopes and crests (up to a maximum elevation of 430 m Australian Height Datum (AHD)) and forms a broad south-west facing basin. Goonbri Mountain (543 m AHD) is located approximately 3 km east of the BCM Project Boundary and is an isolated mountain located on the western extremity of the Nandewar Range. The Nandewar Range lies approximately 10 km to the north-east of the BCM Project Boundary.

The Namoi River is located within the western portion of the BCM Project Boundary and is traversed by the rail spur and access road. The alluvial floodplain of the Namoi River is a wide low-lying landform. Rainfall runoff from the topographically higher areas to the north-east drains towards the Namoi River via Nagero Creek. As such, the catchment drains in a generally south-westerly direction from the BCM Project Boundary.

2.1.3 Land Use

The major land uses in the vicinity of BCM are agriculture, coal mining and forestry.

Agriculture is the dominant land use in the north-west Region of NSW. Historically, agricultural enterprises in the region included grazing and dry land pasture improvement. The construction of Keepit Dam and Split Rock Dam has ensured a more reliable supply of water during prolonged dry periods. As a result, these dams facilitated the introduction of intensive cropping to the region.

The alluvial floodplain of the Namoi River supports highly productive agricultural land. The floodplain supports both dry land and irrigated cropping, as well as pasture establishment enterprises. The land surrounding the floodplain is primarily used for grazing, including sheep and cattle grazing.

Coal mining is a relatively recent land use in the Gunnedah Basin. BCM is surrounded by Maules Creek to the north and Tarrawonga to the south. The three mines are collectively referred to as the Leard Mining Precinct (or the BTM Complex). A number of other small to medium sized coal mines are present in the region including Narrabri Mine, Rocglen Mine, Sunnyside Mine, Vickery Mine and Werris Creek Mine.

BCOPL also formerly operated the Forest View Quarry to the east of BCM which is accessed by Goonbri Road. BCOPL surrendered Environment Protection Licence (EPL) 20404 for this site in December 2018.

The Leard State Forest is approximately 8,134 ha in size and consists predominantly of native vegetation communities dominated by Ironbark, White Box, Blakely's Red Gum and White Cyprus Pine. Selective logging activities have been undertaken in the past, but the Leard State Forest remains in a generally forested state. The parts of the state forest that are not reserved for mining can be used for recreation purposes. In 2004, recreational hunting within the state forest was permitted in order to control pest species.

The Leard State Conservation Area is located approximately 5 km north-west of the Project Boundary, and covers an area of 1,176 ha. In addition, Mt Kaputar National Park is located approximately 25 km to the north of the BCM Project Boundary. Mt Kaputar National Park covers an area of approximately 36,817 ha and possesses significant recreational value.

2.1.4 Land Ownership

BCM is located within the Leard State Forest, which is Crown land. The land within the Leard State Forest is managed by the Forestry Corporation of NSW on behalf of the Crown. BCOPL has recently consulted with the Forestry Corporation of NSW regarding the activities proposed by the Modification (see **Section 5**).

BCOPL owns the land on which the Mine Infrastructure Area (MIA), CHPP and rail spur are located, apart from those parts of the rail spur which are located on land jointly owned with Whitehaven Coal and small parcels of Crown land and local roads.

Whitehaven Coal has significant landholdings to the north, west and south of Leard State Forest. These landholdings are associated with Maules Creek and Tarrawonga. Due to the significant landholdings of BCOPL and Whitehaven Coal, there is a significant buffer from the BCM mining operations to the nearest private freehold land.

The mining operations associated with the Project will generally be undertaken on Crown land (Leard State Forest) and a small area of land owned by Whitehaven Coal.

There are currently three private residences provided acquisition rights under SSD 09_0182 within the Zone of Acquisition (ZOA). These include location property identification (ID) 44, 48 and 90. All other residences previously within the ZOA are either owned by BCOPL, Whitehaven Coal or jointly owned between BCOPL and Whitehaven Coal.

Five regionally significant Biodiversity Offset Areas (BOAs) were secured as part of the BCM Biodiversity Offset Strategy. To meet BCM's offset requirements under Schedule 3, Condition 43 of SSD 09_0182, BCOPL have acquired an additional five BOAs. **Table 1** lists the current BOAs and their relative areas they encompass. These are identified and maintained according to the approved Biodiversity Offset Strategy (WSP, 2019).

Table 1 BCOPL Biodiversity Offset Areas

Biodiversity Offset Area	Area (ha)
Merriendi BOA	547
Namoi BOA*	3,336.5
Wirrilah BOA	873.1
Myall Plains BOA	480.4
Mallee BOA	2,066.2
Sub-Total	***7,303.2***
Additional Biodiversity Offset Area	**Area (ha)**
Sunshine	738.1
Nioka North	867.9
Goonbri	223.4
Jeralong	570.1
Braefield	1,400.7
Sub-Total	***3,800.2***
TOTAL	**11,103.4**

**Contains land purchased as a joint venture between BCOPL and Whitehaven Coal.*

2.1.5 Hazards

The Leard State Forest is mapped as bushfire prone land. Asset protections zones (APZs) will be established around the proposed infrastructure in accordance with the recommendations of *"Planning for Bush Fire Protection"* (Rural Fire Service, 2019).

The Namoi River floodplain intersects the approved access road and rail spur. Aside from this section of the access road, all other areas of BCM are outside of flood prone land. None of the activities proposed by the Modification will be undertaken on flood prone land.

BCM is not located within a landslide risk area or mine subsidence district.

2.2 GOVERNMENT POLICIES AND PLANS

2.2.1 Dark Sky Planning Guideline

The '*Dark Sky Planning Guideline*' (Dark Sky Guideline) (DPE, 2016) was published to help protect the Dark Sky Park and region surrounding the Siding Spring Observatory. The guideline provides technical information and guidance to the state and local government, community, and professionals about the management of light in the Dark Sky Region. The guideline:

- Sets out planning controls for development near Siding Spring Observatory; and
- Provides advice on how to minimise light pollution and details good lighting design principles.

The Dark Sky Planning Guideline applies to BCM for the reasons outlined in **Section 4.2.3**.

Schedule 3, Condition 65 of SSD 09_0182 specifies operational measures to be applied to BCM's operations to minimise lighting and visual effects from its operations. This includes the requirement for all external lighting to comply with *Australian Standard (AS)4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting* (or its latest version) and to ensure lighting is directed below horizonal. These requirements are entirely consistent with the lighting design principles described within the Dark Sky Guideline and will continue to be implemented for the Modification.

The requirements of the Dark Sky Guideline have been considered in the visual impact assessment which is discussed further in **Section 6.3.2**.

2.3 CUMULATIVE IMPACTS

BCM is part of the Leard Mining Precinct along with Tarrawonga to the south and Maules Creek to the north. Tarrawonga is operated by Tarrawonga Coal Pty Limited (TCPL), whereas Maules Creek is operated by Maules Creek Coal Pty Limited (MCCPL). Both TCPL and MCCPL are subsidiaries of Whitehaven Coal.

Tarrawonga and Maules Creek have both been included in the cumulative impact assessments conducted for the '*Continuation of Boggabri Coal Mine Environmental Assessment*' (Hansen Bailey, 2010) and subsequent modifications to SSD 09_0182.

The noise and dust emissions associated with the Modification will be insignificant in scale compared to those of the existing mining operations in the Leard Mining Precinct. As such, the contribution of the Modification to cumulative impacts is expected to be immaterial.

2.4 PLANNING AGREEMENTS

BCOPL has entered into a Voluntary Planning Agreement (VPA) with Narrabri Shire Council as required by Schedule 2, Condition 23 of SSD 09_0182. The general terms of the VPA are consistent with Appendix 3 of SSD 09_0182.

3. MODIFICATION DESCRIPTION

This section provides a detailed description of the proposed activities and administrative amendments to SSD 09_0182.

3.1 OVERVIEW

The Modification seeks the following changes to the approved operations at BCM under Section 4.55(1A) of the EP&A Act:

- Operation of a mobile rock crushing plant and associated fleet within the existing approved Mine Disturbance Boundary at BCM;
- Relocation of the Pre-Shift Start-up Infrastructure to a location which is closer to active mining operations and will be accessible from a portion of the former Leard Forest Road (which has previously been closed to the public); 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*.

3.1.1 Mobile Rock Crushing Facility

BCOPL has identified that there would be benefit in 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.

To achieve these outcomes, BCOPL proposes the operation of a mobile rock crushing facility. The facility consists entirely of moveable units including crushers, screens and conveyors. As such, no construction work is required to commission the facility. Raw and crushed rock will be 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 will contain stockpiles of both raw rock and crushed rock (separated into various size fractions).

The rock crushing facility will be located within a compound that is conceptually 200 m x 200 m. Bunding will be established to safely delineate the crushing operations from other mining activities.

The mobile rock crushing facility will be 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 that approved).

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

The indicative 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.

Operation of the mobile rock crushing facility will occur seven days per week but will be limited to 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 will be installed with appropriate dust controls, such as water sprays. The peak daily water demand for the facility is anticipated to be 20,000 L/day (or around 7.3 ML/year). Recycled mine water will be used for dust suppression, where practicable. External water supplies (if required) will be sourced under BCOPL's existing water access licences (i.e. from the BCM borefield or the Namoi River) consistent with the approach described in the approved Water Management Plan.

The operation of the rock crushing facility will require three FTE personnel (to be sourced from the existing work force).

3.1.2 Pre-Shift Start-Up Infrastructure

BCOPL proposes to construct a new PSI Site adjacent to the active mining area and within the approved Mine Disturbance Boundary, as shown in **Figure 2**. The proposed PSI Site indicatively includes a pre-shift information session facility, heavy vehicle workshop, and a diesel storage and dispensing facility. An indicative design layout for the PSI Site is presented in **Appendix A**.

The proposed PSI Site will enable shift changes to occur more efficiently by moving the changeover point from the existing MIA to a new location closer to the mining area. The heavy vehicle workshop will assist with routine maintenance activities, primarily on tracked equipment which will reduce the maintenance downtime for this equipment. The diesel storage and dispensing facility will also deliver substantial efficiencies by placing this facility closer to the mining operations. Each of these initiatives are vital improvements to the efficiency of operations at BCM in consideration of the progression of mining operations further towards the north-west of the approved Mine Disturbance Boundary.

The PSI Site will include information session areas, bathhouse and amenities. and general office, training and meeting spaces. Communication facilities will be installed to provide connectivity to the site CCTV, IT networks, mining systems information and site access systems.

The PSI Site will be fitted with potable and firefighting water storage tanks (3 x 200,000 Litre tanks) and systems. These water storage tanks will continue to be supplied from existing imported water carting services and suitable quality on site supplies (as is currently in place).

An onsite sewage treatment plant will treat the wastewater from the bathhouse and amenities, with treated effluent to be irrigated onto a transpiration area which has been conceptually located to the north of the PSI Site.

Adequate lighting will be installed across the facility to ensure safe access for workers performing tasks or accessing their private vehicles. The power supply to the facility will be via generator (2 x 500 KVA) and/or supported by a solar system and battery (solar panels to be installed on the new buildings).

Access to the PSI Site will be via the existing BCM Access Road, the southern portion of the former Leard Forest Road and some additional internal access roads within the approved Mine Disturbance Boundary. The section of the former Leard Forest Road which BCOPL has advised is currently intermittently used for undertaking routine inspection of work areas, dam infrastructure, accessing environmental monitoring locations and other purposes is currently closed to public traffic. BCOPL has also advised that its blast contractor also currently uses the road irregularly to escort heavy rigid supply vehicles to their existing compound and material storage area. This section of road may require upgrades to facilitate the vehicle movements associated with the Modification. These upgrades works will be located within the existing road corridor and therefore will not result in additional vegetation clearing. Car parking facilities will be constructed at the new buildings.

During construction, BCOPL has advised that a small incremental increase of vehicle movements will occur on the former Leard Forest Road which will include concrete deliveries and light vehicles associated with general construction activities. BCOPL has estimated that during operations, there will be an incremental increase in vehicle movements on the section of the former Leard Forest Road by approximately 50 light vehicle movements travelling to and from the PSI Site at shift change over in the morning (between around 5:30 am and 6:30 am) and evening shift changes (between around 5:30 pm and 6:30 pm) (i.e. a total of 200 vehicles per day).

The Diesel Storage and Dispensing Facility will comprise the relocation of the eight existing 110,000 litre diesel storage tanks to a location closer to the mining area, as well as eight new 110,000 litre tanks. Diesel will be delivered to the facility using road registered trucks as is currently the practice at BCM. The proposed increase in diesel storage capacity will facilitate the ongoing security of the BCM's operational diesel supplies.

3.1.3 Administrative Changes to SSD 09_0182

Schedule 3, Condition 71 of SSD 09_0182 currently requires BCOPL to prepare a Rehabilitation Management Plan (RMP) to the satisfaction of the Department of Regional NSW – Resources Regulator (Resources Regulator). The Rehabilitation Reforms under the *Mining Act 1992* (Mining Act) that commenced on 2 July 2021 have resulted in the removal of the regulatory ability for the Resources Regulator to approve a RMP as was previously provided by its authority to approve a Mining Operations Plan under the Mining Act.

BCOPL therefore seeks to amend the wording of these rehabilitation management and reporting conditions to align with the conditions of a Mining Lease associated with the BCM under the Mining Act.

BCOPL propose that Schedule 3, Condition 69 be amended as follows:

> "*The Proponent must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed Rehabilitation Strategy described in the EA (and depicted conceptually in Appendix 9) and comply with the objectives in Table 16.*"

BCOPL propose that Schedule 3, Condition 71 be amended as follows:

> "*The Proponent must prepare a Rehabilitation Management Plan for the development, in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992.*
>
> *The Proponent must implement the Rehabilitation Management Plan.*"

In order for BCOPL to demonstrate that it has established an appropriate strategy to achieve the stated rehabilitation objectives under SSD 09_0182, a condition is proposed which requires the preparation of a Rehabilitation Strategy (as opposed to a Rehabilitation Management Plan) for the Project to the satisfaction of the Secretary. The proposed condition stipulating the requirement for a Rehabilitation Strategy is provided below:

> "*Rehabilitation Strategy*
>
> *The Proponent must prepare a Rehabilitation Strategy for the development, to the satisfaction of the Secretary. This strategy must:*
>
> *(a) be prepared by a suitably qualified and experienced person(s) whose appointment has been endorsed by the Secretary;*
>
> *(b) be prepared in consultation with RR, Forestry Corporation of NSW, BCD, DPE Water, North West Local Land Services, Council and the CCC;*
>
> *(c) be submitted to the Secretary for approval by 31 June 2023, or as otherwise agreed by the Secretary;*
>
> *(d) build upon the Rehabilitation Objectives in Table 16 and proposed Rehabilitation Strategy in the EA, describe the overall rehabilitation outcomes for the site, and address all aspects of rehabilitation including mine closure, final landform, post-mining land use/s and water management.*
>
> *(e) align with the strategic rehabilitation and mine closure objectives and address the principles of the Strategic Framework for Mine Closure (ANZMEC and MCA, 2000), or its latest version;*
>
> *(f) describe how the rehabilitation measures would be integrated with the measures in the Biodiversity Management Plan required under condition 49;*

(g) describe how rehabilitation will be integrated with the mine planning process, including a plan to address premature or temporary mine closure;

(h) include details of:

i. target vegetation communities and species to be established within the proposed revegetation areas, including habitat for threatened fauna; and

ii. the design of the surface water drainage network on the final landform; and

(i) investigate opportunities to refine and improve the final landform over time;

(j) include a post-mining land use strategy to investigate and facilitate post-mining beneficial land uses for the site, that:

i. align with regional and local strategic land use planning objectives and outcomes;

ii. support a sustainable future for the local community;

iii. utilise existing mining infrastructure, where practicable; and

iv. avoid disturbing self-sustaining native ecosystems, where practicable;

