SOUTH32

Illawarra
Metallurgical
Coal

niche
Environment and Heritage

element.

Appin Mine Ventilation and Access Project

SECTION 4.55 MODIFICATION TO BULLI SEAM OPERATIONS PROJECT APPROVAL (08_0150)

Also including administrative modifications of Bulli Seam Operations Project Approval (08_0150).
Prepared for South32 Illawarra Metallurgical Coal – June 2021.

APPIN MINE VENTILATION AND ACCESS PROJECT

Modification Report for modification to Project Approval 08_0150

Report Number

5948

Date

30 June, 2021

Version

Final Report

Prepared by

Matthew Richardson
Director, Niche Environment and Heritage

Neville Hattingh
Director Element Environment

Mark Roberts
Senior Environmental Scientist – Element

Kai Whitaker
Environmental Scientist – Niche

DISCLAIMER AND COPYRIGHT

EXECUTIVE SUMMARY

Introduction

This modification report has been prepared by Niche Environment and Heritage Pty Ltd (Niche) and Element Environment Pty Ltd (Element) on behalf of Endeavor Coal Pty Ltd, a wholly owned subsidiary of South32 Illawarra Metallurgical Coal (IMC) for submission to the NSW Department of Planning, Industry and Environment (DPIE) to gain approval to modify Project Approval 08_0150 (the Mine Approval).

The Mine Approval applies to the Bulli Seam Operations (BSO) Project, known as the Appin Mine (hereafter referred to as the Mine).

IMC proposes to construct and operate the Appin Mine Ventilation and Access Project (the Project) including:

- Two ventilation shafts (VS); VS7 and VS8.
- Mine access infrastructure at VS7.
- Upcast ventilation fans at VS8.
- Administration/bathhouse/storage buildings and other supporting surface facilities.
- High and low voltage electrical infrastructure.
- Utilities and security structures.
- Upgraded site access on Menangle Road and internal site access roads.
- Other minor activities associated with the construction and operation of the ventilation shafts.

Additionally, IMC proposes administrative changes to the following sections of the Mine Approval:

- Schedule 3, Condition 5(k) – extraction plans.
- Schedule 4, Condition 10 – air quality acquisition criteria.
- Schedule 4, Condition 15 – surface water discharges.
- Schedule 6, Condition 1 – environmental management strategy.
- Appendix 4 – key surface facilities sites.

Need and justification

An integral requirement of underground mining is adequate ventilation infrastructure and mine access to ensure a safe and efficient underground working environment. More specifically, mine ventilation is required to:

- provide air of sufficient quantity and quality for a safe working environment;
- dilute mine gases to below prescribed concentrations; and
- cool the working areas for comfort and mitigation of heat stress.

The proposed mine ventilation infrastructure is necessary for the safe and efficient mining of the Mine. Based on the mining schedule, the proposed ventilation shafts are required to be operational on or before 2025 to maintain continuity of safe underground operations.

Developing a mine access facility will greatly improve underground travel times and, therefore, improve production efficiency. Other benefits of the mine access facility include improved safety through reduced egress times in the event of an incident and reduced logistics complexity with timely delivery of consumables and other key underground components. Co-locating the ventilation and mine access infrastructure on the Site will reduce the overall development footprint compared with two facilities at separate sites.

Site description

The Site comprises most of Lot 20A of Deposited Plan 4450 and part of the Menangle Road reserve. The Site is approximately 35 km northwest of Wollongong, 8 km northwest of Appin and 1.3 km southwest of Menangle. The Site is in the BSO Longwall Mining Area and the South Campbelltown Mine Subsidence District in the Southern Coalfield of NSW.

The western extent of the Site is bounded by Menangle Road and the eastern side by Foot Onslow Creek. The Hume Motorway is approximately 670 m east of the Site. The Site is on the southern margins of the Cumberland Plain, which is characterised by low lying, gently undulating plains and hills. Landforms at the Site includes flat areas, lower slope and upper slopes and crests.

There is minimal vegetation on the Site apart from some native and introduced vegetation and

the following endangered ecological communities (EEC):

- Plant Community Type (PCT) 835: Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.
- PCT 849: Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion.

The Site is accessed via a gated gravel driveway and track from Menangle Road. Menangle Road consists of two 3.5 m wide lanes on a single undivided carriageway.

There is a previously recorded Aboriginal heritage site consisting of a low-density open camp site near Foot Onslow Creek – Bulli Site 7 (Aboriginal Heritage Information Management System (AHIMS) ID#52-2-3687), which is in the Site and will be directly impacted.

There are no items of historic heritage significance on the Site. The Site is part of the regional cultural landscape associated with early 19th Century settlement and the development of large rural estates such as South Camden.

Permissibility and approval pathway

The Site is zoned RU2 under the land use table in the Wollondilly Local Environmental Plan 2011 (LEP). Mining is a prohibited land use in this zone. Notwithstanding, clause 7(1)(a) of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) makes underground mining permissible on any land. Clause 3 of the Mining SEPP defines underground mining as:

a) mining carried out beneath the earth's surface, including bord and pillar mining, longwall mining, top-level caving, sub-level caving and auger mining, and

b) shafts, drill holes, gas and water drainage works, surface rehabilitation works and access pits associated with that mining (whether carried out on or beneath the earth's surface).

Therefore, the Project is permissible pursuant to the Mining SEPP on the land following from the fact that the Mine is an underground mine and the Project involves the development of shafts and access pits associated with the mine.

Modification applications to the Mine approval are to be made under Section 4.55 of the EP&A Act and an application to modify a State Significant Development (SSD) project must be accompanied by a modification report.

Impact assessment

Correspondence was sent to DPIE on 8 October 2020 informing it of the proposed modification and the key matters that will be addressed in the report accompanying the modification application. These matters were noise and blasting, air quality and greenhouse gas, biodiversity, Aboriginal heritage, surface water, traffic and visual amenity. In DPIE's reply dated 29 October 2020 it was requested that agricultural impacts be assessed also.

The above matters were assessed and addressed in this report, plus other matters which will only have a minor or no impact but were addressed in the BSO Project Environmental Assessment (EA).

Agriculture

The Project would result in the temporary removal of 0.0028 ha of Class 4 land, 12.22 ha of Class 5 land, and 9.25 ha of Class 6 land from potential agricultural use (total of 21.44 ha). Given that the Site has not been used for agricultural purposes since November 2020, the Project will not remove any land from current agricultural use.

Noise and blasting

Construction noise was assessed at sensitive receivers in accordance with the Interim Construction Noise Guidelines (ICNG), which included derivation of noise management levels (NML) that apply to standard construction hours.

Shaft sinking is proposed to occur 24 hours a day, 7 days a week, so predicted noise levels have been assessed against the ICNG's out of hours (OOH) NML. Predicted noise levels have also been assessed against calm and noise-enhancing meteorological conditions during night-time.

Minor exceedances of construction noise will occur during standard construction hours under the following circumstances:

- During the proposed civil works, noise levels are predicted to exceed the NML at R2 and R3 by 5 dBA and 1 dBA, respectively.
- During shaft sinking without an acoustic shed, noise levels are predicted to exceed the NML at R2 and R3 by up to 5 dBA and 1 dBA, respectively.
- During the proposed intersection works, noise levels at R2 are predicted to exceed the NML by up to 4 dBA.

Minor exceedances of construction noise will occur during out of hours construction hours under the following circumstances:

- Without the use of acoustic sheds, predicted noise levels associated with OOH construction activities under calm meteorological conditions exceed the NML at five sensitive receivers, with the maximum predicted exceedance being 17 dBA at R2.
- Without the use of acoustic sheds, predicted noise levels associated with OOH construction activities under noise enhancing meteorological conditions exceed the NML at 13 sensitive receivers, with the maximum predicted exceedance being 22 dBA at R2.

Measures to manage construction noise levels to within NMLs are provided. The use of acoustic sheds results in predicted levels complying with the OOH NML under calm and noise enhancing meteorological conditions. The required noise reduction of the sheds would be confirmed during detailed design.

Noise trigger levels were determined in accordance with the Noise Policy for Industry (NPfI) for the following equipment operating simultaneously during noise enhancing meteorological conditions:

- Ventilation fans and substation.
- Ventilation fans and substation plus mine access comprising forklift/truck/car movements and water treatment plant.

The predicted noise levels were assessed against the Project noise trigger levels (PNTL) determined in accordance with the NPfI. Noise generated by the above scenarios during the assessed periods is predicted to comply with the PNTLs.

Road noise levels at the most potentially affected sensitive receivers along Menangle Road have been predicted for the 'no-build' and 'build' scenarios. Predicted road noise levels at the façade of the most potentially affected receivers along Menangle Road comply with the Road Noise Policy impact assessment criteria.

Overpressure and vibration levels have been predicted using equations from AS 2187.2-2006 and default site parameters. The results indicate that the blast design is likely to be limited by overpressure, not vibration. Trial blasts would be conducted to develop a site law and a detailed blast design to achieve compliance with the overpressure and vibration criteria.

A Blast Management Strategy has been outlined, including a range of blasting mitigation measures**.**

Air quality and greenhouse gas

Construction of the Project will generate particulates from material handling and ground disturbance; particulates and gasses from combustion of fuel in equipment; and oxides of nitrogen (NOx) and odour from blasting.

Incremental ground level particulates (PM_{10} and $PM_{2.5}$), total suspended particles (TSP) and deposited dust concentrations generated during construction and operation were predicted. Cumulative results were calculated by adding the modelled increment to the adopted background concentrations. The incremental and annual average criteria are not predicted to be exceeded at any of the sensitive receivers.

Emissions of NOx and odour during operations were also assessed. The impact assessment criteria for NO_x are applied to nitrogen dioxide (NO_2).

Incremental NO_2 concentrations from the operation of ventilation shafts were predicted. Cumulative results were calculated by adding the modelled increment NO_2 to the adopted

background concentrations. The incremental and annual average No_2 criteria are not predicted to be exceeded at any of the sensitive receivers.

Incremental ground level odour and hydrogen sulfide (H_2S) concentrations from ventilation shaft airflow was predicted. All assessment locations are below the most stringent odour and H_2S impact assessment criteria.

Project related greenhouse gas (GHG) emissions will not be significant in the State and National contexts. Notwithstanding, management measures will be implemented to reduce the project's GHG emissions.

Traffic and transport

The Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) program was used to predict the impact of Project related traffic on performance of the following intersections for existing plus Project traffic:

- Menangle Road/Woodbridge Road/Station Street.
- Menangle Road/Finns Road.
- Menangle Road/Site entrance.

The AM and PM peak hours were modelled for 2020 (existing conditions) and a 2025 traffic scenario to account for background traffic growth (10% between 2020 and 2025) and the start of operations.

The SIDRA results are expressed as level of service (LoS), degree of saturation and average vehicle delay. A LoS D or better is the desirable design criteria for intersections.

The most significant change in performance will be at the Menangle/Woodbridge Road/Station Street intersection. LoS is predicted to change from A in 2020 to B at this intersection in 2025, which is "good with acceptable delays and spare capacity" according to the Guide to Traffic Generating Development.

The Site entrance has been additionally modelled to determine sensitivity to increased right turn volumes. The results show LoS will remain at level A at these volumes.

Future intersection performance (2035), including a 20% increase in background traffic (2% per year for 10 years), was assessed. The most significant change in performance is predicted at the Menangle/Woodbridge Road/Station Street intersection (Table 6-36). LoS at this intersection is predicted to change from A in 2020 to B in 2035, which is "good with acceptable delays and spare capacity".

Surface water and soils

There is potential for surface water and soil quality impacts, particularly during construction. There is a risk of erosion and sedimentation impacts from surface disturbance and excavation.

Operations could impact water quality due to erosion and runoff from the irrigation spray field, particularly if the spray field is not properly vegetated or irrigation rates are unsustainably high.

Potential impacts will be mitigated through careful design of the Project and implementation of stormwater management measures.

Biodiversity

Biodiversity impacts were assessed in accordance with the Office of Environment and Heritage (OEH) biodiversity assessment method (BAM) using the NSW BAM Calculator.

As described earlier, there are small patches of EECs (PCT 835 and PCT 849) on the Site and there will be unavoidable impacts to these. Impacts to PCT 849 will require offsetting under the NSW *Biodiversity Conservation Act 2016*. The BAM Calculator has determined that two ecosystem offset credits will be required. These ecosystem credits also cover the credit requirement for ecosystem credit species.

As no threatened biodiversity listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded or considered likely to occur on the Site, no assessment/s of significance were required. As such, there is no requirement for Commonwealth referral regarding Commonwealth listed threatened species, communities or populations.

Aboriginal heritage

The Site was surveyed on 7 December 2020 by archaeologists and representatives of the registered Aboriginal parties (RAPs). All of the Site including the land along the eastern bank of Foot Onslow Creek was surveyed. Areas of greater visibility and higher potential (exposures, ridgelines, terraced flats etc.) were targeted during the survey.

Item AHIMS ID #52-2-3688 was found and extends approximately 100 m along a fence on the eastern side of Foot Onslow Creek. This Site is not in the Site boundary and will not be impacted by the Project.

Item AHIMS ID #52-2-3687 was not found during the December 2020 survey. However, a red silcrete flake was found on a dam wall during a later survey, which is unlikely to be in-situ given the dam wall was constructed and would have disturbed the surface. This item is Bulli Site 7 (AHIMS ID #52-2-3687).

The area associated with a known registered Aboriginal site (AHIMS ID# 52-2-3687) was assessed with fifty-two test pits excavated.

Five Aboriginal objects were found in four of the test pits from a range of depths. The frequency and distribution of objects are representative of transient land-use resulting in low-density occupation.

Overall, the results demonstrate the Site was likely associated with a low intensity occupation and use by Aboriginal people. The broad association between artefact bearing test pits, the locations of sites AHIMS ID #52-2-3687 and AHIMS ID#52-2-3688 and the low number of subsurface artefacts suggest that Aboriginal objects resulted not from isolated behavioural events but from sporadic use of and/or movement through the Site over a long period.

The Project would partially impact a single Aboriginal cultural heritage site (AHIMS ID 52-2-3687) registered on AHIMS.

An Aboriginal Cultural Heritage Management Plan (AHMP) will be developed in consultation with the RAPs and relevant regulatory authorities to detail and schedule the mitigation and management measures. The AHMP will include a care and control agreement for the long term management of recovered artefacts.

Historical heritage

The Site was inspected on 7 December 2020 and between 1-12 February 2021, which comprised a systematic meander with areas of potential or disturbance closely inspected and recorded. Aerial photographs from between 1961 and 1975 were observed to determine historic site disturbance.

The historical aerial photographs indicate that little to no development occurred on the Site for the latter half of the 20th century. The site inspection indicates that it likely continued to be used for cattle grazing to the current period.

As there were no listed heritage items nor undiscovered heritage items, no items associated with the Site were assessed using the criteria outlined in Heritage Office (former) (2001) *Assessing Heritage Significance.*

On the basis of this assessment, the Site does not meet the criteria for local or State heritage significance. Implementation of the unexpected finds protocol will ensure any currently undiscovered heritage items, if any exist, are managed appropriately.

Hazardous and offensive development

Department of Planning (2011) Applying SEPP 33 (the guideline) states that this report must determine if the Project will constitute a 'potentially hazardous industry'. If the Project is a potentially hazardous industry, then the SEPP applies and the guideline states that a preliminary hazard analysis (PHA) is required.

The hazardous materials and dangerous goods proposed to be stored at the Project will be below the screening thresholds in the guideline, and will be transported, stored, handled and managed in accordance with relevant regulations and industry standards. As such, the Project does not constitute a potentially hazardous industry, and the assessment requirements of the SEPP, including requirement for a PHA, are not applicable.

Despite the above, in accordance with the guideline, the Project may constitute a

'potentially offensive industry', where in the absence of safeguards and controls, the Project could 'emit a polluting discharge that could cause a significant level of offence'.

As summarised in this report, the Project may emit pollutants, which in the absence of safeguards could cause offense. However, management measures will be implemented to control and minimise these emissions or pollutants to a non-significant level.

Additionally, IMC holds an EPL (No. 2504), issued by the NSW EPA for the operation of the Mine. This EPL could require variation following consultation with the EPA after approval of the Project. However, the EPL would continue to be held for the lifespan of the Project. Therefore, it is likely the historical provision of an EPL by the NSW EPA is sufficient to suggest that existing levels of emissions and pollutants are acceptable to the regulatory authority and that the Project is not offensive industry.

The Project has been designed to minimise the occurrence of contamination, explosion and public safety risks and/or their consequences. These risks will be further examined as part of detailed project design and re-assessed in an ongoing hazard assessment process to ensure that risks are kept as low as reasonably and practically possible

Waste

Most waste associated with the construction phase would be from the construction of the ventilation shafts. Spoil generated from this process is proposed to be used as engineered fill on the Site. The shaft spoil is being emplaced on-site so that it can be used to backfill the shafts at the completion of the operational phase.

During the operational phase, the Project would generate waste streams of a similar nature to waste generation at existing Mine surface facilities.

There will be minimal residual waste during construction given most waste (including spoil) will be incorporated into the project design, and eventually used to rehabilitate the Site. Waste generated during operation of the Project will be similar to other Mine sites, with minimal residual waste requiring disposal.

Visual amenity

Impacts to landscape character and key viewpoints (VP) were assessed in terms of their sensitivity and magnitude of change. Sensitivity refers to the number, type and nature of receptors in the area, how sensitive the area is to change, and the value attached to the landscape.

The project will have a high-moderate impact to viewpoints 3 (310 Menangle Road) and 7 (30 Finns Road). The proposed colour palette will help the Project contrast with colours in the surrounding landscape. However, the built form and bulk will not contrast well with shapes and contours in the surrounding landscape and additional management measures will be required.

Vegetation is proposed to be planted to shield views of the Project. Depending on the maturity of the plantings, it is likely the properties will continue to be impacted in the short to medium term as the vegetation grows. Once the vegetation is mature there could still be glimpses of the Project through gaps in the foliage. However, the impact will be significantly reduced.

The plantings will comprise a new element in the viewscape, however, it will be far more sympathetic to the overall rural viewscape and present less impact than unmitigated views of the Project.

Utilities and infrastructure

There is potential for services and utilities such as electricity and telecommunications to be intercepted by the shaft, boreholes, pipelines and excavation works on the Site and in the Menangle Road corridor, resulting in damage to infrastructure.

The layout of the shaft, boreholes and bulk excavation have taken into consideration the location of any known underground services and proposed subsurface works are unlikely to coincide with any existing infrastructure.

The layout and location of the Project avoids impact to existing public transport infrastructure, including the Main Southern Railway, Menangle Road and the Hume Highway.

The recommended corridor of the Outer Sydney Orbital Stage 1 (OSO1) intersects a portion of the proposed operational area of the Site.

Based on the concept level information available, it is acknowledged that OSO1 infrastructure may be constructed adjacent to the Site. Mine critical infrastructure in the corridor must remain uninterrupted during the construction and operation of the OSO1. IMC and Transport for NSW will work together during the detailed design phase of the OSO1 to establish the design parameters required for this to occur.

Other environmental matters

Other environmental matters which were assessed in the EA have been considered. They include:

- Bushfire risks.
- Subsidence risks.
- Groundwater impacts.
- Socio-economic impacts.

The Project will not significantly change any of these matters from the current approved Mine. There will be short term local economic benefits due to expenditure from the construction employees. There will be a minor medium and long-term economic benefit from the employment of a small number of additional employees (compared to the current Mine workforce) during operation of the Project.

Evaluation of merits

The Project is substantially the same development as that described in the EA as it involves the construction and operation of mining infrastructure subject to PA 08_0150, that is, *ventilation and mine access shafts, on land within the longwall mining domain.* Therefore, DPIE may approve a modification to the Mine approval to allow for development of the Project.

An integral requirement of underground mining is adequate ventilation infrastructure and mine access facilities to ensure a safe and efficient underground working environment. More specifically, mine ventilation is required to:

- provide air of sufficient quantity and quality for a safe working environment;
- dilute mine gases to below prescribed concentrations; and
- cool the working areas for comfort and mitigation of heat stress.

The proposed mine ventilation infrastructure is necessary for the safe and efficient mining of the Mine.

Developing a mine access facility will greatly improve underground travel times and, therefore, improve production efficiency. Other benefits of the mine access facility include improved safety through reduced egress times in the event of an incident and reduced logistics complexity with timely delivery of consumables and other key underground components. Co-locating the ventilation and mine access infrastructure on the Site will reduce the overall development footprint compared with these two facilities at separate sites.