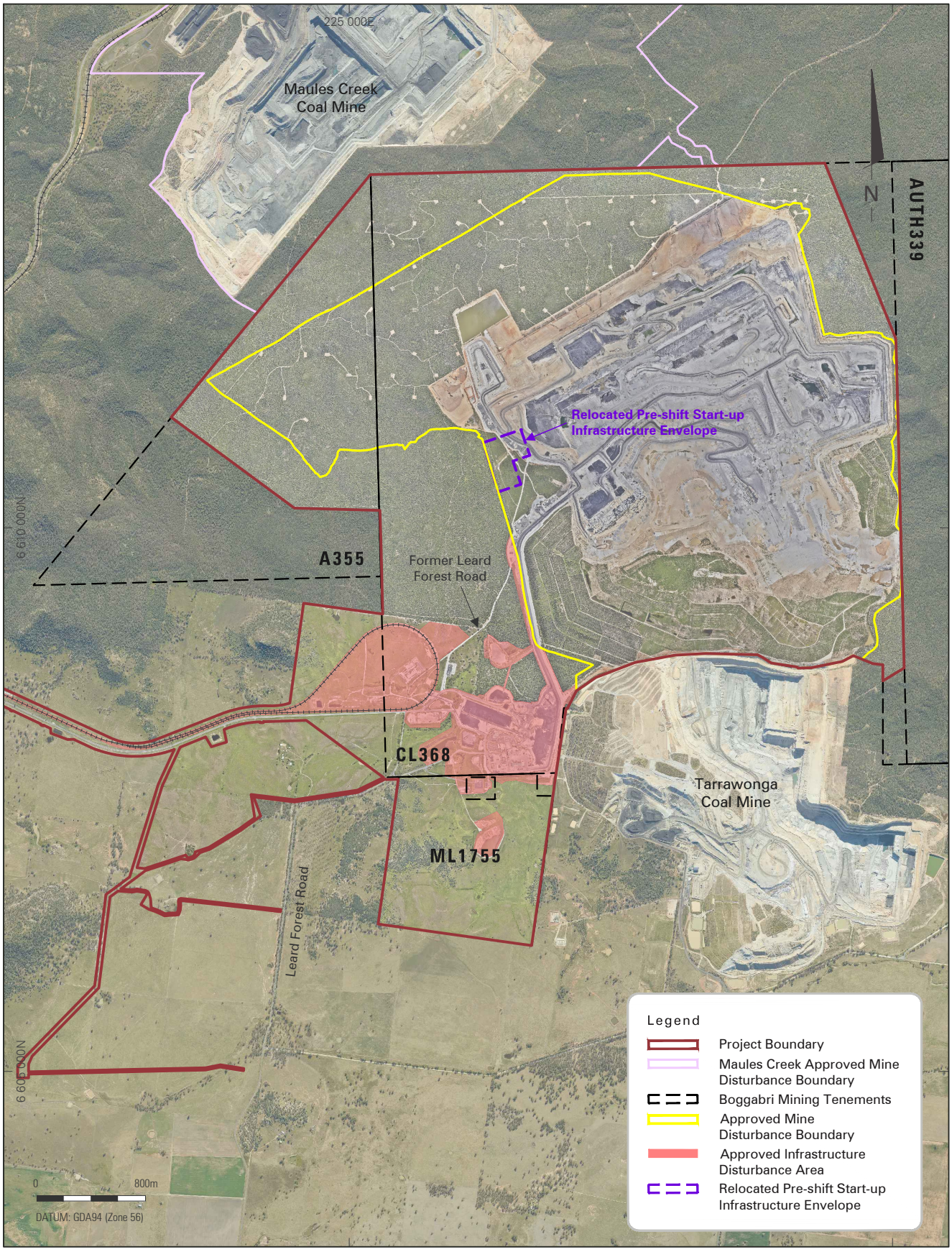
(k) include a stakeholder engagement plan to guide rehabilitation and mine closure planning processes and outcomes;

(l) investigate ways to minimise adverse socio-economic effects associated with rehabilitation and mine closure; and

(m) include a program to report on the outcomes of the investigations required under this condition and review and update this strategy at least every five years.

The Proponent must implement the approved Rehabilitation Strategy as approved from time to time by the Secretary."

Given that the proposed changes to conditions of SSD 09_0182 will continue to address the rehabilitation management requirements under the EP&A Act and Mining Act (albeit in a different format), no additional environmental impacts are anticipated by these administrative changes.



JBA 2167 001 MOD 9 - CONCEPTUAL PROJECT (29/09/2022)

BOGGABRI COAL MINE

Relocated Pre-shift Start-up
Infrastructure Envelope

FIGURE 2

3.1.4 Comparison with Current Approval

Table 2 provides a comparison of the Modification against the approved development under SSD 09_0182 (as modified).

Table 2 Comparison of the Modification to the Approved Development

Component	Currently Approved Development	The Modification
Approved Mine Life	• Mining operations until 31 December 2033	• No change
Project Disturbance	• 2,047 ha	• No change
Maximum Production Rate	• Up to 8.6 Mtpa ROM coal	• No change
Coal Resources	• Total coal resource estimated at 145 million tonnes (Mt) of ROM coal • Target coal seams are the Herndale to Merriown Seams	• No change
Saleable Product	• 135 Mt of product coal	• No change
Mining Method	• Open cut mining using shovel, excavators and a truck fleet (with option of introducing a dragline)	• No change
Rejects Management	• Co-disposal of approximately 10 Mt of coarse and fine reject materials in pit over the life of the mine	• No change
Infrastructure	• Continued use of the MIA (with some upgrades) including bath house and administration offices, fuel farm, vehicle wash bay, workshop, stores compound and laydown areas • Ancillary infrastructure (e.g. explosive magazines, oily water separator, crib huts, laydown pads, etc.) • Power and communications infrastructure • Coal processing and transportation infrastructure including CHPP, train loader and rail loop and spur	• Operation of a mobile crushing plant (supported by existing mobile equipment) within the existing approved Mine Disturbance Boundary at BCM • Relocation of the Pre-Shift Start-up Infrastructure to a location which is closer to active mining operations
Water Management	• Clean water is segregated from dirty and contaminated water • Dirty and contaminated water is reused onsite for dust suppression and other operational demands • Imported water (when needed) will be sourced from the BCM borefield or the Namoi River under BCOPL's water access licences	• Consistent water management objectives to that currently implemented onsite • Marginal increase in water demand for dust suppression at the mobile crushing facility

Component	Currently Approved Development	The Modification
	• Final Landform to be self-draining to the natural environment	
Site Access and Roads	• Access via Kamilaroi Highway and the Boggabri Coal private road	• No change to primary access from public roads • Access to the PSI Site will be via the existing BCM Access Road and the southern portion of the Leard Forest Road
Coal Transport	• Up to 8.6 Mtpa of product coal transported to market from BCM • Up to 3 Mtpa of product coal from Tarrawonga Mine (subject to commercial arrangement) • Total tonnage of coal railed from the Boggabri Rail Spur must not exceed 10 Mtpa • Up to 11 trains per day • Approval to transport minor quantities (60 t) of coal by road for testing or marketing purposes	• No change
Rehabilitation and Final Landform	• Final landform to drain to the natural environment • Minimise the size and depth of the final void and retains no surface water (i.e. no pit lake) • Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems • Integrate mine planning with adjoining mines to minimise environmental impacts	• No change

3.2 REASONS FOR THE MODIFICATION

3.2.1 Mobile Crushing Facility

BCOPL currently imports crushed rock for use in blast stemming and civil works. The Modification will enable BCM to produce its own supply of crushed rock from overburden and interburden material encountered by mining operations, thereby reducing demand on external material suppliers. By reducing reliance on external suppliers, the Modification will both reduce the risk of material shortages (due to local supply issues) as well as deliveries to the site.

On-site production of crushed rock from overburden and interburden material will also facilitate additional benefits including lining of haul roads and armouring of drains. The use of crushed rock as road base will yield various benefits including improved safety (particularly during wet conditions), reduced dust generation, increased productivity and reduced maintenance costs. Armouring of drains should assist with minimising scour associated with overland runoff.

3.2.2 Pre-shift Start-up Infrastructure

BCM personnel currently access the site via the Boggabri mine access road and arrive at the mine infrastructure area (MIA) located to the south-west of the mining area. Shift changeovers currently occur at the MIA, which requires employees to travel approximately 2 km from the mining area to the MIA (and vice versa) at shift changeover time. The Modification proposes the construction of certain infrastructure utilised by the operations workforce (collectively referred to as "Pre-shift Start-up Infrastructure") to a location closer to the mining area to enable shift changeovers to occur more efficiently. The PSI Site will include a refuelling depot and hardstand areas suitable for maintenance. This will reduce truck trips to the MIA for refuelling and save significant time for the maintenance of tracked equipment. Reducing the travel distance for haul trucks will reduce dust emissions and fuel consumption (i.e. lower Scope 1 greenhouse gas emissions).

3.3 ALTERNATIVES TO THE MODIFICATION

3.3.1 The 'No Modification' Scenario

If the Modification is not undertaken, the operational efficiencies described in **Section 3.2** would not be realised. If approval for the proposed rock crushing plant is not granted, BCM would continue to experience substantial interruptions to operations due to wet weather conditions. These operational delays result in reduced efficiency and productivity of mining operations, which in turn affects the ability to maximise economic benefits. The 'No Modification' scenario would forego this opportunity to maximise the economic benefits of BCM as well as the potential reduction in environmental impacts arising from reduced transport movements to and from the BCM.

If the proposed re-location of the Pre-shift Start-up Infrastructure is not undertaken, shift changeovers and maintenance of tracked equipment would continue to be undertaken at the existing MIA. Whilst this is not an impediment to mining operations, the significant operational efficiencies facilitated by the Modification would be foregone.

3.3.2 Alternative Locations

The new Pre-Shift Start-up Infrastructure is proposed at a location that is accessible via the Leard Forest Road. There are no feasible alternative locations, given the limited options for personnel to access the BCM.

4. STATUTORY CONTEXT

This section identifies the statutory provisions under NSW and Commonwealth legislation that are relevant to the Modification.

4.1 OVERVIEW

Table 3 summarises the regulatory framework that is relevant to the Modification. The aspects of the regulatory framework that warrant further explanation are discussed in **Section 4.2**.

Table 3 Relevant Legislative Provisions

Aspect	Relevant Provisions	Applicability to Modification
Power to modify approval	Section 4.55 of the EP&A Act	If the Modification is granted, the modified development would be 'substantially the same development' as the development approved under the existing development consent (as explained in **Section 4.2.1**).
Permissibility	*Narrabri Local Environmental Plan 2012* (Narrabri LEP) Clause 2.9 of *State Environmental Planning Policy (Resources and Energy) 2021* (Resources and Energy SEPP)	BCM is located on land zoned as RU1 (Primary Production) and RU3 (Forestry). Mining on this land is permissible pursuant to Clause 2.9 of the Resources and Energy SEPP (as explained in **Section 4.2.2**).
Gateway process	Clause 103 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) Clause 2.24 of the Resources and Energy SEPP	The Modification does not fall within the definition of 'mining or petroleum development' because no new mining leases are required. Accordingly, the Gateway process does not apply to the Modification.
Matters for consideration	Section 4.55(3) of the EP&A Act Part 2.3 of the Resources and Energy SEPP	The consent authority must consider the matters under Section 4.15(1) of the EP&A Act that are relevant to the Modification. Part 2.3 of the Resources and Energy SEPP prescribes additional matters that must be considered for mining proposals.
Other approvals	Part 2 of *Water Management Act 2000* (WM Act)	The surface water and groundwater sources in the vicinity of BCM are all the subject of Water Sharing Plans. The additional water requirements of Modification can be accommodated within BCOPL's water access licences.
	Sections 89, 90 & 91 of WM Act Section 4.41 of EP&A Act	Water use approvals, water management work approvals and activity approvals under the WM Act are not required for approved SSD.
	Section 48 of the POEO Act and Schedule 1	BCOPL holds EPL 12407 in respect of its operations at BCM which permits crushing, grinding or separating activities at a scale of >500000 – 2000000 tonnes annual processing

Aspect	Relevant Provisions	Applicability to Modification
		capacity. The crushing activities proposed by the Modification will remain within this limit. This EPL will be varied (as required) to include the activities proposed by the Modification.
	Section 68 of the *Local Government Act 1993*	Approval from the local council is required to operate the sewage management system at the new PSI Site.
	Section 68 of *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	The Modification is not likely to have a significant impact on any protected matters of national environmental significance. Accordingly, a referral under Section 68 of the EPBC Act is not required.

4.2 KEY REGULATORY MATTERS

4.2.1 Power to Modify

Section 4.55(1A) of the EP&A Act gives a consent authority the power to modify a development consent. This power to modify is limited by the requirement for the modified development to be 'substantially the same development' as that which was granted.

SSD 09_0182 was granted under the former Part 3A of the EP&A Act (and was originally referred to as PA 09_0182). All approved modifications to SSD 09_0182 were made under the former Section 75W of the EP&A Act, which was the modification provision for Part 3A Projects. Modification of approvals under Section 75W has now been discontinued, however previously approved modifications are deemed to be part of the authorised development.

Clause 3BA(6) of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* relevantly states:

> *(6) "In the application of section 4.55(1A) or (2) or 4.56(1) of the Act to the following development, the consent authority need only be satisfied that the development to which the consent as modified relates is substantially the same development as the development authorised by the consent (as last modified under section 75W):*
>
> *a) development that was previously a transitional Part 3A project and whose approval was modified under section 75W".*

Therefore, the proposed development under the Modification needs to be 'substantially the same development' as SSD 09_0182 (as modified by MOD 7).

The following aspects of BCM will not be altered by the Modification:

- Duration of mining operations;
- Approved Mine Disturbance Boundary;
- Mining method and maximum production rate;
- Methods of coal handling, processing and transportation;
- Hours of operation and size of workforce;
- Conceptual final landform (including the vegetation corridor); and
- Interactions with other operations.

Given that the major characteristics of the development will not be affected by the Modification, the modified development would be substantially the same development as the authorised development.

Section 4.55(1A) of the EP&A Act is also limited to modifications that would involve 'minimal environmental impact'. The assessment of environmental impacts in **Section 6** demonstrates that the Modification will not involve greater than minimal environmental impacts.

Therefore, the Modification satisfies the criteria for modification under Section 4.55(1A) of the EP&A Act.

4.2.2 Permissibility

The Narrabri LEP governs the permissibility of development in the Narrabri LGA. BCM is located on land zoned as RU1 (Primary Production) and RU3 (Forestry). The land use table in the Narrabri LEP states that open cut mining is permissible with consent in zone RU1.

The Narrabri LEP identifies three classes of development that are permissible in zone RU3, namely forestry, aquaculture and roads. As such, open cut mining is not listed as permissible development in this zone. However, Clause 2.9 of the Resources and Energy SEPP provides that mining is permitted on any land where agriculture or industry can be carried out. Aquaculture falls within the definition of 'agriculture' under the Narrabri LEP. Given that agriculture is permissible in zone RU3, open cut mining is also permissible by virtue of Clause 2.9 of the Resources and Energy SEPP.

Therefore, open cut mining (including the activities proposed by the Modification) is permissible on the land at BCM.

4.2.3 Dark Sky Planning Guideline

Section 61(3)(b) of the EP&A Regulation 2021 requires consideration of the Dark Sky Guideline for certain developments located near the Siding Spring Observatory. Section 61(3)(b) of the EP&A Regulation states:

> *"In determining a development application for development on the following land, the consent authority must consider the Dark Sky Planning Guideline –*
>
> *(b) land less than 200 kilometres from the Siding Spring Observatory, if the development is –*
>
> *(i) State significant development, or*
>
> *(ii) designated development, or*
>
> *(iii) development specified in State Environmental Planning Policy (Planning Systems) 2021, Schedule 6."*

Given that BCM is located within a 200 km radius from the Siding Spring Observatory, consideration of the Dark Sky Guideline is required. The applicability of the Dark Sky Guideline to the Modification is discussed in **Section 2.2.1** and an assessment of the potential lighting impacts is provided in **Section 6.3.2**.

5. STAKEHOLDER ENGAGEMENT

This section provides a summary of the stakeholder engagement undertaken for the purposes of the Modification, including consultation with both regulators and the community.

5.1 COMMUNITY ENGAGEMENT

Consultation with key community stakeholders was undertaken identify issues that required further consideration. All stakeholders were presented with an overview of the Modification and the environmental impact assessments to be undertaken. **Table 4** summarises the consultation undertaken, the matters raised by stakeholders and where those issues are addressed in this document.

Table 4 Community Engagement

Stakeholder	Method of Consultation	Matters Raised
Narrabri Shire Council	Letter correspondence dated 27 September 2022	No matters raised.
Gunnedah Shire Council	Letter correspondence dated 27 September 2022	No matters raised.
Boggabri Community Consultative Committee	Meeting on 25 August 2022	No matters raised
Siding Springs Observatory	Letter correspondence dated 27 September 2022	No matters raised.

5.2 REGULATORY CONSULTATION

In addition to community engagement, BCOPL has consulted with the relevant regulatory authorities to ascertain matters for consideration and/or assessment. All stakeholders were presented with an overview of the Modification and the environmental impact assessments to be undertaken. **Table 5** summarises the consultation undertaken, the issues raised and where those issues are addressed in this document.

Table 5 Consultation with Regulators

Stakeholder	Method of Consultation	Matters Raised	Where Addressed in Document
DPE	Meeting on 31 August 2022 Scoping letter on 2 September 2022 Meeting on 6 October 2022	Extent of vegetation clearance Impacts on fauna Changes to former Leard Forest Road Noise impacts Air quality impacts Storage of hydrocarbons	**Section 6.3.1** **Section 6.3.1** **Section 3.1.2** **Section 6.2** **Section 6.1** **Section 6.3.3**
Forestry Corporation of NSW	Letter correspondence dated 27 September 2022 Ongoing meetings	Use of crushed material produced by the proposed rock crushing facility	**Section 3.1.1**

6. ASSESSMENT OF IMPACTS

This section assesses the potential environmental impacts of the Modification.