The Site is suitable for the proposal for the following reasons:

- The Site is zoned RU2 under the land use table in the LEP. Mining is a prohibited land use in this zone. Notwithstanding, clause 7(1)(a) of the Mining SEPP makes underground mining permissible on any land. The Project is permissible pursuant to the Mining SEPP on the land as the Mine is an underground mine and the Project involves the development of shafts and access pits associated with the mine.
- The Site is directly over the main underground roadway workings and can provide direct access to the underground workings.
- The Site is mostly cleared and the previous land use (grazing) ceased in November 2020.
- The Project is unlikely to significantly impact agricultural resources as it will be on low capability land, is not on any mapped BSAL and will not impact on any nearby agricultural operations.

- The Site is close to transport, electricity, water and telecommunications infrastructure which will be augmented or extended to service the Project.
- The Site is not in a WaterNSW 'special areas' drinking water catchment.
- The Project is consistent with the principles of ecologically sustainable development.

Local/State government stakeholders and surrounding landholders were consulted during preparation of the report. Consistent themes in the consultation were construction, traffic and operational noise; construction and operational light spill; impacts to visual amenity; private tank water contamination; runoff during construction and operations; air quality impacts; road safety; impacts on property values; and vibration impacts.

The impact assessments determined the Project is unlikely to have significant residual impacts, that is, it is unlikely to exceed government standards and criteria. Exceptions are biodiversity and visual, where:

- Biodiversity – unavoidable impacts to PCT 849 and PCT 835 will be required to be offset under the BC Act. The BAM Calculator has determined that two ecosystem offset credits will be required for PCT 849. These ecosystem credits also cover the credit requirement for ecosystem credit species.
- Visual – vegetation will be planted to screen views to the Project. Depending on the maturity of the plantings, it is likely the properties will continue to be impacted in the short to medium term as the vegetation grows. Once the vegetation is mature there could still be glimpses of the Project through gaps in the foliage. However, the impact will be significantly reduced.

The Project will have a short term beneficial economic impact associated with the employment of 76 construction personnel (at peak construction periods). There will be a minor medium-long term economic benefit from the employment of small number of additional employees during operation of the Project. These personnel are likely to spend some of their income in the LGA. The Project will also have a major medium-long term economic benefit by ensuring the safe and ongoing operation of the Mine and thereby ensuring:

- the continued direct employment of about 1,800 people.
- the continued engagement of numerous local suppliers and businesses to provide products and services to the Mine. In the 2020 financial year A$236.7M was spent with local vendors.
- the contribution of approximately A$2 billion in royalties and some A$205 million in employee and contractor payroll tax to the State of NSW over the life of the Mine.
- the continued supply of metallurgical coal to Australian steelmakers. The Mine is an essential supplier to BlueScope Port Kembla Steelworks, which is the largest steel production facility in Australia.

On balance, given the need for the Project, lack of alternatives, suitability of the Site, consistency with plans and policies, minor environmental impacts and economic benefit of the Project, it is clear the Project is in the public interest and its approval is likely to benefit the State of NSW.

CONTENTS

Tables

Figures

Attachments

Appendices

GLOSSARY and ABBREVIATIONS

Term / abbreviation	Meaning
AADT	Annual average daily traffic
ACH Bill	Draft *Aboriginal Cultural Heritage Bill, 2018*
ACHA	Aboriginal cultural heritage assessment
ACHCRs	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
AEMR	Annual environmental management reports
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHMP	Aboriginal heritage management plan
AIP	Aquifer Interference Policy
ANZECC	Australian and New Zealand Environmental and Conservation Council
AUSRIVAS	Australian River Assessment System
AVD	Average vehicle delay
BAM	Biodiversity Assessment Method
BBAM	BioBanking Assessment Methodology
BC Act	NSW *Biodiversity Conservation Act 2016*
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity development assessment report
BOPC	Biodiversity Offset Payment Calculator
BSA	Biodiversity Stewardship Agreement
BSO Project	Bulli Seam Operations Project
CCL	Consolidated coal lease
CMSC Act	NSW *Coal Mine Subsidence Compensation Act 2017*
CoRTN	Calculation of Road Traffic Noise
DAWE	Department of Agriculture, Water and the Environment (formerly Department of the Environment and Energy (DoEE))
DS	Degree of saturation
Downcast ventilation shaft	Shaft that draws air into the mine
DPIE	NSW Department of Planning, Industry and the Environment
EIS	Environmental impact statement
EMAI	Elizabeth Macarthur Agricultural Institute
EPA	Environment Protection Authority
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	NSW *Environment Protection and Biodiversity Conservation Act 1995*
EPL	Environment protection licence
ESD	Ecologically sustainable development

Term / abbreviation	Meaning
ETL	Electricity transmission line
FFDI	Forest Fire Danger Index
Heritage Act	NSW *Heritage Act 1977*
IEP	Independent Expert Panel for Mining in the Catchment
GHG	Greenhouse gas
IMC	Illawarra Metallurgical Coal
LALC	Local Aboriginal Land Council
LEP	Local environmental plan
LGA	Local government area
LoS	Level of service
MAP	Menangle Advisory Panel
Mining SEPP	State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
ML	Megalitres
µg/m^3	Micrograms per cubic metre
mm	Millimetres
MNES	Matters of national environmental significance
MOP	Mine operations plan
MSC Act	NSW *Mine Subsidence Compensation Act 1961*
Mt	Million tonnes
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
Ptpa	Million tonnes per annum
MVA	Mine ventilation air
NGER Act	Commonwealth *National Greenhouse and Energy Reporting Act 2007*
NGERS	National Greenhouse Energy Reporting Scheme
NPfI	NSW Noise Policy for Industry (NSW EPA, 2017)
NPI	National Pollutants Inventory
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW BOS	NSW Biodiversity Offset Scheme
OEH	NSW Office of Environment and Heritage (formerly DEC, DECC, DECCW)
OOH	Out of hours
OSO1	Outer Sydney Orbital 1 (Box Hill to Hume Highway at Menangle)
OU	Odour units
PAD	Potential archaeological deposit
PCT	Plant community type
PHA	Preliminary hazard analysis

Term / abbreviation	Meaning
PNTL	Project noise trigger levels
RAP	Registered Aboriginal party
RNP	NSW Road Noise Policy (DECCW, 2011)
ROM	Run of mine coal
SA	Subsidence Advisory NSW
SCA	Sydney Catchment Authority
SEARs	Secretary's environmental assessment requirements
SEMP	stakeholder engagement management plan
SEPPs	State environmental planning policy
SEPP 33	State Environmental Planning Policy No. 33 (Hazardous and Offensive Development)
SEPP 55	State Environmental Planning Policy No. 55 (Remediation of Land)
SIDRA	Signalised and Unsignalised Inters Design and Research Aid
SIOA	social impact and opportunity assessment
SLAR	Strategic land assessment review
SSD	State Significant Development
SSI	State significant infrastructure
STEM	Science, technology, environment and mathematics
TECs	Threatened ecological communities
TfNSW	Transport for NSW
VOC	Volatile organic compounds
VPD	Vehicles per day
VS#6	Vent Shaft Number 6 – Appin Mine
WAL	Water access licence
WCC	Wollongong City Council
WCCPP	West Cliff Coal Preparation Plant
WSC	Wollondilly Shire Council

1 INTRODUCTION

1.1 Overview

South32 Illawarra Metallurgical Coal (IMC) is seeking to modify the Bulli Seam Operations (BSO) Project Approval 08_0150, pursuant to Section 4.55 (2) of the *NSW Environmental Planning and Assessment Act, 1979* (EP&A Act), to incorporate the construction and operation of infrastructure critical to the ongoing viability of the Mine referred to as the Appin Mine Ventilation and Access Project (the Project) and other administrative modifications.

Section 2 of the BSO Project Environmental Assessment (EA) identified that additional ventilation shafts and associated surface infrastructure would be installed during the life of the Appin Mine (the Mine) to maintain a safe and efficient working environment within the underground mine. The EA also identified that the development of new mine access infrastructure may be considered over the life of the Mine. Such development would be subject to separate assessment and approvals.

This Modification Report considers the environmental and community impacts associated with development of two ventilation shafts (Ventilation Shaft 7 [VS7] and Ventilation Shaft 8 [VS8]), mine access infrastructure and improved site access (see Section 3 of this report) at 345 Menangle Road, Menangle NSW (Lot 20A DP 4450; hereafter referred to as the Site). The Project does not propose coal handling facilities (coal stockpiles, coal haulage movements etc.) at the Site.

The location of the Site is shown in Figure 1-1. The indicative Operational Site Layout of the proposed works on the Site are shown in Figure 1-2. The final Operational Site Layout will broadly conform to the design shown in Figure 1-2, however ongoing detailed design may vary the Site layout to accommodate project efficiencies and the safe construction and operation of the Site.

This Modification Report has been prepared by Niche Environment and Heritage Pty Ltd (Niche) and Element Environment Pty Ltd on behalf of IMC for submission to the NSW Department of Planning, Industry and Environment (DPIE) to accompany a Modification Application.

1.2 Applicant

Endeavour Coal Pty Ltd is the proponent for the Project. The Mine is owned and operated by Endeavour Coal Pty Ltd, a subsidiary of Illawarra Coal Holdings Pty Ltd, which is a wholly owned subsidiary of South32 Limited. Throughout this Modification Report Endeavour Coal Pty Ltd is referred to as IMC. IMCs contact details are in Table 1-1

Table 1-1 Proponent details

Project contact	Contact details
Postal address	Level 3, Enterprise 1 Building, Innovation Campus, Squires Way, North Wollongong, 2500 New South Wales, Australia
ABN	38 099 830 476
Web site	https://www.south32.net/our-business/australia/illawarra-metallurgical-coal
Site owner	Endeavour Coal Pty Ltd

1.3 Summary of approved project

The Mine is an existing underground coal mine in the Southern Coalfield of New South Wales (NSW) approximately 25 kilometres (km) north-west of Wollongong (Figure 1-1.). Appin Mine, Cordeaux Colliery and Dendrobium Mine (and associated facilities) collectively operate as South32 IMC.

IMC received Project Approval 08_0150 (the Mine Approval) from the Planning Assessment Commission of NSW under delegation of the Minister for Planning and Infrastructure on 22 December 2011 for current and proposed mining of the Mine. The Mine Approval was gazetted as a State Significant Development for the purposes of future modifications on 23 November 2018.

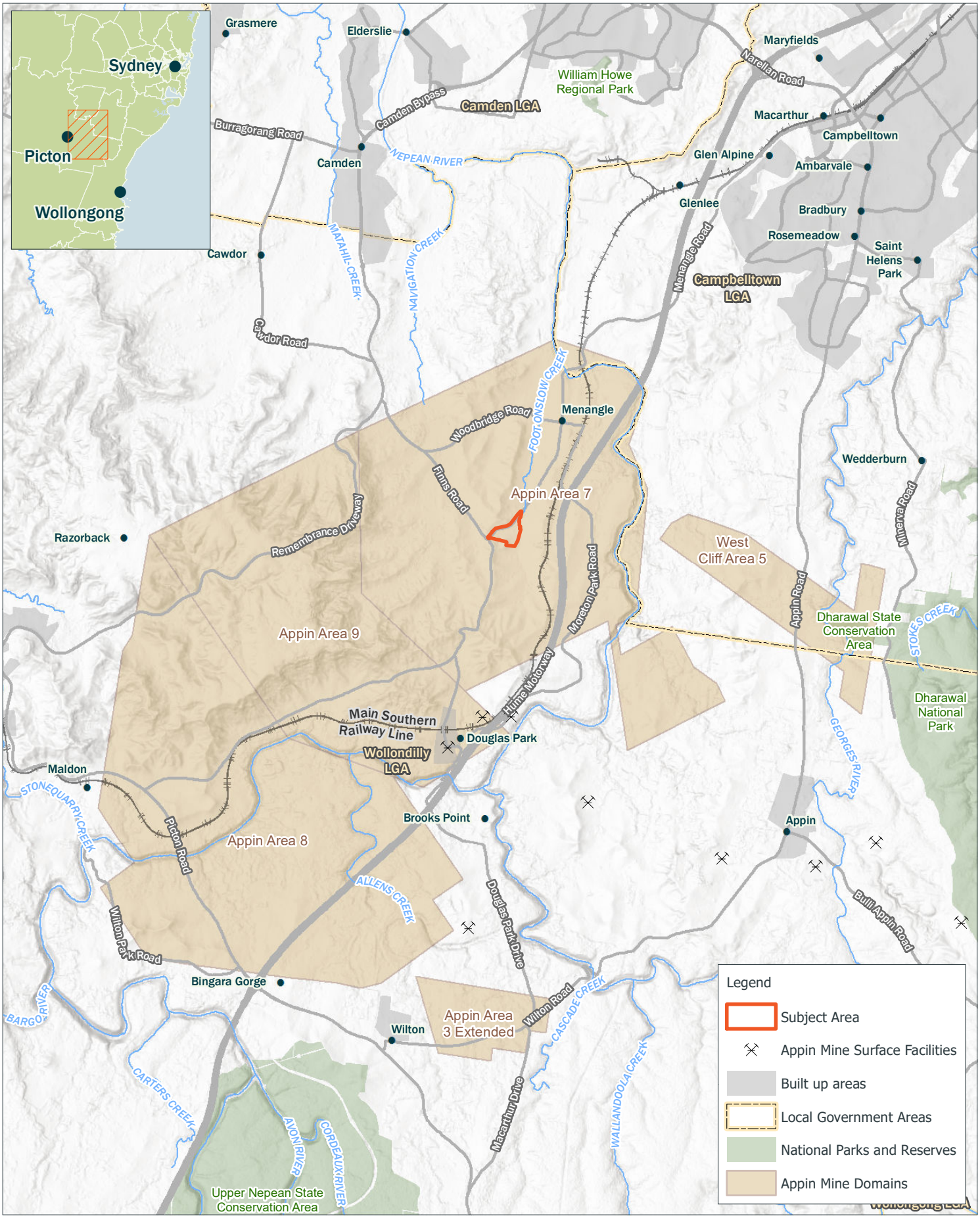
The Mine Approval incorporates the underground longwall mining operations, which extract coal from the Bulli Seam using underground longwall mining methods, and the associated surface activities. The Mine primarily produces hard coking (metallurgical) coal and has an approved operational capacity of up to 10.5 Million tonnes per annum (Mtpa) of Run-Of-Mine (ROM) coal until 2041.

Longwall mining is currently being undertaken in the approved mining areas, Area 9 and Area 7, following completion of longwall mining activities at West Cliff Colliery in early 2016. Key surface facilities at the Mine are shown in Figure 1-3 and include the:

- Appin East Colliery (Appin East)
- Appin West Colliery (Appin West)
- Appin North Colliery (Appin North)
- West Cliff Coal Preparation Plant (WCCPP)
- West Cliff Emplacement Area (WCEA)
- Appin East No.1 and No. 2 ventilation shaft site
- Appin East No. 3 ventilation shaft site
- Appin West No. 6 ventilation shaft site
- Douglas Park substation site

ROM coal is extracted from the Mine's underground mining operations and delivered directly to the WCCPP by winder and conveyor, or is transported from Appin East via truck along Appin and Wedderburn Roads to the WCCPP. Processed coal (clean coal product) from the WCCPP is transported by road to the Port Kembla Coal Terminal (PKCT) for shipping to domestic and international customers, BlueScope Steel or other local customers.

The Mine is accessed via the shaft at Appin West and drifts at Appin North and Appin East. The Mine is ventilated by two distinct ventilation districts; Appin Mine and Appin North. The Appin Mine district is ventilated by two upcast shafts (No. 2 and No. 6), four downcast shafts (No. 1, No. 3, No. 4, and No. 5) and two intake drifts at Appin East. The Appin North district is ventilated by one upcast shaft (No. 1), one downcast shaft (No. 2) and one intake drift at Appin North.



SOUTH32

FIGURE 1-1

Regional Location

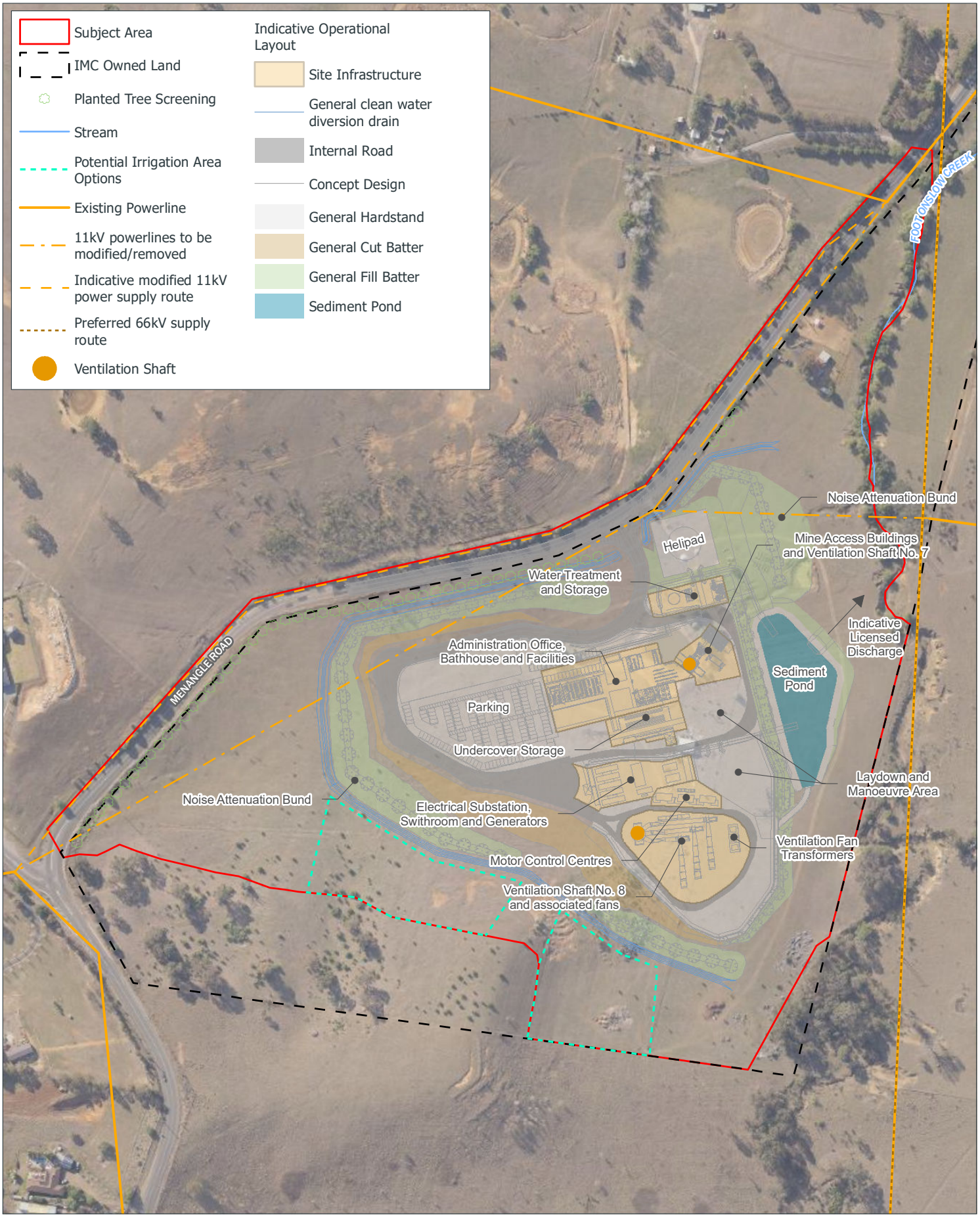
Appin Mine Ventilation and Access Project

GDA 1994 MGA Zone 56

Terrain: Multi-Directional Hillshade: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community