6.1 AIR QUALITY AND GREENHOUSE GAS

6.1.1 Background

An air quality and greenhouse gas impact assessment for the Modification was undertaken by Airen Consulting (Airen). The air quality impacts of the Modification are considered relative to those of the approved development, which represents the baseline scenario. The air quality impacts of the approved development are represented by the predictions for MOD 3 to SSD 09_0182, which was the most recent modification that altered the predicted air quality impacts of the BCM.

The key component of the Modification from an air quality perspective is the mobile crushing facility and its associated mobile equipment. The other components of the Modification are expected to generate minimal dust emissions. The air quality and greenhouse gas impact assessment is summarised below and provided in full in **Appendix B**.

6.1.2 Impact Assessment

Operational Dust Impacts

Operational dust emissions associated with the Modification will be generated primarily by the mobile crushing plant and associated fleet.

Operation of the crushing plant involves various dust generating processes including vehicle movements on unsealed roads, material handling, crushing and screening. The estimated annual operational dust emissions are presented in **Table 6** The total suspended particulate (TSP) emissions associated with the Modification are estimated at 26,570 kg/year. The incremental impact of the Modification represents a 0.4% increase to the annual TSP emissions of the approved BCM (see **Table 7**).

Table 6 Estimated Annual Dust Emissions Associated with the Modification Alone

Activity	Annual Emissions (kg/y)		
	TSP	PM10	PM2.5
Hauling Rock from Source to Crusher	10,000	2,955	500
Loading Rock to Mobile Crusher	135	64	7
Crushing (mobile)	1,665	653	83
Screening (mobile)	4,500	1,500	225
Loading Product to Trucks	135	64	7
Hauling Product from Crusher to Destination	10,000	2,955	500
Unloading Product at Destination	135	64	7
TOTAL	**26,570**	**8,254**	**1,328**

Table 7 Estimated Annual Dust Emissions from the BCM With and Without the Modification

Air Quality Indicator	Annual Emissions as Approved without the Modification (t/y)	Annual Emission with the Modification (t/y)	Percentage Change (%)
TSP	7,219	7,246*	0.4%

** Includes the predicted 26,570 kg/y (or 26.6 t/y) of TSP generated by the Modification alone*

Airen concludes that the minor increase in dust due to the Modification is unlikely to be discernible beyond the existing dust levels at private receptors in the vicinity of BCM.

Greenhouse Gas Assessment

Table 8 shows the estimated additional greenhouse gas (GHG) emissions due to the Modification and compares this to the emissions for the approved operations. These emissions primarily relate to the fuel consumption of the mobile crushing equipment (estimated at 1,300 Litres per day, or 475 Kilolitres per year).

The additional emissions due to the fuel consumption of the mobile crushing facility will be partially offset by the following:

- Reduced diesel fuel usage due to fewer truck trips from the mining area to the MIA for shift changeover and/or refuelling (which would instead occur at the PSI Site); and
- Use of solar panels to supply a portion of the energy requirement for the PSI Site.

These potential savings have conservatively been omitted from the assessment of GHG impacts.

The predicted direct (Scope 1) emissions associated with the Modification represents a 0.21% increase in the GHG inventory for the approved operations. As such, the activities associated with the Modification are not predicted to significantly alter the overall GHG impacts of the development.

Table 8 GHG Impacts of the Modification Compared to the Approved Operations

Statistic	GHG Emissions (t CO_2-e/y)			
	Scope 1	Scope 2	Scope 3	Total
Average Annual Emissions for the Approved Operations	629,497	48,580	16,537,799	17,215,876
Additional Emissions due to the Modification	1,291	-	66	1,357
Percentage Change due to the Modification	0.21%	0.00%	0.00%	0.01%

6.1.3 Mitigation and Management

BCOPL currently manages its air quality and greenhouse gas impacts in accordance with its approved Air Quality and Greenhouse Gas Management Plan (AQGGMP). Given that the Modification is not predicted to exacerbate the air quality impacts of the approved development, no additional controls are required.

The PSI Site will include solar panels and an associated battery storage to reduce the operational GHG emissions from this infrastructure.

The AQGGMP will be updated to include the activities associated with the Modification. This update will identify the existing dust controls that can be applied to the Modification, and the additional GHG mitigation measures.

6.2 ACOUSTICS

6.2.1 Background

An acoustic impact assessment for the Modification was undertaken by Bridges Acoustics. This assessment considered the potential noise impacts of the Modification, including both construction and operational noise.

The rock crushing facility consists entirely of mobile plant and therefore does not involve a construction phase (other than minor site establishment incorporated into routine mining operations). Accordingly, the assessment of the proposed rock crushing facility is limited to its operational impacts.

The acoustic impact assessment is summarised below and is provided in full in **Appendix B**.

6.2.2 Impact Assessment

Mobile Rock Crushing Facility

Operation of the mobile crushing plant and associated equipment may include the following noise generating processes:

- Hauling of raw material from the mining area to the crushing facility;
- Feeding the crusher using an excavator;
- Crushing;
- Screening;
- Loading of crushed rock onto trucks; and
- Hauling of crushed material to the end use location.

The combined sound power level (SPL) of the crushing and screening plant, as well as the supporting mobile equipment, is estimated at 122 A-weighted decibels (dBA). In comparison, the combined SPL of the approved mining operations is approximately 140 dBA.

The noise levels generated by the mobile rock crushing facility are predicted to be at least 8 dBA below the relevant criteria at the nearest sensitive receptors.

Rock crushing activities will be limited to the day period. However, delivery of crushed material to other parts of the site may occasionally be undertaken at night. Given that the combined SPL of the rock crushing facility is more than 6 dBA less than that of the approved mining activities (which occur 24 hours per day), transportation of crushed rock can be undertaken at night without resulting in noise exceedances.

Pre-shift Start-up Infrastructure

Construction

Construction of the PSI Site will involve earthworks, concreting, mechanical/structural works, and installation of services (e.g. water, electricity, communications etc). The proposed construction work is assumed to involve the following noise sources:

- Heavy excavators and haul trucks sourced from the existing mining fleet;
- Smaller excavators for minor earthworks (such as trenching);
- Mobile crane;
- Concrete agitator trucks; and
- Power tools.

Previous noise assessments for the approved operations have conservatively assumed that all equipment at BCM is in use at the same time. For this reason, noise generated by the mining excavators and trucks allocated to construction activities have already been reflected in the predicted noise levels for BCM. As such, these machines do not need to be considered as additional noise sources.

The additional equipment used during the construction phase is predicted to produce a combined SPL of 100-110 LAeq,15min (which is the A-weighted noise level over a 15 minute period). This combined SPL is 10-20 dBA lower than the noise level that are predicted to be generated by the existing mining activities. As such, noise generated by the proposed construction activities will not materially contribute to noise generated by the development.

Operations

The facilities at the PSI Site will not produce significant operational noise. The operational impacts of the PSI Site will primarily be due to vehicle movements to and from the new site. The PSI Site will include generators producing a combined SPL of 105 dBA; however this does not contribute noticeably to the overall noise from the site.

The worst-case noise level would occur at shift changeover times as both heavy trucks and personnel are arriving at the site. The combined SPL produced by haul trucks, fuel delivery trucks and commuter vehicles is estimated at 118 LAeq,15min. This combined SPL is predicted to result in a maximum level of 24 LAeq,15min at the nearest sensitive receptors (assuming noise enhancing weather conditions). Given that this worst-case level is 14 dBA below the relevant noise criteria at these receptors, noise from the PSI Site is not expected to result in any significant impacts to private receptors.

Road Traffic Noise

Traffic movements associated with mobile crushing facility will be limited to the initial delivery of plant to site and occasional maintenance visits. Deliveries associated with the mobile crushing facility will occur via the Kamilaroi Highway and private mine access road.

Traffic movements associated with the construction of the PSI Site will include deliveries of concrete, steel, infrastructure parts and other building materials. Peak construction traffic is likely to occur during a large concrete pour, which may involve concrete agitator trucks arriving every 10-15 minutes. As such, the worst-case construction traffic is estimated at 12 truck movements per hour (six in each direction) and 30 car movements for personnel access. The worst-case traffic noise levels at the nearest private receptor are predicted to be 21 LAeq, 1hr (A-weighted noise level averaged over a 1 hour period) and 31 LAeq, 15 min due to truck movements. These predicted levels are within the relevant noise criterion of 35 LAeq, 15 min.

Noise due to car movements travelling from the private mine access road and the former Leard Forest Road to the PSI Site will be generally in line with current noise levels.

6.2.3 Mitigation and Management

BCOPL currently manages its noise impacts in accordance with the reasonable and feasible measures described within the approved Noise Management Plan (NMP). Given that the Modification is not predicted to exacerbate the noise impacts of the approved development, no additional noise controls are required.

Nevertheless, the NMP will be updated to include the activities associated with the Modification, such that the existing noise controls will be applied (where warranted) to the proposed activities. The update of the NMP will note that operation of the mobile crushing facility will be limited to the day period, thereby reducing noise impacts during the more sensitive night period.

6.3 OTHER ENVIRONMENTAL ASPECTS

6.3.1 Ecology

The activities proposed by the Modification will occur predominantly within the approved Mine Disturbance Boundary for BCM under SSD 09_0182. The PSI Site will be located on land that was historically disturbed for the storage of topsoil and has been re-vegetated with pasture species.

The former Leard Forest Road will require upgrades to facilitate use of this road for access to the PSI Site. Although this section of road is located outside of the approved Mine Disturbance Boundary, the necessary road upgrade works will occur within the existing road corridor. As such, the proposed upgrades to the former Leard Forest Road will not result in additional disturbance.

For these reasons, the Modification will not result in any additional vegetation disturbance or loss of habitat.

Once the PSI Site has been constructed, operational personnel will travel to work via the private mine access road and a section of the former Leard Forest Road. This section of the former Leard Forest Road traverses through the Leard State Forest and as such, there is a risk of vehicle interactions with fauna.

As briefly described within **Section 1.1**, BCOPL currently has a modification application (MOD 8) with DPE for assessment which proposes various mine plan changes and for the construction of a fauna movement crossing over the existing haul road at BCM. BCOPL is seeking approval to construct the fauna movement crossing over the existing haul road to improve the movement of fauna through the Leard State Forest and into the Southern Rehabilitation Area at BCM. The existing haul road is to some extent an ecological barrier to the movement of some fauna species. The proposed fauna movement crossing over the haul road as proposed by MOD 8 is at least 140 m to the east of the former Leard Forest Road.

The use of the former Leard Forest Road for access to the PSI Site (as described within **Section 3.1.2**) has the potential to marginally increase the impact on some fauna species which currently cross this section of road and would potentially utilised the fauna movement crossing as proposed to be constructed as part of MOD 8. WSP was commissioned to consider the potential impact of the incremental increase in vehicle movements on this section of the former Leard Forest Road (as proposed by MOD 9) on fauna which may utilise the fauna movement crossing. A copy of WSP's Assessment is provided within **Appendix D**.

WSP notes in their report that although the former section of the Leard Forest Road is currently used intermittently by light vehicles and irregularly by heavy rigid supply vehicles, there will be an increase in vehicle movements (as described within **Section 3.1.2**). The incremental increase in light vehicle movements has the potential to increase wildlife-vehicle collisions along the former Leard Forest Road in vicinity of the proposed fauna movement crossing and add incrementally to noise, dust and lighting pollution in its near vicinity. However, it is considered unlikely that the Modification will add substantially to wildlife-vehicle collisions or inhibit animals from making east-west movements in the southern margin of the Leard State Forest. Separate to the incremental increase on this road during the two shift change over periods, it is probable that local fauna will still undertake crossings of this section of the former Leard Forest Road due to:

- The short duration over which a small incremental increase in light vehicle movements will be experienced;
- Low traffic volumes outside the two shift change over periods;
- Section of the Leard Forest Road occurring at grade;
- The relatively short distance (<25 m at widest point) between remnant vegetation that borders the immediate road boundary;
- Any road upgrades being limited to the existing road corridor (no additional vegetation clearing is proposed); and
- Canopy connectivity that provides gliding passage across Leard Forest Road.

To mitigate the negative ecological impacts associated with increased vehicle movements along this section of the former Leard Forest Road, it is proposed that wildlife signage will be installed to notify road users of the presence of wildlife. Further, the speed limit for vehicles travelling along this section of road within the Leard State Forest will be reduced to 50 km per hour (km/h).

As is currently implemented on the BCM Access Road, BCOPL will monitor for any carcasses and wildlife collisions on this section of the former Leard Forest Road. The results of these incidences will be reported within the Annual Review.

Workforce training will be undertaken to ensure that the employees are aware of the sensitivities with travelling on the section of the former Leard Forest Road and the potential interactions with fauna. Awareness training will identify the responsibilities of the road users and responsibilities in relation to the maintenance of the signage to be installed, speed limits and requirement to report any vehicle interactions with fauna to the BCOPL Environmental Department.

BCOPL encourages its operational workforce to carpool as a measure to reduce traffic from the public road network and to assist in managing fatigue and road safety risk. In recent years, BCOPL has observed carpooling to be more frequently utilised by operational employees travelling to and from the BCM. This practice has the potential to further reduce the light vehicles which will utilise this road on a day-to-day basis.

6.3.2 Visual and Lighting

The mobile rock crushing facility will be located within the mining area (i.e. generally below ground surface) at all times. As such, the rock crushing activities will not be openly visible from any public locations.

The PSI Site will be located within the Leard State Forest. The infrastructure area will be bounded by remnant forest to the south and west, whereas the existing mining area is located to its east and north.

The proposed infrastructure will not be visible from receptors to the south or west of the site due to screening provided by intervening topography and dense vegetation in the Leard State Forest. Similarly, receptors to the east and north will be screened by existing topography (i.e. the Willow Tree Range).

Lighting will be installed at the PSI Site, as this area will be operational 24 hours per day. There will be no direct lighting impacts on surrounding receptors due to screening provided by intervening topography and vegetation.

To minimise diffuse lighting impacts, external lighting at the PSI Site will comply with Australian Standard *'AS4282 (INT) 2019 – Control of Obtrusive Effects of Outdoor Lighting'*. Controls to minimise diffuse lighting may include the use of warmer shades of white and directing external lighting downwards.

As explained in **Section 4.2.3**, the Dark Sky Planning Guideline is relevant to the Modification because it is located within 200 km of the Siding Springs Observatory. The additional lighting required for the Modification is insignificant in the context of existing night lighting in the Dark Sky Region and will not have any discernible effect on the Siding Springs Observatory. Notwithstanding, lighting required for the Modification will be consistent with the nine principles recommended by the Dark Sky Planning Guideline, where practicable.

6.3.3 Contamination and Hazards

As described in **Section 3.1.2**, the proposed PSI Site will include diesel storage tanks re-located from the MIA as well additional tanks. The maximum volume of diesel stored at the site is expected to be in the order of 1,760,000 L (or 1,760 m^3). Based on a relative density of 0.83 (BP, 2019), this volume of diesel fuel equates to a mass of approximately 1,461 t. This is less than the threshold prescribed for a "Chemical Storage" under Schedule 1 of the POEO Act. Accordingly, the proposed storage of diesel fuel at the PSI Site does not constitute a Scheduled Activity under the POEO Act.

Notwithstanding, diesel fuels at BCM will be stored in accordance with *AS1940: The storage and handling of flammable and combustible liquids*.

6.3.4 Bushfire

The proposed site is mapped as bushfire prone land. Chapter 8.3.6 of '*Planning for Bush Fire Protection*' (Rural Fire Service, 2019) (PBFP) provides guidance regarding bushfire protection measures for mining development. PBFP recommends that an APZ of at least 10 m should be established around all infrastructure associated with mining. An APZ is a buffer zone with minimal fuel zones (i.e. vegetation). The layout of the new infrastructure site will incorporate the APZs recommended by PBFP.

The PSI Site will be fitted with a fire safety equipment and BCM personnel are trained in emergency response procedures through site inductions. The PSI Site also contains water tanks which can be used for emergency services (if required).

The mobile rock crushing facility will be located within the active mining area and as such, does not involve any bushfire risks.

6.3.5 Other Land Uses

The activities proposed by the Modification are located within the Leard State Forest. Under the approved conceptual final landform (Appendix 9 of SSD 09_0182), the entire area within the Approved Mine Disturbance Boundary is required to be rehabilitated. The Modification will not alter the conceptual final landform and as such, areas disturbed by the Modification will be revegetated in accordance the current rehabilitation strategy.

7. JUSTIFICATION OF THE MODIFICATION

This section provides a justification and evaluation of the Modification, having regard to its potential benefits, environmental impacts, and the principles of Ecologically Sustainable Development (ESD).

7.1 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The objects of the EP&A Act include "*to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment*" (Section 1.3(b)). "Ecologically sustainable development" has the same meaning as in Section 6(2) of the *Protection of the Environment Administration Act 1991*. **Table 9** lists the four principles of ESD and explains how the Modification satisfies these principles.