Drawn by: LL File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_1-1_RegionalLocation.mxd Last updated: 23-Jun-21 5:01:56 PM

v2.0



SOUTH32

FIGURE 1-2

Subject Area

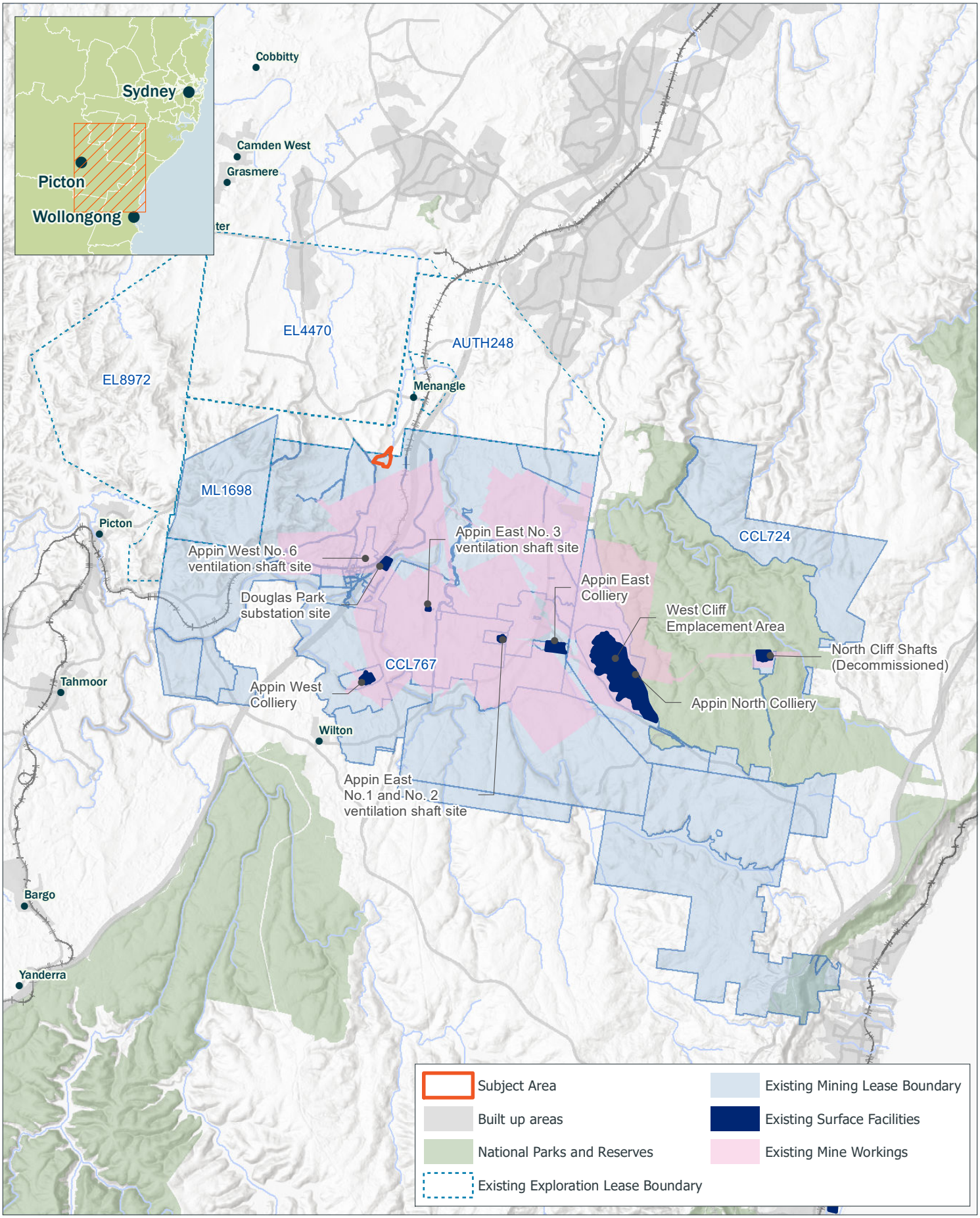
Appin Mine Ventilation and Access Project

N

0 50 100

m

GDA 1994 MGA Zone 56



SOUTH32

FIGURE 1-3

Bulli Seam Operations Project Overview

Appin Mine Ventilation and Access Project

N

0 2 4

km

GDA 1994 MGA Zone 56

Terrain: Multi-Directional Hillshade: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community

Drawn by: LL File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_1-3_BSO.mxd Last updated: 23-Jun-21 5:03:05 PM

v2.0

1.4 Need and justification

1.4.1 Bulli Seam Operation Approval

As noted above, the EA explicitly contemplates the need to develop future mine ventilation and mine access facilities to maintain a safe working environment within the underground mine (subject to separate assessment and approval).

In relation to mine ventilation, Section 2.5.6 of the EA states:

'*Additional ventilation shafts and associated surface infrastructure would be installed during the life of the Project to maintain a safe working environment within the underground mine'*

Section 2.5.6 of the EA also states:

'Development of additional ventilation shafts and associated surface infrastructure would be subject to separate assessment and approvals.'

In relation to mine access, Section 2.11 of the EA states:

'ICHPL may in the future consider developing a new pit top[1] within the mining area. However, a new pit top is not currently considered as a component of this Project and is not assessed in this EA. If required in the future, any new pit top would be subject to a separate assessment, public consultation and approval process.'

IMC notified DPIE of the proposed Modification Application in writing on 8 October 2020, which included a description of the key features of the Project, the planning approval pathway and level of assessment proposed for each environmental matter required to be considered in the Modification Report.

Following a meeting, DPIE confirmed in writing on 29 October 2020 that the approval pathway for the proposed Modification Application is under Section 4.55(2) of the EP&A Act. In addition the DPIE stated in this response it is generally satisfied with the proposed matters to be addressed in the Modification Report but also requested IMC include:

- consideration of the agricultural impacts of the modification;
- the statutory context for the modification, including the relevant matters for consideration under Section 4.15 of the EP&A Act and the relevant objects of the Act; and
- an evaluation of the modified project as a whole.

These items are addressed throughout the document, and in detail in Section 6.2, Section 4 and Section 7.1, respectively.

1.4.2 Mine ventilation

An integral requirement of underground mining is adequate ventilation infrastructure and mine access facilities to ensure a safe and efficient underground working environment. More specifically, mine ventilation is required to:

- Provide air of sufficient quantity and quality for a safe working environment;
- Dilute mine gases to below prescribed concentrations; and

[1] Pit tops are now generally referred to as collieries (such as Appin West, Appin North and Appin East Collieries) or mine access facilities, such as those described for the Project.

- Cool the working areas for comfort and mitigation of heat stress.

As mining progresses, the operational faces typically move further from the sources of fresh air (downcast ventilation shafts and drifts) as well as infrastructure that returns air to the surface (upcast ventilation shafts). The ventilation fans at the upcast shafts must 'pull' air through a steadily increasing distance to achieve the required quantities and pressures of air at the operational faces to achieve a safe and efficient underground working environment. As mining progresses, the capacity of the ventilation fans is exceeded and additional ventilation infrastructure must be constructed to support continued operations.

IMC has developed a set of ventilation parameters which provide the basis for assessing the adequacy of the Mine ventilation system. The parameters take into account the underground conditions at the Mine and the requirements of the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* (NSW) to determined specified minimum air quantities and pressures for various underground operational activities. Ventilation modelling of the mine plan and mining schedule are used to establish the requirement for additional ventilation infrastructure in order to maintain an adequate ventilation system for future operations.

Ventilation modelling undertaken as part of the IMC mine planning process established that two additional ventilation shafts (one downcast ventilation shaft, and one upcast ventilation shaft) is now necessary to ventilate continued mining activities in Appin Area 7.

The proposed mine ventilation infrastructure is necessary for the safe and efficient mining of the approved Mine. Based on the current mining schedule, the proposed ventilation shafts are required to be operational on or before 2025.

1.4.3 Mine access

The working faces at the Mine are progressing further from existing mine access locations, resulting in increasing travel times for workers. Current underground travel times are estimated at approximately 45 minutes (each way) to the key working areas of the Mine. As mining progresses, over half of Appin Area 7 will require travel times in excess of 70 minutes (each way) with some operational faces requiring over 80 minutes of travel each way (or over 2.5 hours per shift). Increased travel times have the potential to impact production efficiency over the long term.

Developing a mine access facility at the Site, as proposed in this Project, would greatly improve underground travel times, improving safety through reduced egress times in the event of an emergency, while also improving production efficiency. The mine access facility would also reduce logistics complexity with timely delivery of consumables and other key underground components.

The Project would be similar to previously approved mine access infrastructure for the Mine and will not increase the volume of coal produced. Coal handling infrastructure is not proposed as part of the Project. Further, the intention to co-locate both ventilation and mine access infrastructure within the Ventilation Shaft 8 (upcast ventilation shaft) would reduce the overall development footprint compared to where these two facility types were pursued as separate facility types.

1.4.4 Other

The Mine Approval permits IMC to mine the Bulli Seam until 2041. Development of the Project is key to ensuring the safe and efficient mining of the Bulli Seam.

The Mine has been operating since the 1960's and remains an essential supplier to Australian steelmakers, including BlueScope Port Kembla Steelworks, which is the largest steel production facility in Australia. The Mine provides direct employment to about 1,800 people and works with numerous local

suppliers and businesses to support its activities. In the 2020 financial year A$236.7M was spent with local vendors.

The EA outlined the broader Mine justification, which has not been repeated in full here but includes:

- Socio economic benefits: Section 7.8.3 of the EA noted that the Mine will provide for increased localised employment (directly as IMC personnel or indirectly as contractors). This is particularly the case during construction programs for mine infrastructure as is proposed by the Project.
- IMC have long standing commitments to supply Bulli Seam coal to their customers. Reduced mining efficiency (through impeded ventilation and mine access) may affect volumes of coal that are produced and supplied to their customers.

The Preferred Project Report (PPR) dated 24 September 2010, estimated that in total over its life, the Mine would contribute $2 billion in royalties and some $205 million in employee and contractor payroll tax to the State of NSW. The proposed Project supports the Mine justification.

1.4.5 Suitability of the Site

The Site is a suitable location for the development of additional ventilation and mine access infrastructure for the Mine as outlined below.

The Project is positioned to align with the approved layout of the underground workings for Appin Area 7, including the Simpson Mains[2] which are directly beneath the Site, to be proximal to required services and to minimise the potential impacts on the environment and communities of Menangle and Douglas Park.

1.4.5.1 Existing land use

The Site has previously been cleared and has operated as a grazing property for many years. Grazing ceased on the Site on 25 November, 2020. Very small areas of degraded native vegetation occur on the Site (in the west, adjacent to Menangle Road and along sections of Foot Onslow Creek). The indicative Site layout has ensured the avoidance of the majority of that vegetation and a commitment from IMC to avoid undertaking construction and operational activities within these areas (see the Subject Area identified in Figure 1-2).

A single residential dwelling is located on the Site, however the dwelling was vacated in April 2021, and will not be occupied as a residential dwelling during the life of the Project. The Site retains a number of dilapidated farming sheds and livestock yards. Two small farm dams occur on the Site but they are highly degraded following years of unhindered access to them by the grazing stock.

As the Site is not used for agriculture and comprises low capability land (predominantly classes 5 and 6), the surface disturbance associated with the Project would likely have a negligible impact on potential agricultural enterprises and related industries. More detail regarding the agricultural potential of the Site is provided in Section 6.2.

Adjacent land use includes stock grazing, rural residential, residential township (Menangle), mixed agriculture and small business. The Project will not significantly alter the current or proposed future landuse of the surrounding properties.

2 The Simpson Mains are the main headings positioned on the eastern side of the Appin Area 7 longwall domain, in a north west orientation. Main headings are the primary underground roadways that provide for access, ventilation and coal clearance. Development headings branch off the main headings, and run between the longwalls.

1.4.5.2 Existing mining tenements

The underlying tenure at the Site is shown on Figure 1-3. Mining authorisations issued for the Mine relevant to the Site include Consolidated Coal Lease 767 (CCL767) and Authorisation 396 (A396). Exploration licence issued for the Mine relevant to the Site are Exploration Authorisation 248 (A248).

A mining lease (surface or subsurface) is not required under the *Mining Act 1992* for the discrete operation of the ventilation and mine access infrastructure (a personnel and materials shaft (and associated infrastructure)) proposed.

Underlying the northern portion of the Site exists a Petroleum Production Lease (PPL) issued to AGL Upstream Investments Pty Ltd[3] (AGL). The Camden Gas Project operates within this PPL. In February 2016, AGL announced[4] that the Camden Gas Project will cease production in 2023. There are no active gas wells on the Site.

1.4.5.3 Existing surface and underground mining infrastructure

There is no existing surface mining infrastructure on the Site. The Site is however within the approved Longwall Mine Domain of the Mine and is directly over the main underground roadway workings, known as Simpsons Mains. As such the location of the Site can provide direct access to the underground workings used to provide for the safe and efficient delivery of Mine Ventilation Air (MVA) and personnel to the mining environment.

1.4.5.4 Proximity to existing infrastructure

The Site is bound on the western and southern sides by Menangle Road (Figure 1-2). The Main Southern Rail Line and the Hume Motorway lie approximately 700 m and 900 m respectively to the east of the Site (Figure 1-1).

IMC anticipates that the majority of heavy vehicle movements will approach the Site from the south by exiting the Hume Highway at Picton Road, travelling along Picton Road to Menangle Road and then north to the Site. These roads are suitable for use by heavy vehicles.

The Site is also in close proximity to electricity, water and telecommunications infrastructure which will be augmented or extended to service the Project.

1.4.5.5 Proximity to primary agricultural production

The Project is unlikely to have a significant impact on agricultural resources. The Site comprises low capability land (land and soil capability [LSC] classes 5[5] and 6[6]) which is not currently being used for agriculture. The Site is not on or within two kilometres of any mapped potential biophysical strategic agricultural land (BSAL). The disturbance footprint is small (25.65 ha) and has been positioned to avoid potential environmental and community impacts. Further, the Project is not likely to impact any adjacent

3 https://www.resourcesandgeoscience.nsw.gov.au/__data/assets/image/0007/537514/161207PELSAPPSPGH.jpg

4 https://www.agl.com.au/about-agl/how-we-source-energy/camden-gas-project

5 LSC Class 5 land is defined as: Moderate–low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.

6 LSC Class 4 land is defined as: Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.

agricultural enterprises with the majority of the adjacent landholdings retaining few if any grazing stock. There are no intensive agricultural activities (chicken farms, feedlots, hatchery's etc.) in close proximity to the Site.

More detail regarding the agricultural potential of the Site is provided in Section 6.2.

1.4.5.6 Drinking water catchments

The Site is not located within WaterNSW 'Special Areas' drinking water catchments. Foot Onslow Creek on the eastern boundary of the Site reports to the Nepean River which does not supply drinking water to the local or broader community within the Sydney Basin.

1.4.6 Discussion of alternatives

A number of alternative ventilation infrastructure and mine access solutions have been investigated as part of the prefeasibility study (PFS) for the Project. The key alternatives considered by IMC included:

1. Smaller ventilation shafts
2. Alternative methods of shaft construction
3. Use of underground booster fans to maintain production
4. No additional ventilation infrastructure
5. Alternative sites for the location of the Project.

1.4.6.1 Ventilation shaft size

This Project proposes to construct VS7 to an approximate depth of 591 m with an approximate diameter of ~8.1 m (finished and lined internal diameter of ~7.5 m). Ventilation Shaft 8 is proposed to be constructed to an approximate depth of 560 m with an approximate diameter of ~6.1 m (finished and lined internal diameter of ~5.5 m). Section 3 of this report provides greater detail on the proposed ventilation shaft dimensions and construction methodology.

Construction of multiple significantly smaller diameter shafts were originally considered as a potential alternative to the Project, however given that smaller shafts would reduce the volume of MVA supplied to the mine and would require more ventilation shafts to be constructed to adequately supply Appin Area 7 this alternative was considered an unsuitable proposal. Further, the opportunity to co-locate mine access infrastructure within Ventilation Shaft 7 could not have been achieved with small diameter ventilation shafts.

1.4.6.2 Ventilation shaft construction method

Ventilation shafts can be constructed using various methods, several of which were considered as potential alternatives to the Project including:

- Raised boring
- Blind boring
- Conventional shaft sinking via controlled blasting (also known as blind sinking)
- Vertical tunnel boring machine.

Each method was considered, and blind boring and conventional shaft sinking were considered as feasible for the Project, and were subject to detailed investigations.

Conventional Shaft Sinking

Conventional shaft sinking is proposed as the shaft construction method. Section 3 provides a detailed description of the conventional shaft sinking methodology. In summary, controlled blasting is:

- Safe: with the right controls and processes in place, controlled blasting is safe in proximity to residences and infrastructure.
- Proven: controlled blasting is used widely across Australia and across the world. This method has been used in tunnelling projects in Sydney which are currently being constructed or recently constructed, in close proximity to public infrastructure and residences.
- Regulated: controlled blasting in NSW is strictly regulated by the NSW Environment Protection Agency (EPA), the Department and Safework NSW.
- Monitored: controlled blasting is carefully monitored to ensure levels remain within allowable limits, and is overseen by blast management specialists.

Using conventional shaft sinking with controlled blasting for the Project is less likely to result in delays to construction as blasting allows greater control over varied geotechnical conditions. The method reduces impacts on the community, given that the excavation is completed using short blasts as opposed to constant drilling. The detailed controlled blasting program will be developed by specialist contractors.

Blind boring

Blind boring is a vertical, rotary drilling technique that works (drills) from the surface down to the desired depth. It requires the construction of a large A-frame rig, from which the drilling assembly is suspended. The drilling assembly provides the vertical thrust to a hard rock cutter head unit equipped with disk type tools, similar to those found on tunnel boring machines.

Blind boring requires the shaft to be constantly filled with water during the drilling and lining process. The rock fragments disturbed and broken by the drilling assembly is 'flushed' from the shaft through controlled flow of water around the cutting head and piped to the surface where the sediment and rock laden water is treated in a series of surface water management and sedimentation ponds. Blind boring requires the management and handling of relatively large volumes of sediment and rock laden construction water in a series of surface water treatment ponds which have not been proposed in this Project. Further, blind boring requires a standing column of water to be present within the shaft during excavation, which presents additional safety and operational risks while the shaft is being excavated over existing headings.

The use of blind boring methods to achieve the depth and diameter proposed for VS7 and VS8 was considered to be unsuitable, given the technical limits of blind boring equipment.

1.4.6.3 Use of booster fans

Underground booster fans are installed to allow intake air to travel further in the Mine, however they can introduce additional safety risks when used in a sequence. Ventilation modelling established that as a minimum, five underground booster fans along with a significant amount of underground roadway 'brushing'[7] would be required to provide sufficient MVA at the future working areas of the Mine.

The installation of an underground booster fan, continuing to draw MVA from within the existing ventilation system, is not an adequate alternative to provide sufficient ventilation for future mining requirements. The installation of underground booster fan infrastructure can also generate unacceptable

7 Brushing refers to excavating the floor using a miner, which increases the height of the existing roadway.

regulatory, operational and safety risks. Further, the opportunity to co-locate mine access infrastructure on the Site would be lost.

1.4.6.4 No additional ventilation infrastructure

As outlined in Section 1.4.1, the EA explicitly contemplates the need to develop future mine ventilation and mine access facilities to maintain a safe working environment within the underground mine during its approved life. The ventilation assessment has established that the proposed infrastructure is required to fulfil these objectives, consistent with the EA. Given these considerations, and the assessment of available alternatives, a 'do nothing' approach, where the required infrastructure is not constructed, is not considered an acceptable alternative to the development of the Project.

1.4.6.5 Alternative sites for the project

IMC completed an options analysis for the potential location of the Project. That assessment included both a range of alternative Project locations and a range of alternative concept designs to facilitate those locations including inclined drifts (rather than vertical shafts) and multiple smaller shafts. A variety of location options were considered in this assessment, including consideration of properties not owned by IMC and properties within the wider approved Longwall Mining Area.

The assessment concluded that the proposed Site was the optimal location to develop the Project, when considering the alternative options against the key criteria given in Table 1-2.

Potential alternative locations for the Project are constrained by a number of factors including both underground and surface constraints.

Underground constraints

Underground constraints relate primarily to the underground environment and current and future mine geometry. Key underground constraints that dictate the potential location of any mine ventilation and access infrastructure include:

- Proximity to proposed current and future longwall mining areas
- Proximity to existing and planned ventilation roadways (main and development headings)
- Distance to other ventilation shafts and interaction with the existing mine ventilation system
- Geometry of underground workings
- Arrangement of fresh and return air roadways
- Proximity to underground services
- Resultant air velocities in underground workings.

As noted above, shafts cannot be located above an active or proposed longwall. The Project would be located over the Simpson Mains which support Appin Area 7 mining (see Figure 1-4). Locating the Site above the Simpson Mains has the additional benefit of avoiding the sterilisation of the coal reserve which may be an outcome of locating the Site elsewhere within the longwall mining domain but away from, or separately to, the Simpson Mains.

Surface constraints

Once the underground requirements and constraints have been identified, consideration must be given to the surface constraints which will dictate the precise location of the mine ventilation and access infrastructure.

Key surface constraints that dictate the potential location of any mine ventilation and access infrastructure include:

- Existing land use and ownership
- Proximity to aboveground services (roads, electricity, water supply etc.)
- Surrounding land use (including proximity to local residents)
- Site accessibility
- Public surface infrastructure
- Surface topography and slope (construction difficulty)
- Impacts to environment, community, heritage or cultural features.