Table 9 Principles of Ecologically Sustainable Development

Principle	Application to the Modification
The precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	The air quality, greenhouse gas and noise assessments have demonstrated that the potential emissions of the Modification will not be significant. The proposed activities will be located within the approved Mine Disturbance Boundary, thereby avoiding further vegetation disturbance. The land within the approved Mine Disturbance Boundary will be rehabilitated post-mining consistent with the currently approved rehabilitation plans. For these reasons, the Modification does not pose a threat of serious of irreversible damage.
Inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	The Modification does not propose any disturbance outside of existing and approved disturbance areas at BCM. Upon the completion of mining at BCM, disturbed areas will be rehabilitated to achieve the post-mining land use (i.e. biodiversity area). As such, these values will be maintained for the benefit of future generations.
Conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.	Activities proposed by the Modification will be located within the approved Mine Disturbance Boundary, thereby avoiding further vegetation disturbance.
Improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services	The Modification is consistent with the 'polluter pays' principle for the following reasons: • BCOPL bears the cost of all environmental management measures including dust and noise controls, fuel efficiency measures (i.e. to reduce Scope 1 GHG emissions) and post-mining rehabilitation; • BCOPL compensates for its social impacts through the existing VPA, which will continue to be relevant to the Modification (see **Section 2.4**); and • BCOPL has an existing Access and Compensation Agreement with Forestry Corporation of NSW to allow the approved open cut mining within the Leard State Forest and includes a requirement for compensation of impacts to forestry resources.

For the reasons described above, the Modification is consistent with the object of the EP&A Act relating to ESD.

As explained in **Section 3.2**, the Modification will improve the efficiency of operations which may lead to greater productivity (and therefore greater royalties to NSW, payments to NSC under the VPA and other economic benefits to the community). As such, the Modification is consistent with the objects of the EP&A Act including "*to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources*" and "*to promote the orderly and economic use and development of land*".

7.2 MERIT EVALUATION

The Modification will facilitate the following improvements to operations at BCM:

- Lining of haul roads with crushed rock, which may enable greater operability under wet conditions and reduced maintenance costs;
- Reduced reliance on external gravel suppliers, thus reducing risk of interruptions due to external factors and fewer deliveries to the site; and
- More efficient shift changeovers by enabling this to occur closer to the active mining area.

These operational efficiencies have the potential to result in greater resource production at BCM, which leads to greater benefits including royalties to NSW, VPA payments to the NSC and other flow-on benefits of improved efficiencies of operations.

Section 6 summarises the potential environmental impacts of the Modification. The specialists' impact assessments have determined that the dust, GHG and noise emissions generated by the Modification will not significantly increase the impacts of the currently approved development under SSD 09_0182. The infrastructure proposed by the Modification will not be visible from public locations and appropriate measures will be implemented to minimise night lighting impacts. The findings of these impact assessments have confirmed that the Modification will involve 'minimal environmental impact' and as such, can appropriately be granted under Section 4.55(1A) of the EP&A Act.

Given that the Modification will not significantly increase the environmental impacts of the approved development, the potential benefits of the Modification will outweigh its environmental costs.

The following aspects of BCM will not be altered by the Modification:

- Duration of mining operations;
- Approved Mine Disturbance Boundary;
- Mining method and maximum production rate;
- Methods of coal handling, processing and transportation;
- Hours of operation and size of workforce;
- Conceptual final landform (including the vegetation corridor); and
- Interactions with other operations.

Given that key aspects of the approved development are unaffected by the Modification, as well as the benefits of the proposed development outweighing its costs, the Modification is in the public interest and will not affect the merits of the approved development.

8. REFERENCES

- Airen Consulting (2022), *Air quality and greenhouse gas assessment of Boggabri Coal Mine Modification 9*.
- BP (2019), *Safety Data Sheet: Automotive Diesel Fuel*.
- Bridges Acoustics (2022), *Boggabri Coal Mine – Modification 9 Acoustic Assessment*.
- Department of Planning, Infrastructure and Environment (2021). *State significant development guidelines – Preparing an Modification Report*.
- Department of Planning & Environment (2016). *The Dark Sky Planning Guideline.*
- Hansen Bailey (2010). *Continuation of Boggabri Coal Mine Environmental Assessment.*
- Narrabri Shire Council (2012). *Narrabri Local Environmental Plan 2012.*
- Rural Fire Service (2019). *Planning for Bush Fire Protection.*

9. ABBREVIATIONS

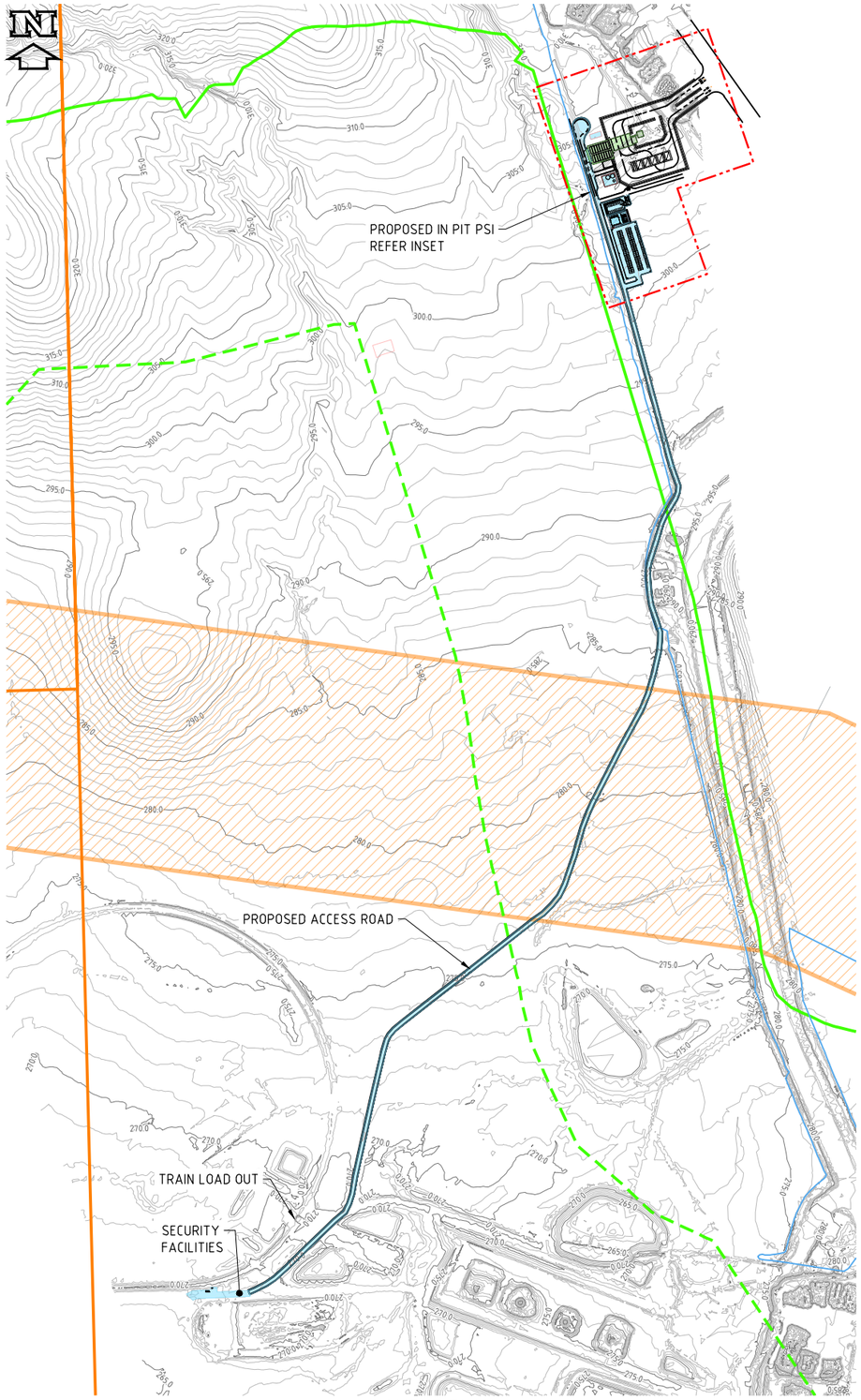
Abbreviation	Meaning
°C	Degrees Celsius
AHD	Australian Height Datum
AWS	Automated Weather Station
BCM	Boggabri Coal Mine
BCOPL	Boggabri Coal Operations Pty Ltd
BOA	Biodiversity Offset Area
BoM	Bureau of Meteorology
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
dBA	A-weighted decibel
DPE	Department of Planning & Environment
EP&A Act	*Environmental Planning & Assessment Act 1979*
EP&A Regulation	*Environmental Planning & Assessment Regulations 2021*
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FTE	Full Time Equivalent
GHG	Greenhouse Gas
ha	Hectare
IA	Idemitsu Australia Pty Ltd
km	Kilometre
LGA	Local Government Area
m	Metre
Maules Creek	Maules Creek Coal Mine
MCCPL	Maules Creek Coal Pty Ltd
MIA	Mine Infrastructure Area
Mining Act	*Mining Act 1992*
mm	Millimetre
Mtpa	Million tonnes per annum
Narrabri LEP	Narrabri Local Environmental Plan
NMP	Noise Management Plan
Resources and Energy SEPP	*State Environmental Planning Policy (Resources and Energy) 2021*
RMP	Rehabilitation Management Plan
ROM	Run of Mine

Abbreviation	Meaning
SPL	Sound Power Levels
SSD	State Significant Development
t	Tonnes
Tarrawonga	Tarrawonga Coal Mine
TCPL	Tarrawonga Coal Pty Ltd
VPA	Voluntary Planning Agreement
WM Act	*Water Management Act 2000*
ZOA	Zone of Acquisition

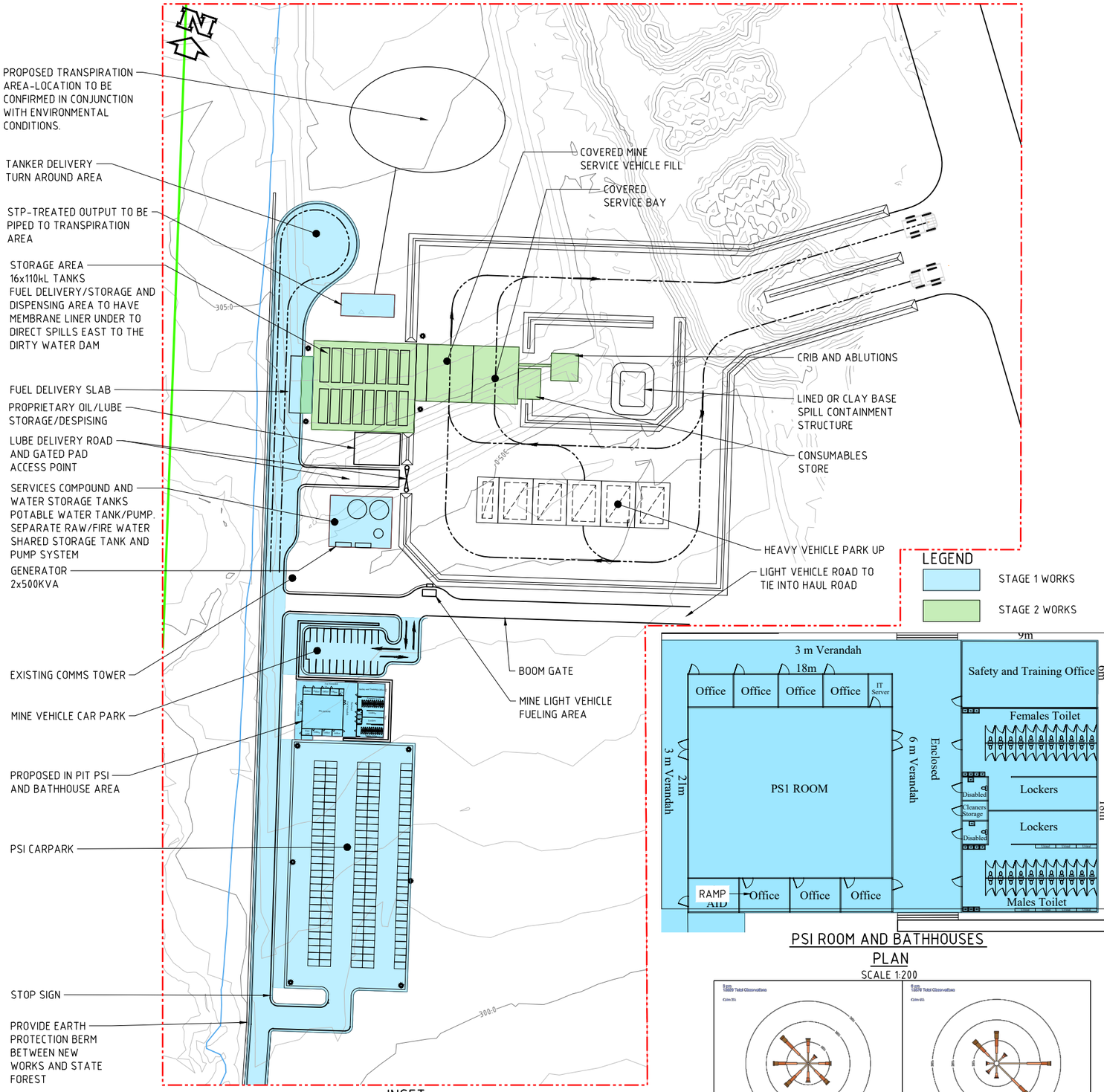
APPENDIX A

INDICATIVE DESIGN LAYOUT OF PSI SITE

PS132282-SKT-0001C

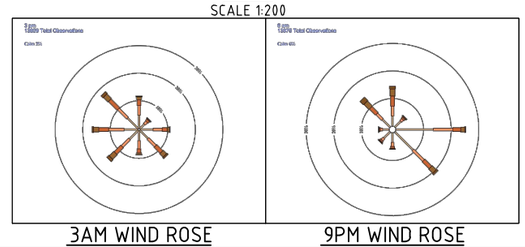


LAYOUT PLAN
NOT TO SCALE



INSET
SCALE 1:1000

PSI ROOM AND BATHHOUSES PLAN
SCALE 1:200



3AM WIND ROSE | 9PM WIND ROSE

REV	DATE	BY	DESCRIPTION	CHK	APPD
A.3	06.10.22	CH	WORK IN PROGRESS	KC	
A.2	26.09.22	CH	WORK IN PROGRESS	KC	
A.1	12.06.22	CH	WORK IN PROGRESS	KC	

REFERENCE COORDINATION DRAWINGS

DESCRIPTION	DRAWING NO.	REV	CHK

SURVEY DATUM

HORIZONTAL DATUM: | VERTICAL DATUM:

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Full Size 1:200 ; Half Reduction 1:400
SCALE (m)
0 10 20 40 60
Full Size 1:1000 ; Half Reduction 1:2000
SCALE (m)

A1 ORIGINAL
DO NOT SCALE THIS DRAWING

APPROVED

SIGNED:

DATE: | RPEQ:

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CLIENT:

PROJECT: BOGGABRI COAL OPERATIONS
CONCEPT

TITLE: IN PIT PSI
OPTION 1
FACILITY PLAN

DRAWING STATUS: PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DESIGNED:	CHECKED:	APPROVED:
K. CLEMENTS	K. CLEMETNS	
PROJECT No:	DRAWN:	DATE:
PS132282	C. HARDING	12.06.22

DRAWING No: PS132282 - SKT - 0001 | REV: A.3

File name: U:\PROJECTS\AU\PS132XX\PS132282_PREPARE_DESIGN_C\04_WIP\BIM\DRAWINGS\CAD\PS132282-SKT-0001C.DWG, printed on Thursday, 6 October 2022 1:41:13 PM, by Kromin, Natalia

APPENDIX B

AIR QUALITY & GREENHOUSE GAS IMPACT ASSESSMENT

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Registered office:
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4 October 2022

Attention: Andrew Wu
Senior Environmental Engineer
James Bailey & Associates Pty Ltd

Dear Andrew

Air quality and greenhouse gas assessment of Boggabri Coal Mine Modification 9

Please see below for the air quality and greenhouse gas assessment to accompany the Modification Report for Boggabri Coal Mine Modification 9 (MOD 9).

1. Background

Boggabri Coal Operations Pty Ltd (BCOPL) operates the Boggabri Coal Mine (BCM) on behalf of Idemitsu Australia Pty Ltd (IA) and its joint venture partners. BCM is an open cut mine located approximately 15 kilometres (km) north-east of the township of Boggabri in the North West Region of NSW. It is located wholly within the Narrabri Local Government Area (LGA). BCM has operated since 2006 and is part of the Leard Mining Precinct, being located immediately adjacent to the Tarrawonga Mine to the south and Maules Creek Coal Mine to the north.

BCM operates under State Significant Development Consent SSD 09_0182, which authorises the production of up to 8.6 million tonnes per annum (Mtpa) of Run of Mine (ROM) coal until the end of December 2033. Open cut mining is currently undertaken using a fleet of shovels / excavators and haul trucks. Although SSD 09_0182 provides approval for the use of a dragline, all mining activities to date have been undertaken using conventional truck and shovel operations.

The approved ancillary infrastructure at BCM includes the administration facilities, workshop, coal handling and preparation plant (CHPP), stockpile areas, rail loading and transportation infrastructure, water and waste management systems, bore field and power and communications infrastructure. The primary access to BCM is via the private mine access road which connects with the Kamilaroi Highway approximately 12 km to the west of the administration facilities.