The location of the preferred Site for the Project and the alternative locations that have been considered are discussed below.

1.4.6.6 Preferred project site

The range of underground and surface constraints considered by IMC in relation to the location of the preferred Site and the general arrangement of the Site infrastructure are described in Table 1-2 below.

Table 1-2: Preferred project Site justification

Consideration	Advantages	Challenges
Proximity to neighbours	The Site is located within a rural setting with few adjoining or nearby properties. The dwellings of the nearest neighbours will be 413 m from Ventilation Shaft 7. No other dwelling will be within 500 m of the proposed ventilation shaft locations, several neighbours will be closer to the Site where other construction and operational activities will occur. The existing residential dwelling on the Site is unoccupied and will remain unoccupied.	Approximately five residential properties will have direct or filtered views of the Site. Site design including bunding, vegetation screening, use of appropriate colour schemes and sensitive lighting design will minimise disturbance to neighbours and the broader community of Menangle.
Existing land use	The existing land use of the Site is described in Section 1.4.5.1. The Project will not significantly alter the land use of surrounding properties.	-
Surface environment	The Site is situated on undulating land with the hill slope falling from the west at Menangle Road to the east with the lowest point being at Foot Onslow Creek. The general Site arrangement has been designed such that the majority of the operational footprint will be located on relatively flat ground between the break of slope and Foot Onslow Creek. Disturbance to steep hills and hilltops will be generally avoided by the Project. The Site is also predominantly cleared (historical) and devoid of high value native vegetation. A very small area of degraded native vegetation will be removed by the Project and IMC proposes to offset those impacts in accordance with the NSW Biodiversity Offsets Scheme. The Site is adjacent to Foot Onslow Creek, a degraded, ephemeral rural waterway. The Project will protect Foot Onslow Creek by observing appropriate setbacks from the riparian and instream	Overland flows will be managed through the design and construction of clean water diversion mechanisms that will direct the water from upslope of the Site, around the Site and either into the sediment pond or to natural flow paths and overland discharge points allowing natural water flow to report to Foot Onslow Creek.

Consideration	Advantages	Challenges
	environments and through appropriate surface water management.	
Heritage and Archaeological Features	The Site is not located on land that has historic heritage value (noting that significant heritage values occur in the local area).	An Aboriginal Cultural Heritage Assessment (ACHA) has been undertaken for the Project. It is noted that several artefacts were located during the ACHA and test excavation. The indicative operational footprint has been designed to avoid, as far as practical, areas of archaeological deposit.
Underground mining environment	The Site is located above Simpson Mains and in close proximity to the development of Appin Area 7 and future mining domains. Locating the Site above the Simpson Mains avoids the sterilisation of the coal reserve within the Mining Lease.	The Wandinong Fault occurs beneath the ground surface, including at the seam level. The l fault has influenced the location of the Simpsons Mains, and therefore the location of the shafts on the property. Additional technical challenges would be encountered if the mains and shafts were placed further towards the east i.e. closer to the fault.
Proximity to existing services	The Site is in close proximity to existing or planned electricity, water and communications infrastructure.	-
Public surface infrastructure	The Project proposes to improve the existing access from Menangle Road to the Site through the development of a suitable site entrance with appropriate approach and departure lane designs (subject to agreement with Wollondilly Shire Council). The potential future Outer Sydney Orbital 1 (OSO1) transport corridor may traverse the Site if the OSO1 is constructed. The indicative Site layout is mindful of the potential OSO1 corridor and has been set out to avoid co-locating essential Project infrastructure within the potential OSO1 corridor, where possible.	IMC will continue to engage with both the Wollondilly Shire Council and Transport for NSW to accommodate any concerns raised in relation to the maintenance of safe and serviceable passage along Menangle Road and the coexistence of the potential OSO1 corridor.
Site accessibility	As noted above, the Site is directly adjacent to Menangle Road and the Project proposes to improve the Site access subject to consultation with Wollondilly Shire Council.	-
Site ownership	The Site is owed by IMC.	-

SOUTH32

FIGURE 1-4

Underground constraints associated with the Site location

Appin Mine Ventilation and Access Project

2 STRATEGIC CONTEXT

2.1 Site location and character

2.1.1 Location

The Site comprises the majority of Lot 20A DP 4450[8], as well as a portion of the Menangle Road reserve. The Site is approximately 35 km northwest of Wollongong, 8 km northwest of Appin and 1.3 km southwest of Menangle. The Site is within the Bulli Seam Operations Project Longwall Mining Area and the South Campbelltown Mine Subsidence District in the Southern Coalfield of NSW (Figure 1-3).

The western extent of the Site is bounded by Menangle Road and the eastern side by Foot Onslow Creek. The Hume Motorway is approximately 670 m east of the Site (Figure 1-2).

There are no protected areas, such as reserves or national parks, adjacent to the Site.

2.1.2 Zoning

The Site is located within the Wollondilly Local Government Area (LGA) and is zoned as RU2 Rural Landscape under Part 2 of the Wollondilly Local Environmental Plan 2011 (LEP). Permissibility of the Project within this zone is discussed in Section 4.4.2.1. Consideration of the Project against the objectives of this zone is outlined in Section 4.6.4.

2.1.3 Access and road network

Access to the Site is via a gated, gravel driveway and track from Menangle Road, approximately 600 m north of its intersection with Finns Road. Menangle Road consists of two 3.5 m wide lanes on a single undivided carriageway.

IMC has identified that the existing access into the Site is unsuitable for long-term use by both heavy and light vehicles. IMC propose to construct an upgraded intersection on Menangle Road to ensure safe entry and exit from the Site throughout both the construction and operational phases of the Project. Further detail on the proposed upgraded intersection is provided in Section 3.5.

2.1.4 Sensitive receivers

A number of rural residential properties are in the general location of the Site and may be potentially impacted by the Project. These rural residential properties (refer to Figure 2-3) are considered sensitive receivers for the purposes of assessing the potential impacts of the Project on noise and air quality in the local area.

8 Note: Lot20A DP4450 comprises a 25.65 ha property. The Project Area, as shown in Figure 1-2 does not take in the entire property but excludes several areas within the lot boundary from disturbance during both the construction and operational phase of the Project.

2.2 Biophysical factors

2.2.1 Climate

The Camden Airport Automatic Weather Station (AWS) is the nearest weather station to the Site with publicly available long term climate statistics. It is approximately 13 km north-west of the site. Average climate data recorded at the AWS is summarised in Table 2-1.

Table 2-1 Summary of climate data recorded from Camden Airport AWS

Parameter	Period	Measurement	Month
Temperature (˚C)			
Mean maximum	Annual	23.8	
	Highest monthly	29.8	January
	Lowest monthly	17.4	July
Mean minimum	Annual	10.3	
	Highest monthly	17.0	February
	Lowest monthly	3	July
Mean rainfall (mm)	Annual	789.8	
	Highest monthly	101.3	February
	Lowest monthly	35.8	July
Mean 9am wind speed (km/h)	Annual	7.0	
	Highest monthly	9.3	October
	Lowest monthly	5.4	May

The data shows that temperatures range throughout the year from a mean (average) maximum of 29.8°C in January to an average minimum of 3°C in July. The area experiences moderate rainfall, with an average annual rainfall of approximately 789.8 mm. Rainfall is generally evenly distributed throughout the year, with the highest mean rainfall in autumn and summer and the lowest in late winter/early spring.

Annual winds are predominately from the south-west, south and south-east.

Further discussion on climate data relevant to the site, and its use in the noise and air quality assessments, is provided in sections 6.3 and 6.4 respectively.

2.2.2 Air quality

The main sources of air pollutants in the area are emissions from agriculture; other anthropogenic activities such as wood heaters and motor vehicle/train exhaust; and long-range drift of particles into the region.

Particulate matter, or dust, can be defined by the following sub-categories:

- Total Suspended Particles (TSP), which comprises the total mass of all particles suspended in the air.
- Particulate matter with an aerodynamic diameter of 10 µm or less (PM_{10}).
- Particulate matter with an aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$).

- Deposited Dust (DD), which is dust that has settled from the atmosphere onto surfaces.

Data from the nearest DPIE air quality monitors (Camden Airport and Campbelltown West) for the above pollutants were used to characterise the background levels for the site. Data from 2018 are summarised in Table 2-2 as this was the year modelled for the air quality impact assessment (Appendix C).

Nitrous oxides were also assessed and background levels are included in Table 2.2.

Table 2-2 Summary of background air quality levels

Pollutant	Period	Unit	Regional average
$PM_{2.5}$	24-hr average	-	Daily varying
	Annual average	$\mu g/m^3$	7.7
PM_{10}	24-hr average	-	Daily varying
	Annual average	$\mu g/m^3$	17.7
TSP	Annual average	$\mu g/m^3$	44.2
NO_2	1-hr maximum	$\mu g/m^3$	68.6
	Annual average	$\mu g/m^3$	15.0

Note: deposited dust not listed as no regional measurements are available.

There were three existing exceedances of the daily PM_{10} criterion at Campbelltown West and six existing exceedances of the daily PM_{10} criterion at Camden Airport. When combined into a regional average, there are four existing exceedances of the daily PM_{10} criterion in the background dataset.

There were two existing exceedances of the daily $PM_{2.5}$ criterion at Campbelltown West and Camden Airport, although the PM_{10} and $PM_{2.5}$ exceedances occur on different days. When combined into a regional average, there are three existing exceedances of the daily $PM_{2.5}$ criterion in the background dataset.

2.2.3 Topography, geology and soils

The Site is on the southern margins of the Cumberland Plain, which is characterised by low lying, gently undulating plains and hills. The Site is also on the peripheries of the Woronora Plateau, as defined by the gorges and sandstone plateaus found to the east and the incised Nepean Gorge.

The Blacktown Soil Landscape makes up 10% of the Site and is characterised by gently undulating hills, with relief up to 30 m and slopes of usually less than 5% gradient (Figure 2-1). Crests of hills and ridges are broad and rounded, with convex upper slopes. Lower slopes of this soil landscape are generally concave with broad drainages lines and valley flows.

The underlying geology within the Blacktown Soil Landscape is Wianamatta Shale, with overlying, generally shallow podzolic loam soils and clay. The Blacktown soils have formed in situ through weathering of the shale geology.

The Theresa Park Soil Landscape comprises approximately 90% of the Site. This soil landscape is formed from fluvial processes associated with the Foot Onslow Creek and the Nepean River. It is characterised by its undulating slopes, floodplains and terraces with local relief up to 60 m and slope gradients <5%, except on edges of terraces where gradients exceed 10%.