BCOPL seeks a modification (MOD 9) to SSD 09_0182 to facilitate the following activities:

- Operation of a mobile rock crushing plant and associated fleet within the approved Mine Disturbance Boundary
- Construction of the Pre-Shift Information Session Infrastructure closer to active mining operations, and use of a portion of the former Leard Forest Road for access to the new facility
- Minor administrative changes to the rehabilitation conditions of SSD 09_0182 to align these requirements with recent amendments to the *Mining Regulation 2016*

Figure 1 shows the location of the BCM, the assessed locations for the mobile crushing facility and the location of relocated infrastructure associated with MOD 9. The mobile crushing facility will periodically be relocated within the mining area to accommodate the progression of mining. Four representative locations have been assumed for

assessment purposes. These locations are representative of the worst case positioning in relation to sensitive receivers surrounding the BCM.

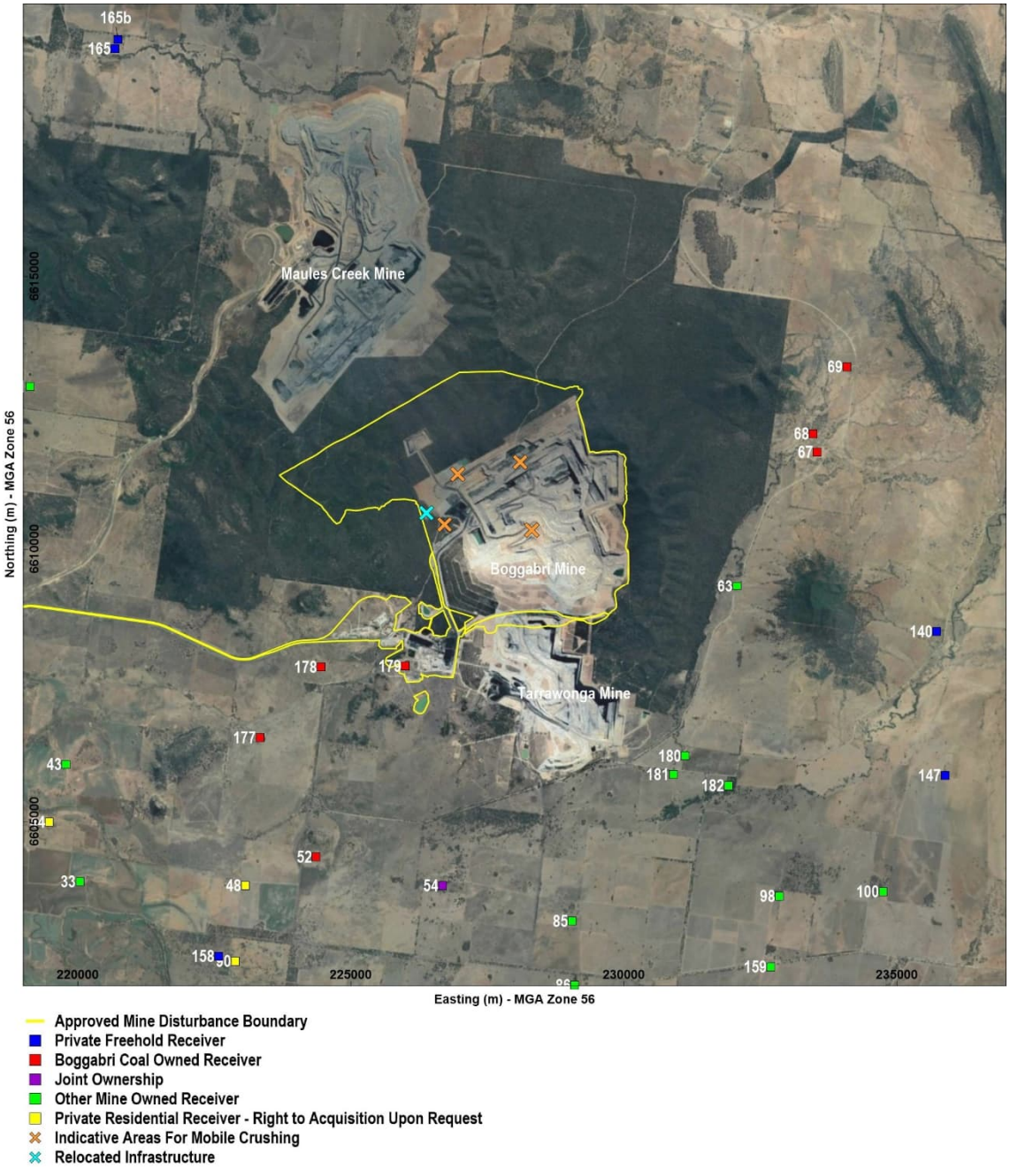

Figure 1 Location of the BCM and activities associated with MOD 9

2. Key Issues

Air quality issues can arise when emissions from an industry or activity lead to deterioration in the ambient air quality. Potential air quality issues have been identified from a review of MOD 9 and associated activities. This identification process has considered the types of emissions to air and proximity of these emission sources to sensitive receptors.

Emissions from the MOD 9 activities will primarily consist of dust, also referred to as particulate matter. These emissions will be generated from the additional handling, crushing and transport of material associated with the mobile crusher. Key classifications of particulate matter include:

- Total suspended particulates (TSP)
- Particulate matter with equivalent aerodynamic diameter of 10 microns or less (PM_{10})
- Particulate matter with equivalent aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)
- Deposited dust

Operation of the mobile crusher and associated equipment will consume additional fuel, leading to greenhouse gas emissions as carbon dioxide equivalent gases (CO_2-e). The relocation of the Pre-Shift Information Session Infrastructure closer to active mining operations will potentially reduce CO_2-e emissions due to shorter travel distances to the pit by large haul trucks.

The key issues which will be relevant to MOD 9 for consideration in this assessment include:

- Dust (i.e. particulate matter) in the form of TSP, PM_{10}, $PM_{2.5}$ and deposited dust
- Greenhouse gas emissions (e.g. CO_2-e)

3. Assessment Criteria

3.1 Air Quality

Air quality is typically quantified by the concentrations of substances in the ambient air. Air pollution occurs when the concentration (or some other measure of intensity) of one or more substances known to cause health, nuisance and/or environmental effects, exceeds a certain level. With regard to human health and nuisance effects, the substances most relevant to the BCM have been identified, from Section 2, as particulate matter in various forms.

The Environment Protection Authority (EPA) has developed criteria for a range of air quality indicators, including particulate matter, that are used for the assessment of specific projects. These criteria are outlined in the "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA, 2022), hereafter referred to as the Approved Methods. Table 1 shows the relevant EPA assessment criteria as well as the criteria from SSD 09_0182. The EPA criteria apply to existing and potentially "sensitive receptors", which is defined by the Approved Methods as "a location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area".

It is relevant to note that the 24-hour average PM_{10} criteria from the EPA and SSD 09_0182 are interpreted differently. That is, the 24-hour average PM_{10} EPA criterion of 50 µg/m^3 relates to the total concentration of pollutants in the air (that is, cumulative) whereas the criterion from SSD 09_0182 relates only to the increment of the project.

Table 1 Air quality assessment criteria

Air quality indicator	Averaging time	EPA assessment criteria	[d] Air quality criteria from SSD 09_0182
Particulate matter (PM_{10})	24-hour	50 µg/m³	[a] 50 µg/m³
	Annual	25 µg/m³	[a] 30 µg/m³
Particulate matter ($PM_{2.5}$)	24-hour	25 µg/m³	-
	Annual	8 µg/m³	-
Particulate matter (TSP)	Annual	90 µg/m³	[a] 90 µg/m³
Deposited dust	Annual (maximum increase)	2 g/m²/month	[b] 2 g/m²/month
	Annual (maximum total)	4 g/m²/month	[a] 4 g/m²/month

[a] *Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to all other sources);*

[b] *Incremental impact (ie incremental increase in concentrations due to the project on its own);*

[c] *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*

[d] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.*

3.2 Greenhouse Gas

Greenhouse gas (GHG) is a collective term for a range of gases that are known to trap radiation in the upper atmosphere, where they have the potential to contribute to the greenhouse effect (global warming). GHGs include:

- Carbon dioxide (CO_2); by far the most abundant GHG, primarily released during fuel combustion
- Methane (CH_4); generated from the anaerobic decomposition of carbon-based material (including enteric fermentation and waste disposal in landfills)
- Nitrous oxide (N_2O); generated from industrial activity, fertiliser use and production
- Hydrofluorocarbons (HFCs); commonly used as refrigerant gases in cooling systems
- Perfluorocarbons (PFCs); used in a range of applications including solvents, medical treatments and insulators
- Sulphur hexafluoride (SF_6); used as a cover gas in magnesium smelting and as an insulator in heavy duty switch gear

It is common practice to aggregate the emissions of these gases to the equivalent emission of carbon dioxide. This provides a simple figure for comparison of emissions against targets. Aggregation is based on the potential of each gas to contribute to global warming relative to carbon dioxide and is known as the global warming potential (GWP). The resulting number is expressed as carbon dioxide equivalents (or CO_2-e).

GHG emissions that form an inventory can be split into three categories known as 'Scopes'. Scopes 1, 2 and 3 are defined by the Greenhouse Gas Protocol (WRI, 2004) and can be summarised as follows:

- Scope 1 – Direct emissions from sources that are owned or operated by the organisation (examples include combustion of diesel in company owned vehicles or used in on-site generators).
- Scope 2 – Indirect emissions associated with the import of energy from another source (examples include importation of electricity or heat).
- Scope 3 – Other indirect emissions (other than Scope 2 energy imports) which are a direct result of the operations of the organisation but from sources not owned or operated by them (examples include business travel, product transport by air or rail, and product usage).

The purpose of differentiating between the scopes of emissions is to avoid the potential for double counting, where two or more organisations assume responsibility for the same emissions.

There are no specific GHG emission limits that have been defined for the assessment of individual projects. However, GHG emission inventories are often compared to State and National inventories and considered against current policies. Australia has now legislated a Climate Change Bill. This Bill includes targets to cut emissions by 43% by 2030 from 2005 levels, and achieve net zero emissions by 2050.

4. Assessment Methodology

4.1 Air Quality

The potential air quality impacts of MOD 9 have been determined by preparing particulate matter emission inventories for approved and proposed modification scenarios. This involved:

- Calculating TSP, PM_{10} and $PM_{2.5}$ emissions from all relevant and additional activities associated with MOD 9, based on emission factors from the NPI and US EPA.
- Incorporating emissions from MOD 9 activities into the overall BCM site emission inventory.
- Comparing site emissions with and without MOD 9 activities to highlight the expected changes.
- Determining the potential change and significance in air quality impacts due to the additional activities and emissions associated with MOD 9 and with consideration of the nature and scale of activities, proximity to sensitive receptors, the existing air quality and meteorological conditions, and previous and relevant air dispersion modelling for the BCM.

Section 5 provides the air quality assessment.

4.2 Greenhouse Gas

GHG emission inventories have been collated and prepared for the BCM including with all relevant activities associated with MOD 9. This involved:

- Calculating GHG emissions from all relevant and additional activities associated with MOD9, based on emission factors from the National Greenhouse Accounts (NGA) Factors.
- Comparing the change (increment) in GHG emissions from the BCM for with and without MOD 9 scenarios.

Combustion of diesel fuel by the mobile crushing equipment will be the main source of GHG emissions for MOD 9. Fuel consumption rates have been combined with the NGA emission factors (DISER, 2021) to derive Scope 1 and 3 emission estimates. It is also relevant to note that power to the new infrastructure will be supplied by a solar power / battery system with backup support of a diesel generator. Section 6 provides the GHG assessment.

5. Air Quality Assessment

This section aims to determine the potential change and significance in air quality impacts due to the additional activities and emissions associated with MOD 9. It considers the nature and scale of activities, proximity to sensitive receptors, the existing air quality and meteorological conditions, and previous and relevant air dispersion modelling for the BCM. These aspects are discussed below.

5.1 Nature and Scale of Activities

Dust (i.e. particulate matter) will be the most significant air quality issue for MOD 9. These emissions will be due to the additional handling, crushing and transport of material associated with the mobile crusher and associated equipment. The amount of dust produced will depend on various factors including:

- The quantities of material handled, processed and transported
- The characteristics of material being handled such as moisture and silt content
- The distances which materials will be transported
- The measures in place to manage and control emissions
- The environmental conditions at the time of activities (for example, rainfall)

The mobile crushing plant will be predominantly used to produce material for lining of haul roads, drains and potentially other construction uses. The equipment comprising the plant will include a jaw crusher, cone crusher, screen, loader, and excavator, and will occupy an area of approximately 200 m by 200 m. Stockpiles will be located within 50 m of the crushing process.

Raw feed will be supplied from the mine and transported to a raw feed stockpile. The excavator will feed the crushers to deliver a peak daily production rate of up to 1,800 tonnes per day (t/d) and an average monthly production rate of 25,000 tonnes (t). The crusher will operate 7 days per week, during daytime hours. Water sprays will be attached to conveyors in various locations and used for dust suppression.

A new in-pit pre shift information session facility will be constructed for the purpose of reducing inefficiencies associated with operator transit time experienced during shift commencement and cessation. The new facility will require the procurement and installation of new infrastructure closer to the operational area of the mine. The new infrastructure will include:

- A new office complex complete with pre shift information session area, bathhouse and amenities and general office, training and meeting spaces
- Water storages, both firefighting and potable water classes
- Power supply from generator and solar equipment
- Information systems
- General lighting
- Carparking and walkways
- Diesel storages and decanting equipment
- Access roadway

An existing site diesel storage area, located in the current mine infrastructure area (MIA), will be relocated to the new in pit facility. This will include an additional 8 x 110kL tanks to service the mine's operational diesel requirements. The facility will enable refuelling of the equipment (and/or service trucks) to be performed at the new dispensing area at a location closer to the active mining operations.

5.2 Sensitive Receptors

The BCM is located in a predominantly rural-residential area in the Northwest Slopes and Plains region of NSW, approximately 15 km northeast of Boggabri, and within the Narrabri Shire Council (NSC) LGA. The closest regional centres are Gunnedah, approximately 40 km to the south, and Narrabri, approximately 50 km to the northwest. The Willow Tree Range forms part of the Leard State Forest and borders the BCM to the north, east and west.

The land surrounding the BCM is predominantly used for agriculture including cattle grazing, cotton, and wheat farming. The area also includes two other existing open-cut coal mines. Maules Creek Mine is located approximately 5 km to the northwest and Tarrawonga Mine borders the BCM to the south. There are also several isolated rural residences associated with the surrounding farms (Figure 1).

The surrounding terrain is gently undulating with steeper slopes emerging near ridgelines, encompassing the BCM. Figure 2 shows a pseudo three-dimensional representation of the local terrain. This topographical environment will influence local wind conditions, discussed in Section 5.3.

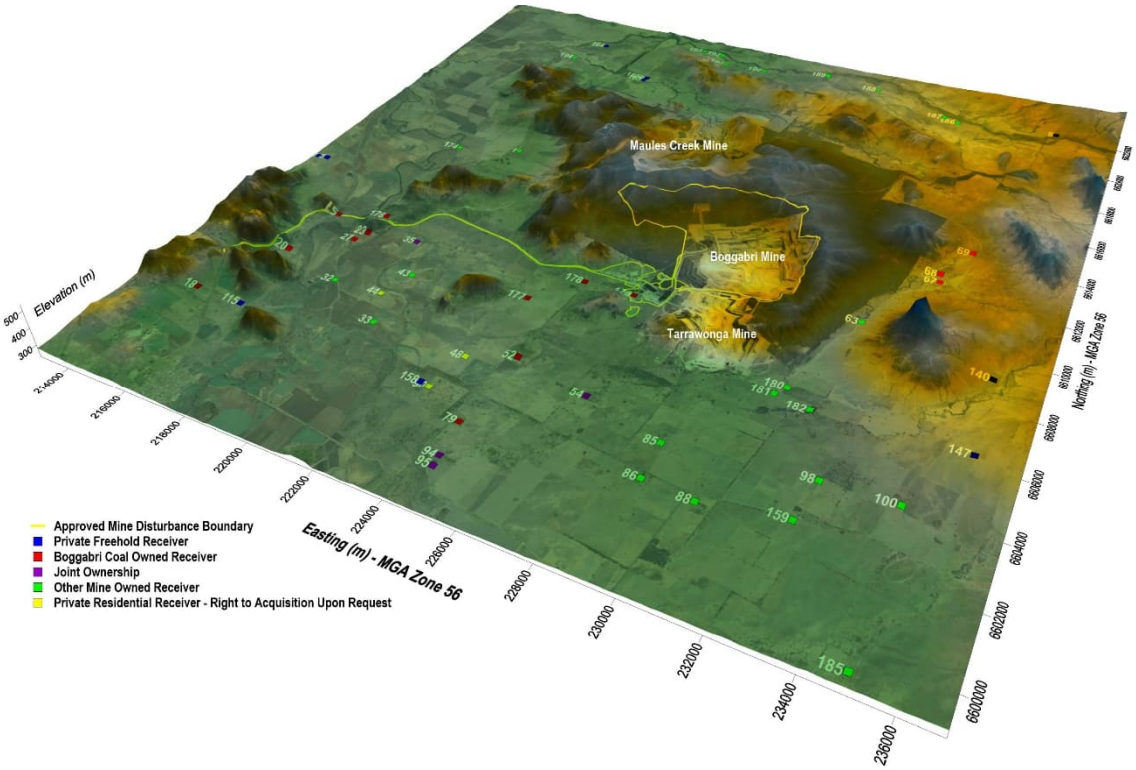

Figure 2 Pseudo three-dimensional representation of the local terrain

5.3 Meteorology

Meteorological conditions are important for determining the direction and rate at which emissions from a source will disperse. BCOPL operates four meteorological stations around the BCM with one station, referred to as "W1" and located near the rail loop, specifically operated to meet the monitoring requirements of SSD 09_0182. Meteorological monitoring is also carried out by the operators of the Maules Creek Mine and Tarrawonga Mine.

Wind-roses have been prepared from the data collected at W1 in a recent six-year period (2015 to 2020 inclusive). The wind-roses (Figure 3) show the frequency of wind speeds and wind directions based on hourly records. The most common winds in the area are from the north-northwest and south-southeast. This pattern of winds is evident in all six recent years of data, to various degrees. The wind-roses can also be used to determine the frequency of winds from the BCM towards the nearest sensitive receptors. For example, winds from the BCM towards receptors to the south occur for approximately 5 to 10% of the time.

Figure 3 shows some fluctuations in the prevailing winds, from north to northwest and from south to southeast, but the data generally indicate that wind patterns do not vary significantly from year to year.

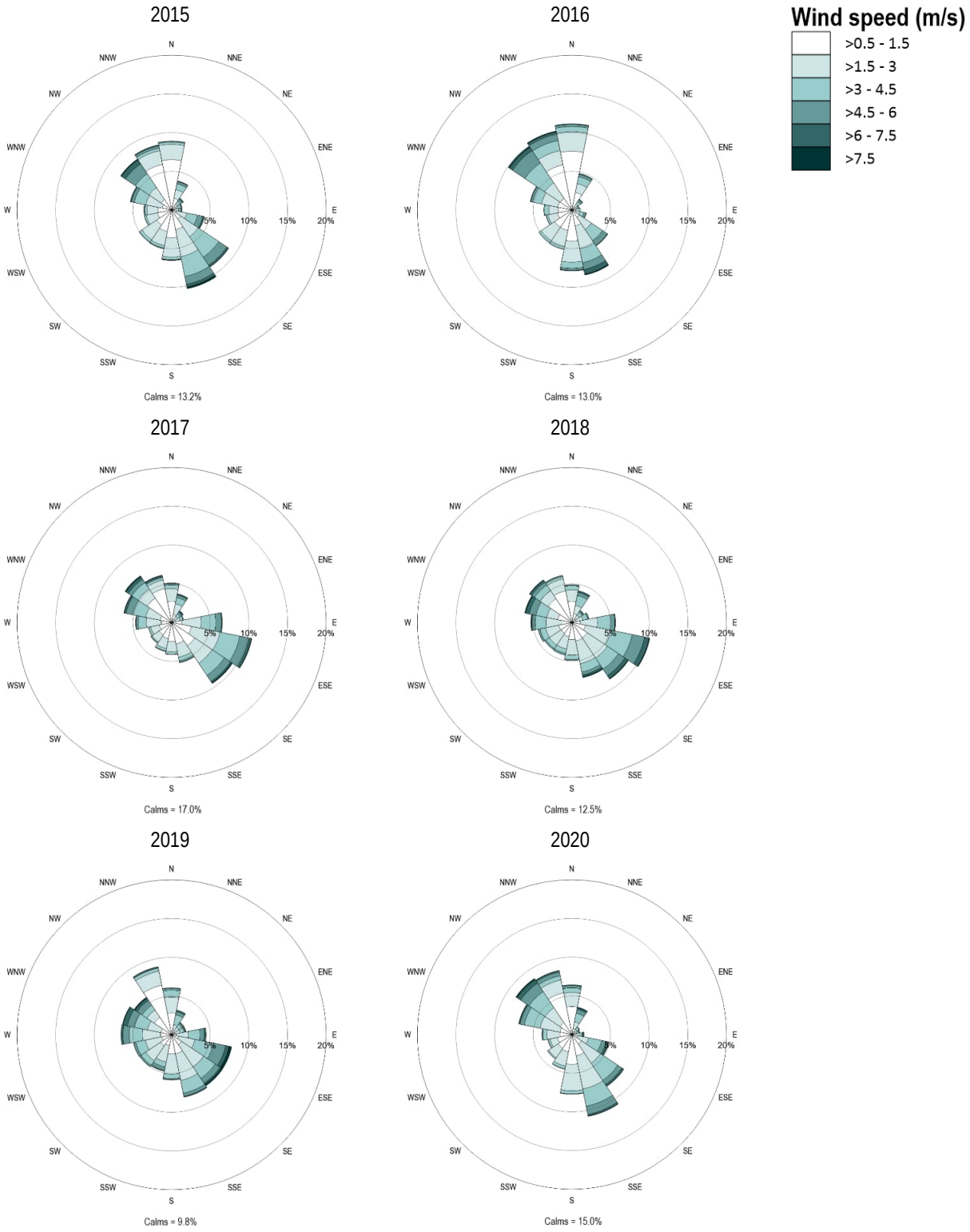

Figure 3 Annual wind-roses for data collected at the BCM meteorological station

5.4 Existing Air Quality

Air quality in many parts of NSW, including the Northwest Slopes and Plains region, was adversely influenced by drought conditions between 2017 to 2019 and lower than average rainfall. A deterioration in air quality conditions over these years was not unique to the Northwest Slopes and Plains and extraordinary events, beyond normal conditions, have been identified as part of annual reviews of monitoring data.

In its "Annual Air Quality Statement 2018", the DPE (formerly OEH) concluded that particle levels increased across NSW due to dust from the widespread, intense drought and smoke from bushfires and hazard reduction burning (OEH, 2019). The DPE subsequently concluded, from their "Annual Air Quality Statement 2019", that air quality in NSW was greatly affected by the continuing intense drought conditions and unprecedented extensive bushfires during 2019. In addition, the continued "intense drought has led to an increase in widespread dust events throughout the year" (DPE, 2020).

The influence of drought conditions on air quality is evident in the DPE's monitoring data. Figure 4 shows the rolling annual average PM_{10} concentrations from data collected at various rural and urban air quality monitoring sites since 2011. These data clearly show an increase in PM_{10} concentrations at all rural and urban locations from 2017 onwards, reflecting the onset of drought conditions, and increased bushfire activity in 2019. The rolling annual average PM_{10} concentrations decreased rapidly from 2020 to 2022 as rainfall increased.

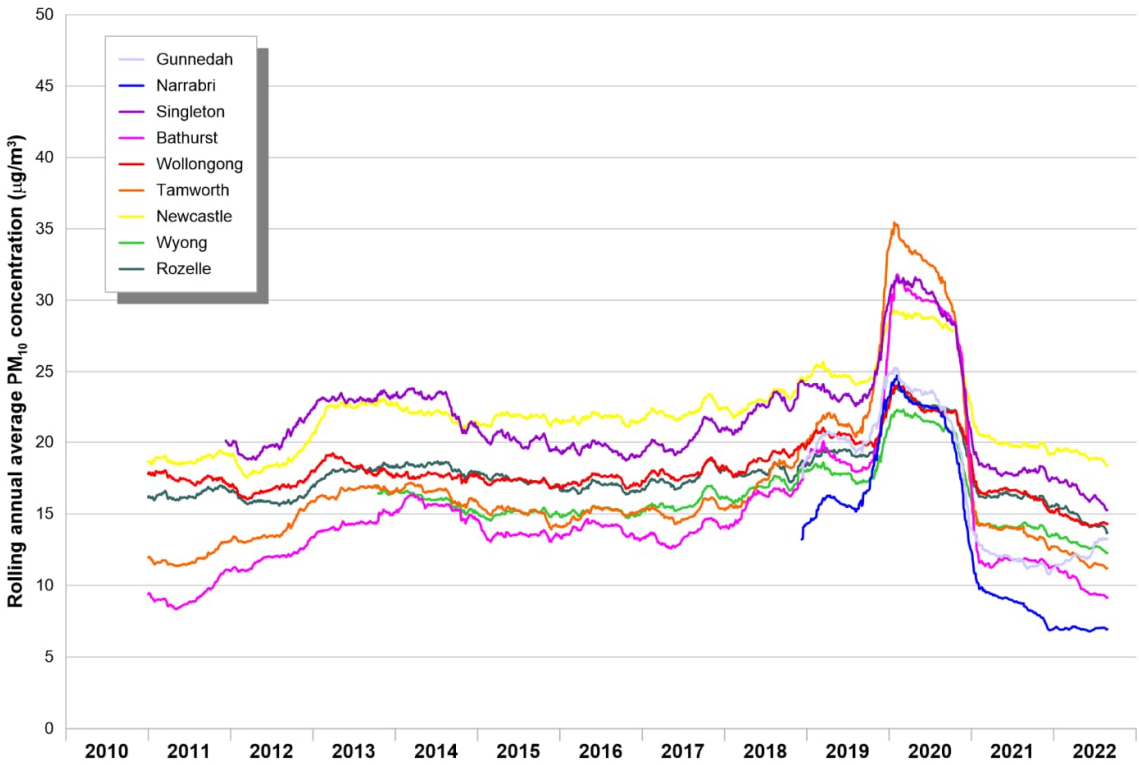

Figure 4 Rolling annual average PM_{10} concentrations at various NSW air quality monitoring sites

BCOPL conducts monitoring of TSP, PM_{10} and deposited dust at various locations around the BCM. Data from this network are reviewed by BCOPL as part of an annual reporting process to assess compliance with SSD 09_0182. These reviews have shown that BCOPL has complied with the TSP, PM_{10} and deposited dust criteria specified in SSD 09_0182 (Table 1) in all years between 2015 and 2020 (the latest Annual Review available).

5.5 Emissions

Table 2 shows the estimated annual particulate matter emissions from the MOD 9 activities. Calculations and assumptions are provided in Appendix A.

Table 2 Estimated annual particulate matter emissions from the MOD 9 activities

Activity	Annual emission (kg/y)		
	TSP	PM_{10}	$PM_{2.5}$
Hauling product from pit to crusher	10,000	2,955	500
Loading rock to mobile crusher	135	64	7
Crushing (mobile)	1,665	653	83
Screening (mobile)	4,500	1,500	225
Loading product to trucks	135	64	7
Hauling product from crusher to destination	10,000	2,955	500
Unloading product at destination	135	64	7
Total	26,570	8,254	1,328

The emissions associated with MOD 9 (Table 2) have been included in approved site emission inventories for the purposes of assessment. The approved operations are represented by BCM as at MOD 3. Table 3 provides a summary of the estimated annual TSP emissions from the BCM both with and without MOD 9. The potential increase in annual TSP emissions from the BCM, due to MOD 9, has been calculated to be 0.4%. PM_{10} and $PM_{2.5}$ were not quantified in MOD 3 but similar changes can be expected.

Table 3 Estimated annual emissions from the BCM with and without MOD 9 activities

Air quality indicator	Annual emission as approved* without MOD 9 (t/y)	Annual emission as approved* with MOD 9 (t/y)	Percentage change (%)
TSP	7,219	7,246	0.4%

* MOD 3 is the most recent modification to BCM that included emission estimates

5.6 Modelling

The significance of the change in dust emissions due to MOD 9 (from Section 5.5) has been assessed by considering historical air dispersion modelling for the BCM. Results from the approved operation have been used for this purpose.

Annual average PM_{10} concentrations have defined the maximum extent of air quality impact from the BCM. Figure 5 shows the modelled annual average PM_{10} due to the BCM and other sources as adapted from PAE Holmes (2011). Increasing model results for the approved operation by 0.4% to account for the estimated increase in emissions due to MOD 9 activities may change annual average PM_{10} concentrations by around 0.1 $\mu g/m^3$. This level of change is negligible in comparison to the EPA assessment criteria (25 $\mu g/m^3$) and will not affect the BCM's ability to comply with EPA assessment criteria. Similarly, this approach can be applied to other particulate matter classifications to demonstrate that the changes associated with MOD 9 are not significant and will not lead to adverse air quality outcomes (i.e. exceedances of assessment criteria).

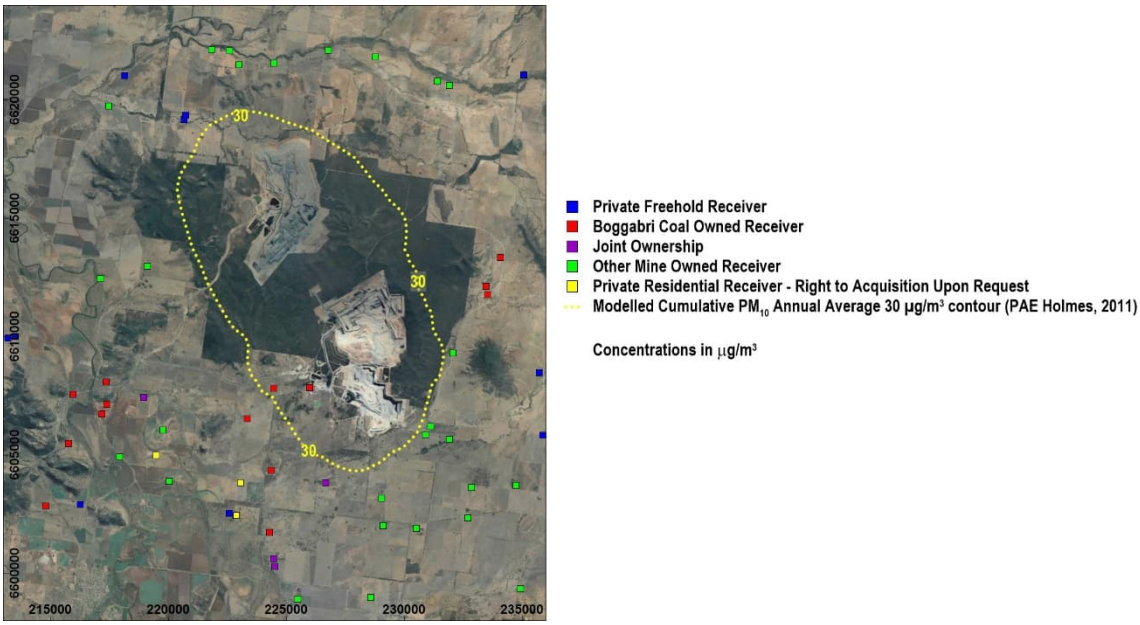

Figure 5 Modelled annual average PM_{10} due to the BCM and other sources (adapted from PAE Holmes, 2011)

6. Greenhouse Gas Assessment

Table 4 shows the estimated additional GHG emissions due to the MOD 9 activities. These activities primarily relate to the fuel consumption of the mobile crushing equipment (1,300 litres per day). Fuel saved by moving the Pre-Shift Information Session Infrastructure closer to active mining operations has not been considered. This is a conservative approach.

Table 4 Calculation of additional GHG emissions due to MOD 9

Fuel usage (kL/y)	Emission factor (kg CO_2-e/kL)			GHG emission (t CO_2-e/y)			
	Scope 1	Scope 2	Scope 3	Scope 1	Scope 2	Scope 3	Total
475	2721.3	0	138.96	1,291	-	66	1,357

The additional emissions due to MOD 9 have been compared to the overall site emissions (Table 5). The increase in direct (Scope 1) emissions is estimated to be 0.21% compared to the GHG inventory calculated for the approved operation. These calculations suggest that the activities associated with MOD 9 are not likely to be significant in terms of changes to overall site GHG emissions.

Table 5 Comparison of additional GHG emissions due to MOD 9 with approved operation

Statistic	Scope 1	Scope 2	Scope 3	Total
Average annual emissions from Approved Operation (t CO_2-e/y) *	629,497	48,580	16,537,799	17,215,876
Additional emissions due to MOD 9 (t CO_2-e/y)	1,291	-	66	1,357
Percentage change due to MOD 9 (%)	0.21%	0.00%	0.00%	0.01%

* As presented in Jacobs, 2021

7. Conclusions

This report has provided an assessment of the potential air quality impacts of the BCM Modification 9 including quantification of GHG emissions. In summary, the assessment involved determining the potential change and significance in air quality impacts due to the additional activities and emissions associated with MOD 9. The assessment considered the nature and scale of activities, proximity to sensitive receptors, the existing air quality and meteorological conditions, and previous and relevant air dispersion modelling for the BCM. GHG emissions were estimated in accordance with recognised methodologies.

In terms of air quality and GHG impacts, MOD 9 can be considered a minor change to the approved operation. Specifically:

- The increase in annual TSP, PM_{10} and $PM_{2.5}$ emissions from the BCM will be in the order of 0.4%. Based on examination of historical modelling, this increase is unlikely to result in exceedances of the EPA's impact assessment criteria. Continued compliance with the criteria from SSD 09_0182 is also anticipated.
- The increase in annual direct (Scope 1) GHG emissions from the BCM will be in the order of 0.21%.

Yours sincerely

Shane Lakmaker
Director / Atmospheric Scientist
Airen Consulting

8. References

DISER (2021) “National Greenhouse Accounts Factors”. Department of Industry, Science, Energy and Resources.

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PAE Holmes (2011) “Air Quality Assessment – Continuation of Boggabri Coal Mine”. Prepared for Hansen Bailey on behalf of Boggabri Coal Operations Pty Ltd.

PAE Holmes (2012) “Boggabri Coal Mine Modification to Development Consent (MOD 3) – Air Quality”. Letter report dated 25 May 2012.

US EPA (1985 and updates) “Compilation of Air Pollutant Emission Factors”, AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711. Now a web-based document.

WRI (2004). “Greenhouse Gas Protocol A Corporate Accounting and Reporting Standard - REVISED EDITION”. The Greenhouse Gas Protocol is a collaboration between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The Protocol provides guidance on the calculation and reporting of carbon footprints.

Appendix A Emission calculations

Additional emissions due to mobile crushing

	Annual emissions (kg/y)						TSP		PM10		PM2.5		Variables				
Activity	TSP	PM10	PM2.5	Control (%)	Intensity	Units	Factor	Units	Factor	Units	Factor	Units	(ws/2.2)^1.3	Moisture (%)	kg/VKT	t/truck	km/trip
Hauling product from pit to crusher	10000	2955	500	75	300000	t/y	0.13333	kg/t	0.0394	kg/t	0.007	kg/t	-	-	4.0	60	2
Loading rock to mobile crusher	135	64	7	0	300000	t/y	0.00045	kg/t	0.0002	kg/t	0.000	kg/t	0.38	2	-	-	-
Crushing (mobile)	1665	653	83	50	300000	t/y	0.01	kg/t	0.004	kg/t	0.001	kg/t	-	-	-	-	-
Screening (mobile)	4500	1500	225	50	300000	t/y	0.03	kg/t	0.01	kg/t	0.002	kg/t	-	-	-	-	-
Loading product to trucks	135	64	7	0	300000	t/y	0.00045	kg/t	0.0002	kg/t	0.000	kg/t	0.38	2	-	-	-
Hauling product from crusher to destination	10000	2955	500	75	300000	t/y	0.13333	kg/t	0.0394	kg/t	0.007	kg/t	-	-	4.0	60	2
Unloading product at destination	135	64	7	0	300000	t/y	0.00045	kg/t	0.0002	kg/t	0.000	kg/t	0.38	2	-	-	-
	26570	8254	1328														

APPENDIX C

ACOUSTIC IMPACT ASSESSMENT

BRIDGES ACOUSTICS

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PATERSON NSW 2421

Phone: 02 4938 5866
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E-mail: bridgesacoustics@bigpond.com

23 September 2022
Ref: J0254-13-L2

James Bailey & Associates Pty Ltd
6/127 John Street
SINGLETON NSW 2330

Attn: Mr Andrew Wu

Dear Andrew,

RE: BOGGABRI COAL MINE - MODIFICATION 9 ACOUSTIC ASSESSMENT

1. INTRODUCTION

Boggabri Coal Operations Pty Ltd (BCOPL) operates the Boggabri Coal Mine (BCM) on behalf of Idemitsu Australia Pty Ltd (IA) and its joint venture partners. BCM is an open cut mine located approximately 15 kilometres (km) north-east of the township of Boggabri in the North West Region of NSW and is located within the Narrabri Local Government Area (LGA). BCM has operated since 2006 and is part of the Leard Mining Precinct, being located immediately adjacent to Tarrawonga Mine to the south and Maules Creek Coal Mine to the north.

BCM operates under State Significant Development Consent SSD 09_0182, which authorises the production of up to 8.6 million tonnes per annum (Mtpa) of Run of Mine (ROM) coal until the end of December 2033. Open cut mining is currently undertaken using a fleet of shovels or excavators and haul trucks. Although SSD 09_0182 provides approval for the use of a dragline, all mining activities to date have been undertaken using conventional truck and shovel operations.

The approved ancillary infrastructure at BCM includes the administration facilities, workshop, coal handling and preparation plant (CHPP), stockpile areas, rail loading and transportation infrastructure, water and waste management systems, bore field and power and communications infrastructure. The primary access to BCM is via the private mine access road which connects with the Kamilaroi Highway approximately 12 km to the west of the administration facilities.

BCOPL seeks a modification (MOD 9) to SSD 09_0182 to facilitate the following activities:

- Operation of a mobile rock crushing and screening plant and associated mobile machines within the approved Mine Disturbance Boundary;
- Construction of the Pre-Shift Information Session Infrastructure closer to active mining operations, and use of a portion of the former Leard Forest Road for access to the new facility; and
- Minor administrative changes to the rehabilitation conditions of SSD 09_0182 to align these requirements with recent amendments to the *Mining Regulation 2016.*

2. MODIFICATION DETAILS

2.1 Mobile Rock Crushing and Screening Plant

The proposed rock crushing and screening plant and associated equipment includes mobile units able to be readily transported to and within the site. Plant will be periodically relocated as the active mining area progresses and is anticipated to include the following components:

- A Powerscreen Maxtrak 1300 cone crusher. This unit is expected to produce a sound power level of 115 dBA based on supplied noise measurement data on three sides and at 3 distances from the machine;
- A Powerscreen Premiertrak 400X jaw crusher. This unit is expected to produce a sound power level of 116 dBA based on noise measurements around a similar machine on another site;
- A Powerscreen Warrior 2400 two-deck screening plant and attached conveyors. Previous noise measurements around similar plant indicated a sound power level in the range 111 dBA (for screening relatively soft crushed sandstone) to 118 dBA (for screening hard rock). An assumed sound power level of 118 dBA has therefore been adopted for this unit;
- An excavator which, according to supplied noise data, will produce a sound power level of approximately 103 dBA; and
- A loader which, according to supplied noise data, will produce a sound power level of approximately 113 dBA.

A combined sound power level of 122 dBA would be produced assuming all proposed equipment operates continuously and simultaneously. This combined sound power level is approximately equivalent to one large BCM mining truck.

The rock crushing and screening plant is proposed to be located within the mining area and would be periodically relocated. The plant is therefore assumed to operate at the closest point within the approved mining area to each assessed receptor.

2.2 Infrastructure

Proposed infrastructure to be constructed within the Pre-Shift Information Session Infrastructure Area includes:

- A heavy vehicle workshop which may produce a short term sound power level of up to 122 dBA if multiple heavy vehicles move to or from the workshop or are simultaneously tested after maintenance or repairs are completed. Assuming up to 5 minutes of noise in a 15 minute period results in a sound power level of 117 LAeq;
- A heavy vehicle refuelling station which may produce a short term sound power level of up to 118 dBA as a heavy vehicle enters or leaves the station. Assuming up to 3 minutes of noise in a 15 minute period results in a sound power level of 111 LAeq;
- Two power generators of approximately 500 kW capacity, each producing a sound power level of approximately 102 dBA for a total 105 dBA sound power level, operating continuously;
- Road trucks delivering fuel and other materials, producing a sound power level of approximately 108 dBA while manoeuvring at relatively slow speed within the infrastructure area. A duration of approximately 2 minutes of noise per vehicle and a likely maximum of 3 vehicles in a 15 minute period results in an average sound power level of 104 LAeq during worst case periods;
- Light vehicle movements as staff arrive and depart. Assuming up to 75 light vehicles enter or leave in a 30 minute period which is 50% of the proposed carpark capacity, an average sound power level of 90 dBA per vehicle and a duration of 1 minute of noise per vehicle results in a total sound power of 94 LAeq during shift change periods; and

- Office air conditioners, water pumps and similar sources that produce insignificant noise compared to the sources listed above.

A worst case total sound power level of 118 LAeq,15min is predicted from the infrastructure area, although noise levels will be significantly lower for much of the time. The predicted sound power level is approximately equivalent to one medium BCM mining truck.

The proposed infrastructure location is immediately adjacent to the existing mining area approximately 2 km north of the existing coal handling and preparation plant, as shown in the plan in Appendix A.

3. ASSESSMENT

3.1 Closest Receptors and Noise Criteria

Excluding receptors owned by BCOPL and other mining companies, nearest noise sensitive receptors in each direction from BCM are identified in Table 1. The minimum distance from the rock crushing and screening plant has been determined by assuming the plant are located at the closest point to each receptor within the existing mining area, within the future mining area or within the existing overburden emplacement area, whichever is closer to the receptor. Receptors that are currently subject to acquisition by BCOPL if requested by the owner are also noted in Table 1.

Table 1: Nearest Privately-Owned Receptors

Receptor ID	Direction	Minimum Distance, km		Noise Criteria, Day – Evening – Night
		From Rock Crusher	From Infrastructure	
165	North-west	7.1	10.1	35 – 35 – 35
165b	North-west	7.3	10.3	35 – 35 – 35
8	West	7.2	10.1	35 – 35 – 35
44	South-west	7.2	8.7	35 – 37 – 37 [1]
48	South	7.3	7.3	36 – 38 – 38 [1]
158	South	8.6	8.6	35 – 35 – 35
140	East	5.8	9.3	35 – 35 – 35

1 Receptor is subject to noise mitigation or acquisition upon request by the owner.

3.2 Rock Crushing and Screening Plant Noise Levels

An estimated rock crushing and screening plant sound power level of 122 dBA, including associated mobile plant, is significantly lower than the total sound power level of approximately 140 dBA from existing BCM mining and coal processing equipment. Assuming the plant are located in the approximate centre of the site, they will produce a noise level approximately 8 dBA lower than existing BCM noise levels at all receptors. If the plant are located at the nearest point within the mining area to any particular receptor, they may produce a noise level up to 2 dBA higher than if they were located in the centre of the mining area, in which case they will remain approximately 6 dBA below existing noise levels from BCM. The rock crushing and screening plant will therefore cause no perceptible increase in noise levels from BCM to any receptor.

To confirm the conclusion above, noise levels from the plant were calculated to closest receptors identified in Table 1. The calculations considered a typical 1/3 octave spectrum for crushing and screening plant and attenuation due only to distance and atmospheric absorption, which are the two most significant sound propagation factors over long distances. Any topographic shielding between BMC and a receptor would further reduce noise levels, as would a typical day-time temperature lapse in the lower atmosphere. Calculated noise levels are presented in Table 2.

Table 2: Calculated Rock Crushing Plant Noise Levels, LAeq,15min

Receptor ID	Direction	Minimum Distance, km	Received Level, LAeq,15min	Noise Criteria, Day – Evening – Night
165	North-west	7.1	25	35 – 35 – 35
165b	North-west	7.3	24	35 – 35 – 35
8	West	7.2	25	35 – 35 – 35
44	South-west	7.2	25	35 – 37 – 37 [1]
48	South	7.3	24	36 – 38 – 38 [1]
158	South	8.6	22	35 – 35 – 35
140	East	5.8	27	35 – 35 – 35

1 Receptor is subject to noise mitigation or acquisition upon request by the owner.

Table 2 indicates conservatively calculated noise levels from the rock crushing and screening plant are at least 8 dBA and typically at least 10 dBA below relevant noise criteria at all receptors. As existing noise levels from BCM are well within the criteria and are predicted to remain within the criteria in the future, combined noise from existing and future mining plus minor additional noise from the rock crushing and screening plant will not cause an exceedance of noise criteria at any receptor.

The rock crushing and screening plant is expected to primarily operate during the day, however some night operation of the plant may occur. Loading crushed rock into trucks and delivery of gravel to roads within BCM will regularly occur during the evening and night. As noise from the plant is expected to be at least 6 dBA lower than existing mining operations, the plant can operate within existing noise criteria at all receptors during all time periods.

3.3 Infrastructure Noise Levels

An estimated combined sound power level of 118 LAeq,15min for the infrastructure area is primarily due to heavy vehicle movements to and from the proposed workshop, with other sources such as fuel delivery truck and car movements producing significantly lower noise levels. The infrastructure area is immediately adjacent to BCM's mining and overburden emplacement areas and therefore mining machines recently operated adjacent to this area and will continue to do so in the future. Noise associated with the infrastructure area is therefore expected to be insignificant compared to approved BCM operation.

To confirm the conclusion above, noise levels from the infrastructure area were calculated to closest receptors identified in Table 1. The calculations considered a typical 1/3 octave spectrum for a haul truck and attenuation due only to distance and atmospheric absorption, which are the two most significant sound propagation factors over long distances. Calculated noise levels are presented in Table 3.

Table 3: Calculated Infrastructure Area Noise Levels, LAeq,15min

Receptor ID	Direction	Minimum Distance, km	Received Level, LAeq,15min	Noise Criteria, Day – Evening – Night
165	North-west	10.1	8	35 – 35 – 35
165b	North-west	10.3	8	35 – 35 – 35
8	West	10.1	8	35 – 35 – 35
44	South-west	8.7	11	35 – 37 – 37 [1]
48	South	7.3	14	36 – 38 – 38 [1]
158	South	8.6	11	35 – 35 – 35
140	East	9.3	9	35 – 35 – 35

1 Receptor is subject to noise mitigation or acquisition upon request by the owner.

Table 3 indicates calculated noise levels from heavy vehicle movements to and from the infrastructure area, which is the dominant source associated with this area, would produce a noise level of up to 14 LAeq,15min at the nearest receptor considering only distance attenuation and atmospheric absorption.

Other factors such as topographic shielding and ground reflection would affect noise levels to a minor extent and night operation under noise enhancing weather conditions may increase noise levels by typically up to 10 dBA, resulting in a maximum level of approximately 24 LAeq,15min at the closest receptor and lower noise levels at other receptors. Even with noise enhancing conditions, noise levels from the infrastructure area are predicted to remain at least 14 dBA below relevant criteria at all receptors. Combined noise from existing and future mining plus minor additional noise from the infrastructure area will not cause an exceedance of noise criteria at any receptor.

3.4 Construction Noise Levels

The rock crushing and screening plant does not require significant construction work as it consists of mobile units that are delivered and set up on a relatively level site prepared by existing mining machines. Set up work typically requires less than one hour and mainly includes deploying a few short conveyors on the screening unit, therefore does not produce significant noise or require additional noisy equipment. A detailed assessment of construction noise associated with the rock crushing and screening plant is therefore not required.

Construction work associated with the infrastructure area is expected to include:

- Earthworks such as levelling and grading the site and minor excavation for workshop foundations, fuel tank supports and buried services. These tasks would be completed with existing mining machines, therefore would not cause significant additional noise compared to existing approved operations;
- Minor earthworks such as backfilling trenches after buried services are installed, using smaller machines such as a backhoe or skid steer loader. These machines typically produce a sound power level in the range 95 to 100 dBA;
- Concrete pouring for building and fuel tank supports and the workshop floor, requiring a truck-mounted pump and a series of agitator trucks with a typical combined sound power level of approximately 110 LAeq,15min;
- Mechanical work requiring delivery trucks, a mobile crane and various hand tools, each producing a sound power level up to 108 dBA for short periods and approximately 100 LAeq,15min;
- Electrical, plumbing and similar work that does not produce significant noise.

Proposed construction work would produce a sound power level in the range 100 to 110 LAeq,15min, at least 10 dBA and typically 20 dBA lower than nearby mining machines operating within the approved mining area. Noise associated with construction work would therefore be inaudible and insignificant compared to existing BCM operation.

3.5 Construction Traffic Noise Levels

Traffic movements on the Kamilaroi Highway and the mine access road would occur as the rock crushing plant is delivered and during construction of the infrastructure area. Delivery of the rock crushing and screening plant and associated equipment is likely to require less than 10 truck movements, with no significant ongoing traffic associated with the plant apart from occasional maintenance and repair visits.

Construction of the infrastructure area will require delivery of materials including concrete, steelwork, perhaps asphalt or other hardstand materials, fuel tanks and portable buildings. Highest construction-related traffic noise levels are likely to occur during a large concrete pour, such as construction of the workshop floor, which will require concrete agitator trucks to visit the site every 10 to 15 minutes for a period of some

hours. Reasonable worst case traffic flows associated with the construction period are therefore 6 truck visits or 12 truck movements per hour, or an estimated 30 car movements per hour as construction staff travel to and from the site.

Additional construction-related traffic is unlikely to significantly affect traffic noise from the Kamilaroi Highway which currently carries significant car and truck traffic to other destinations in the region.

Receptor 8, located 2.8 km to the north, is the closest privately owned receptor to the mine access road. An additional 30 car movements and 12 truck movements per hour on the mine access road would produce a traffic noise level of approximately 21 LAeq,1hr due to cars and 31 LAeq,15min due to trucks, well within the road traffic criterion of 55 LAeq,1hr that applies to local roads and to the 35 LAeq,15min consent criterion that applies to private roads. Combined noise levels, from construction traffic on the access road and existing mining operations, would continue to meet the 35 LAeq,15min consent noise criterion at the closest privately owned receptor.

Traffic noise associated with the modification is therefore expected to be within relevant criteria at all receptors.

3.6 Cumulative Noise Levels

Calculated noise levels from the rock crushing and screening plant and the infrastructure area, and comparisons with existing BCM mining equipment noise levels, indicate the Modification is not expected to result in any appreciable change in noise levels from BCM. Therefore, cumulative noise levels from combined operation of Maules Creek Mine, BCM and Tarrawonga Mine will also not appreciably change.

No cumulative noise impacts are therefore predicted as a result of the proposed Modification.

4. CONCLUSION

An assessment of noise from construction and operation of relocated infrastructure and operation of a rock crushing and screening plant has indicated acoustic issues are unlikely to occur. Proposed additional noise during the construction and operating phases would be well below existing mining noise levels at all receptors and are therefore unlikely to be audible at any receptor. As BCM currently meets relevant noise criteria at all receptors based on regular noise monitoring, compliance with the criteria is predicted to continue if the Modification is approved.

No significant additional traffic is expected as a result of this Modification. Traffic noise associated with the construction phase is predicted to be insignificant at all receptors and, in any case, will occur for a limited time period. As noise levels from BCM will not appreciably change, cumulative noise levels with other mines in the region will also not appreciably change at any receptor.

We trust this assessment provides sufficient information regarding acoustic issues associated with the Modification. Please contact the undersigned for any further information or discussion.

BRIDGES ACOUSTICS

MARK BRIDGES BE (Mech) (Hons) MAAS
Principal Consultant

APPENDIX A: INFRASTRUCTURE LOCATION PLAN

This plan is an extract from Drawing PS132282-SKT-0001 Revision A.1 prepared by WSP Australia Pty Ltd.

APPENDIX D

ECOLOGY ASSESSMENT

Our ref: PS120722-NEW-ECO-LTR-001 RevC

9 November 2022

Nathan Cooper
Principal
James Bailey & Associates

Dear Nathan

Boggabri Coal Mine Modification 9 - Consideration of Potential Impacts to Fauna Movement as a result of the Proposed Incremental Increase in use of the former Leard Forest Road

1. Introduction

Boggabri Coal Operations Pty Limited (BCOPL) is seeking a modification (the Modification) to SSD 09_0182 under Section 4.55(1A) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The Modification seeks to facilitate the following activities and administrative changes:

- Operation of a mobile rock crushing facility and associated fleet within the approved Mine Disturbance Boundary at Boggabri Coal Mine (BCM)
- 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 section of the former Leard Forest Road (which has previously been closed to the public)
- 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*.

1.1 Requirement for a new PSI Site

BCOPL proposes to construct a new PSI Site adjacent to the active mining area and within the approved Mine Disturbance Boundary. The proposed PSI Site indicatively includes a pre-shift information session facility, heavy vehicle workshop, and a diesel storage and dispensing facility.

The proposed PSI Site will enable shift changes to occur more efficiently by moving the changeover point from the existing Mine Infrastructure Area to a new location closer to the mining area. The heavy vehicle workshop will assist with routine maintenance activities, primarily on tracked equipment which will reduce the maintenance downtime for this equipment. The diesel storage and dispensing facility will also deliver substantial efficiencies by placing this facility closer to the mining operations. Each of these initiatives are vital improvements to the efficiency of operations at BCM in consideration of the

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progression of mining operations further towards the north-west of the approved Mine Disturbance Boundary.

Access to the PSI Site is proposed via the existing BCM Access Road, the southern portion of the former Leard Forest Road and some additional internal access roads within the approved Mine Disturbance Boundary. The southern portion of Leard Forest Road is currently closed to public traffic and may require upgrades to facilitate the vehicle movements associated with the Modification. These road upgrades will be located within the existing road corridor and therefore will not result in additional vegetation clearing. The use of the southern portion of the former Leard Forest Road to access the PSI Site represents an incremental increase in the use of this road (i.e. it is currently utilised as part of day-to-day operations at the BCM).

1.2 Department of Planning and Environment advice

As BCOPL is currently seeking approval for Modification 8 (MOD 8), which proposes the construction of a fauna movement crossing over the existing haul road, immediately to the east of the section of the former Leard Forest Road to be utilised by MOD 9, the NSW Department of Planning and Environment (DPE) has requested that the Modification Report include the following:

- Predicted daily traffic numbers using the Leard Forest Road. Traffic analysis should include both construction and operational stages; and
- Broader consideration of the potential fauna impacts due to the proposed fauna crossing (under MOD 8) being located immediately to the east of Leard Forest Road.

This letter has been prepared to provide consideration of the potential fauna impacts due to the proposed fauna crossing.

2. Road barriers and fragmentation

The ability of animals to move through their habitat and across the landscape is critical to their survival and the fragmentation of once contiguous habitat has been demonstrated to have profound implications for the distributions and occurrence of animals (Donald et al., 2001, Fahrig, 2003, Ford et al., 2001, Hannah et al., 2007, Robertson and Radford, 2009). All animals move within their environment at different times, and over different distances, to access food and shelter, avoid predators, and seek mates for reproduction. Clearing and disturbance from anthropogenic activities such as agriculture, urbanisation, mining and transportation can present a barrier to many animals, impeding or preventing their movement among habitat patches.

Roads and other linear infrastructure exert a wide array of negative ecological impacts, including acting as a barrier to animal movement, causes of mortality due to wildlife-vehicle collision, and habitat degradation due to pollution such as noise, dust and lighting. The severity of these direct and indirect impacts is related to road and traffic attributes, including road width and traffic type, volume and timing. An animal's interaction with a road may lead to a number of outcomes as detailed in Table 1.

Table 1 Interaction of an individual animal with a road and potential outcomes at the population level

Interaction of an individual animal with the road	Potential outcome at the population level
The animal avoids the road totally.	The road presents an effective barrier in the landscape for the population.
The animal approaches the road with the intention of crossing but is unable to cross due to the presence of a physical barrier (such as a concrete median barrier).	The road presents an effective barrier in the landscape for the population.
The animal approaches the road with the intention of crossing but is wary of crossing.	If some successful crossings are made, but many are not attempted or completed, the road presents a partial barrier in the landscape for the population.
In crossing the road the animal is hit by a vehicle.	If some successful crossings are made, but many are not attempted or completed, the road presents a partial barrier in the landscape for the population.
The animal crosses the road successfully.	If all crossings are made successfully, then the road does not present a barrier in the landscape for the population.

3. Proposed fauna crossing (MOD 8)

A history of intensive agriculture land use comprising primarily sheep and wheat activities dominates the project locality. These activities resulted in the isolation of the Leard State Forest remnant from other isolated remnants within the locality and region. Historically, the Nandewar Range, Leard State Forest and Namoi River floodplain were once linked by a contiguous corridor of native vegetation.

A central aim of the Boggabri Coal Mine (BCM) Biodiversity Offset Strategy (BOS) (WSP, 2018) is the restoration and establishment of a network of regional and local wildlife corridors that provide linkages between important large, isolated remnants within the region; specifically connecting the Namoi River floodplain with the Nandewar Range. The integration of BCMs mine rehabilitation as part of the Regional East-West Wildlife Corridor is a requirement of the project's Conditions of Approval, Leard Forest Regional Strategy (Umwelt, 2017) and approved BOS. The re-establishment of a Regional East-West Wildlife Corridor will facilitate the movement of threatened species throughout the region and provide for the conservation and restoration of large areas of threatened ecological communities.

Current mining operations are an effective barrier to fauna movement to the east and west of the Leard State Forest. To maintain the ability for fauna to move through the East-West Wildlife Corridor, a vegetation corridor that entails a 500 m wide strip of remnant vegetation on either side of the mining lease boundary dividing Maules Creek Coal Mine and BCM (or alternative as agreed by the DPE) is conditioned to be maintained throughout the life of operations.

BCMs Southern Rehabilitation Area (SRA) has established vegetation, which has been observed to support mobile and semi-mobile fauna species and occurs as another potential east-west movement corridor. However, there are three types of roads associated with the BCM and the Leard State Forest that have the potential to affect the movement of wildlife and reduce the quality of adjacent habitat, thereby reducing the effectiveness of the regional wildlife corridor in proximity to the BCM operations (Table 2). These roads range from numerous forestry access tracks (~8 m wide) to the existing Run-of-Mine (ROM) haul road (~130 m wide).

Table 2 Road characteristics

Road type	Typical gap distance (m)
Forestry tracks	8
Leard Forest Road (Photo 1)	25
ROM haul road (Photo 2)	130

Note: Approximate maximum distance that animals would need to navigate between vegetation on opposite sides of the road.

Photo 1 An example of Leard Forest Road, looking north

Photo 2 An example of the haul road, looking south

The current ROM haul road (hereafter referred to as haul road) is the most significant of the potential barriers to animal movement from Leard State Forest to the mine rehabilitation area and it runs in an approximate north – south direction and connects ancillary mine infrastructure, heavy vehicle maintenance workshops, ROM pad and washery with active open cut mine operations. At approximately 130 m in width (at its widest point), the haul road represents a significant potential barrier to the free movement of animals, plants and ecosystem processes and separates the rehabilitated sections of the main overburden emplacement area (OEA) from extant native vegetation to the west in Leard State Forest (Photo 2). Consequently, BCOPL are currently seeking approval as part of MOD 8 to construct a specifically designed fauna movement crossing over the haul road between the OEA and the western side of the regional wildlife corridor. The establishment of the fauna movement crossing is proposed to improve the movement of fauna from Leard State Forest through the SRA.

The former Leard Forest Road and the forestry access tracks are much narrower and generally only take light vehicles with limited heavy rigid supply vehicle movements. These roads, in their current form, are unlikely to be an effective barrier to the movement of most wildlife (Photo 1).

4. Potential fauna impacts associated with the Modification

4.1 Existing vehicle usage of Leard Forest Road

The southern portion of the former Leard Forest Road is currently used intermittently by light vehicles for the purpose of undertaking routine inspection of work areas, dam infrastructure, accessing environmental monitoring locations and other purposes. In addition, BCMs blast contractor currently uses the road irregularly to escort heavy rigid supply vehicles to their existing compound and material storage area.

4.2 Vehicle movements associated with the Modification

Throughout construction of the new PSI Site, it is anticipated that a small incremental increase of vehicle movements will occur and include concrete trucks, cranes and light vehicles associated with general construction activities.

During operational phases of the PSI Site there will be an incremental increase of up to 200 light vehicle movements per day. Vehicle movements would occur in campaigns with approximately 100 light vehicle movements at shift change during the morning period (i.e. between around 0530hrs to 0630hrs) and the evening period (between around 1730hrs to 1830hrs). No additional heavy vehicles will use Leard Forest Road. Heavy vehicles delivering fuel and other consumables will travel via maintenance, through the current site access arrangements.

4.3 Potential fauna impacts

Currently, the southern portion of the former Leard Forest Road is subject to intermittent use by light vehicles and occasional heavy rigid supply vehicles. Whilst all roads have the potential for wildlife-vehicle interactions, in its current form, the author has observed native fauna (birds, macropods, amphibians and reptiles) undertaking successful crossings of this section of the former Leard Forest Road.

The fauna crossing proposed in association with MOD 8 is planned for construction near the southern boundary of the Leard State Forest and would connect the SRA to extant native vegetation to the west of the haul road. Rather than funneling animals directly on to Leard Forest Road, animals that may undertake a movement west from the SRA will need to navigate up to 140 m of remnant native vegetation prior to interacting with the road.

During operation of the new PSI Site, it is this section of the former Leard Forest Road that will observe a small incremental increase in light vehicle movements over two relatively short sessions at discrete periods of the day (e.g. early morning and early evening). The increased traffic movements may increase the potential for wildlife-vehicle collisions and add incrementally to noise, dust and lighting pollution in its near vicinity. It is possible that during the periods of increased vehicle movements, animals that may approach the road with the intention of crossing, may be wary and not undertake the crossing. In addition, secondary mortality is a possibility as carcasses from wildlife-vehicle collisions are known to attract scavengers, especially mammals and birds. These opportunistic feeders are then at risk of being struck as they feed on the carcass. Nevertheless, it is considered unlikely that the Modification would add substantially to wildlife-vehicle collisions or inhibit animals from making east-west movements in the southern margin of the Leard State Forest. Separate to the two shift change over periods, it is probable that local fauna will still undertake crossings of the former Leard Forest Road, as observed in its current form. This is anticipated based on:

- The short duration over which a small incremental increase in light vehicle movements will be experienced
- Low traffic volumes outside the two shift change over periods
- Leard Forest Road occurring at grade
- The relatively short distance (~25 m at widest point) between remnant vegetation that borders the immediate road boundary
- Any road upgrades being limited to the existing road corridor (no additional vegetation clearing is proposed)
- Canopy connectivity that provides gliding passage across the former Leard Forest Road.

4.4 Mitigation

To manage and mitigate the negative ecological impacts associated with increased vehicle movements along the former Leard Forest Road, it is proposed that wildlife signs be installed, and speed limits be limited to 50 km per hour or less in vegetated areas. Additionally, monitoring of the southern portion of the former Leard Forest Road should be undertaken for carcasses and wildlife-vehicle collisions should be reported BCOPL, who will record incidences for reporting in the Annual Review.

4.4.1 Signage

Signage along public roads to alert motorists to the presence of wildlife and the risk of wildlife-vehicle collisions has limited success at modifying driver behaviour because motorists soon ignore the signs. This occurs for a variety of reasons, including that drivers rarely see wildlife near such signs and therefore do not equate a high risk with such signs. However, signs that are more interactive or informative, such as those that are regularly updated with the number of recent wildlife-vehicle collisions appear to result in an albeit small reduction in vehicle speed for a longer period (Huijser, 2015). Although the effectiveness of signage at reducing collisions is questioned, appropriate signage should be installed to alert drivers to the presence of native animals and the potential for wildlife-vehicle collisions. Together with training and inductions, signage may be effective at BCM if enforced.

4.4.2 Traffic calming

Reducing vehicle speed increases the time for motorists to detect wildlife on the road and slow down, thus potentially avoiding a collision or reducing the seriousness of the collision. The current speed limit along the southern portion of Leard Forest Road is 60 km per hour. Given the crepuscular period at which shift change over occurs, it is recommended that Leard Forest Road be limited to a maximum of 50 km per hour in vegetated areas. Reducing speed, even by 10 or 20 km per hour will reduce noise and dust, as well as provide slightly more time for wildlife on the road to evade collision.

5. Conclusion

BCOPL is seeking a Modification to SSD 09_0182 under Section 4.55(1A) of the NSW EP&A Act. The Modification seeks to facilitate several activities and administrative changes, including the construction of a new PSI Site at a location closer to active mine operations. Access to the new PSI Site is proposed via the southern portion of the former Leard Forest Road, which is currently closed to public traffic and may require upgrades to facilitate the vehicle movements associated with the Modification. Any road upgrade will be located within the existing road corridor and therefore will not result in additional vegetation clearing.

Concurrently, BCOPL are seeking approval as part of MOD 8 to construct a specifically designed fauna movement crossing immediately east of southern portion of Leard Forest Road. The crossing structure would span the haul road between the OEA and extant native vegetation to the west of the haul road. The establishment of the fauna movement crossing is proposed to improve the movement of fauna from Leard State Forest through the SRA and builds on the BCM BOS, which aims to restore and establish a network of regional and local wildlife corridors that provide linkages between important large habitat remnants in the region.

Throughout construction and during operational phases of the PSI Site, there will be an incremental increase in vehicle movements per day accessing the southern portion of the former Leard Forest Road. Although the former Leard Forest Road is currently used intermittently by light vehicles and irregularly by heavy rigid supply vehicles, there will be an increase in vehicle movements that would occur in campaigns with approximately 50 light vehicle movements each direction at shift changes during the morning and afternoon periods (approximately 200 additional light vehicle movements per day).

The small incremental increase in light vehicle movements has the potential to increase wildlife-vehicle collisions along the former Leard Forest Road in vicinity of the proposed fauna movement crossing and add incrementally to noise, dust and lighting pollution in its near vicinity. However, it is considered unlikely that the Modification would add substantially to wildlife-vehicle collisions or inhibit animals from making east-west movements in the southern margin of the Leard State Forest. Separate to the two shift change over periods, it is probable that local fauna will still undertake crossings of the former Leard Forest Road due to:

- The short duration over which a small incremental increase in light vehicle movements will be experienced
- Low traffic volumes outside the two shift change over periods
- The relatively short distance between remnant vegetation that borders the immediate road boundary
- Canopy connectivity that provides gliding passage across Leard Forest Road.

To mitigate the negative ecological impacts associated with increased vehicle movements along Leard Forest Road, it is proposed that wildlife signs be installed, and the speed limit be reduced to 50 km per hour or less in vegetated areas. Additionally, monitoring of the southern portion of the former Leard Forest Road should be undertaken for carcasses and wildlife-vehicle collisions should be reported to BCOPL, who will record incidences for reporting within the Annual Review.

Yours sincerely

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