Soils in this landscape are generally podzolic on the terraces with Prairie Soils in floodplains. The soil profile is relatively deep (>250 cm) consisting of sandy loams overlying sandy clay in landforms associated with floodplains and terrace edges. This profile is moderately deep (>150 cm) towards

drainage lines and consisting predominately of sandy clay deposits. The Theresa Park soils are often subject to post depositional movement as a result of seasonal waterlogging/ flooding as well as soil erosion.

Landforms in the Site are flat, lower slope and upper slopes and crests, which are summarised below.

Flat

The northern part of the Site near Foot Onslow Creek is in the flat landform. This unit is covered with pastoral grasses with regrowth vegetation and weeds along the watercourse, and is in the Theresa Park Soil Landscape and is intersected by low drainage lines associated with Foot Onslow Creek.

Lower slopes

The lower slope landform comprises gentle hill slopes leading into cleared pasture and ultimately draining into Foot Onslow Creek. This landform has been extensively, historically, cleared of native vegetation and is part of the Theresa Park Soil Landscape.

Upper slopes and crests

The upper slope and crest landform comprises partially, historically, cleared, heavily grassed steep slopes with some remnant Cumberland Plain Woodland vegetation. This unit occurs around the southern and western end of the Site and is in both the Blacktown and Theresa Park soil landscapes. It is particularly susceptible to erosion and soil slumping due to vegetation clearance and soil exposure.

Surface water resources

Foot Onslow Creek is the primary water body near the Site and meanders in and out of the eastern boundary, flowing in a northerly direction (Figure 2-1). Foot Onslow Creek is a 3rd order (Strahler) stream. This creek contained stagnant pools of water when ecologists were on the Site in August 2020 and January 2021 and was not flowing.

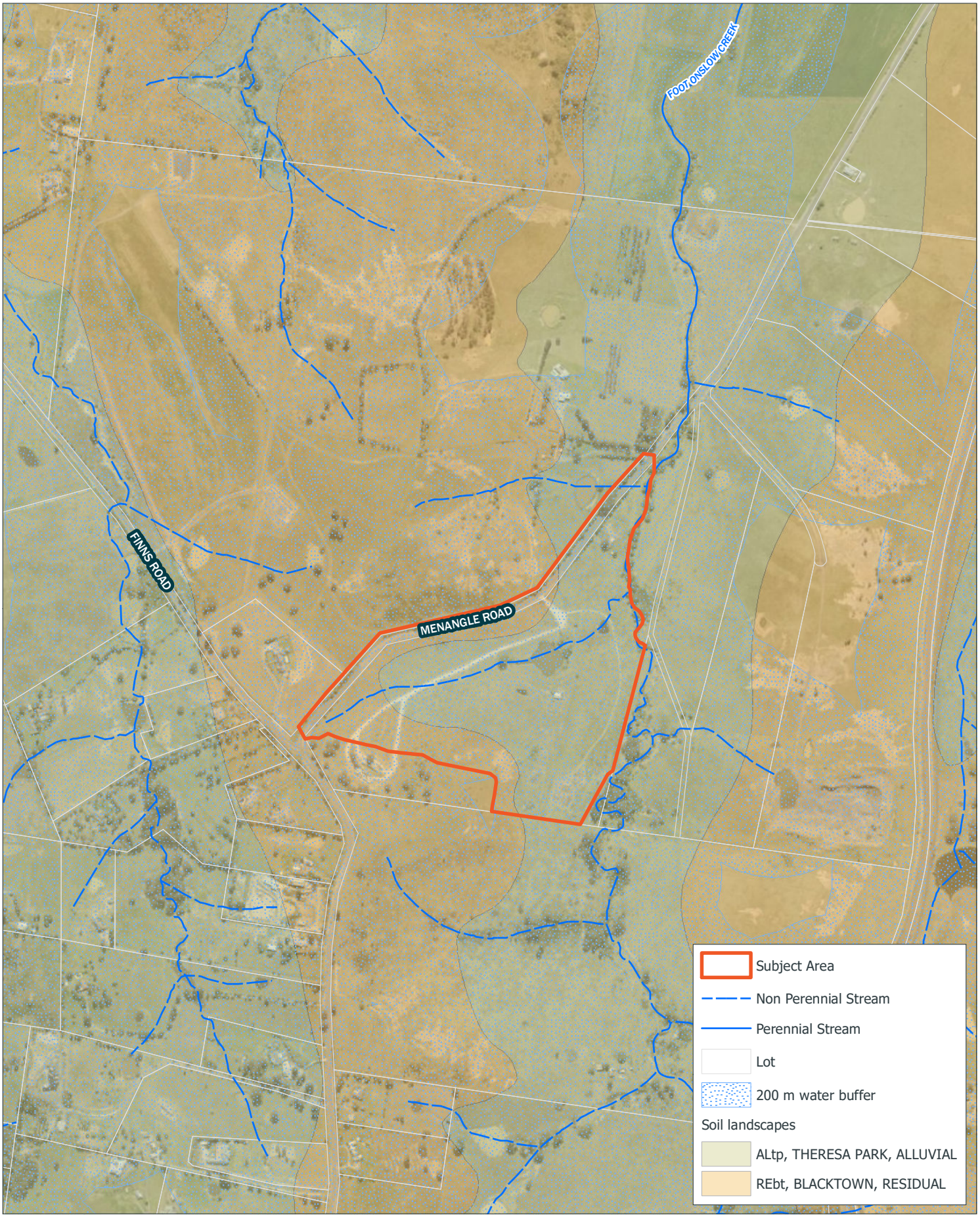
There are two unnamed ephemeral drainage lines on the Site which flow into Foot Onslow Creek. One follows the contour of the Site from the south-western corner through a series of dams before meeting Foot Onslow Creek, while the other flows under Menangle Road in the west and flows into Foot Onslow Creek in the north of the Site. Both of these drainage lines are 1st order (Strahler) streams. Neither contained any water when ecologists were on site.

2.2.4 Hydrogeology

The geology of the Site comprises Wianamatta shales underlain by Hawkesbury Sandstones. Vertical groundwater flow continuity in the Wianamatta Group is retarded by the Ashfield Shale. Whilst of low permeability, the Hawkesbury Sandstone has a relatively higher permeability compared to other units and is capable of higher groundwater yields.

The general groundwater regime for the Mine comprises:

- Perched groundwater system – perched water tables are hydraulically disconnected from the regional aquifer and are associated with swamps, elevated sandstone and shales.
- Shallow groundwater system – associated with the Hawkesbury Sandstone.
- Deep groundwater system – associated with the sandstones of the Narrabeen Group and coal seam aquifers.



SOUTH32

FIGURE 2-1

Soil landscapes and hydrology in the local area

Appin Mine Ventilation and Access Project

N

0 100 200

m

GDA 1994 MGA Zone 56

Recharge to the groundwater system in the BSO area is from rainfall and from lateral groundwater flow. Although groundwater levels are sustained by rainfall infiltration, they are controlled by ground surface topography, geology and surface water levels. A local groundwater mound develops beneath hills with ultimate discharge to incised creeks and water bodies, and loss by evapotranspiration through vegetation where the watertable is within a few metres of ground surface within upland swamps and outcropping sandstone/shales.

No upland swamps are located above the longwall mining area or within 600m of the edge of any secondary extraction (BSO Project Preferred Project Report, 2010).

The only recognised economic aquifer in the area is the Hawkesbury Sandstone. The Project lies within the Hawkesbury Sandstone – South-East, Hawkesbury Sandstone - Confined and the Wianamatta Shale – Sydney groundwater flow systems.

The water quality in the Hawkesbury Sandstone is generally good beneath the Woronora Plateau and the Illawarra Plateau, but it deteriorates rapidly towards the northern limits of the Southern Coalfield. In the vicinity of the Mine, the salinity is generally in the range 1,000 to 3,000 milligrams per litre (mg/L).

2.2.5 Biodiversity

Potential impacts of the Project on biodiversity were assessed in the biodiversity development assessment report (BDAR) in Appendix E and summarised in Section 6.8. The landscape was characterised and the databases in Section 2.2.5.1 were searched to characterise the existing environment and develop a flora and fauna survey strategy.

2.2.5.1 Flora and threatened ecological communities

The following databases and reports were searched and the results are summarised below:

- NSW BioNet Atlas Database for spatial records of threatened flora listed under the BC Act within a 10 km radius of the Site.
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Protected Matters Search Tool) for flora and ecological communities identified as MNES within a 10 km radius of the Site.
- Preliminary run of the Biodiversity Assessment Method (BAM-C tool) (using benchmark condition for previously mapped plant community types (PCTs)) to identify candidate flora and fauna species credit species and predicted ecosystem credit species known or predicated to occur in the subregion.
- Existing vegetation mapping was examined prior to the field survey to determine the vegetation communities likely to be present on the Site.
- An unpublished flora and fauna constraints assessment prepared for the Site by Niche in 2020.
- An unpublished flora and fauna assessment for the Appin Area STIS Exploration prepared by Niche in 2020.

The Site is in the Sydney bioregion and Cumberland sub region. There is minimal native vegetation on the Site. A 1,500 m buffer was searched around the Site for the purpose of vegetation mapping. Non-woody and woody vegetation comprised less than 5% of the buffer area.

Survey validated site vegetation mapping was updated to reflect survey outcomes (Figure 2-2). The quality and type of PCTs present varied markedly from the existing mapping. Vegetation occurring across the Site aligned to two PCTs summarised in Table 2-3.

Table 2-3 Site PCTs

PCT ID	PCT name	Zone (condition)	BC/EPBC acts status	Site total (ha)	BAM plots completed
835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Forest (low)	Endangered (BC Act) Critically Endangered (EPBC Act)	0.44	1
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Grassland (low)	Critically Endangered (BC Act) Critically Endangered (EPBC Act)[2]	18.21	4
		Shrubland (low)		0.1	1
		Woodland (low)[1]		0.06	1

Notes:

[1] Given this zone consists of an isolated tree which is not representative of the PCT in the locality, a BAM plot was conducted within a larger stand of woodland beyond the limit of the construction footprint, and adjacent to the subject land to the south. This approach was adopted to ensure a representative sample of the vegetation on the broader property outside of the Subject Area could be sampled, as per the requirements of BAM 2020, and extrapolated to the Site vegetation.

[2] Noting that Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion conforms to Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest under the EPBC Act, it is noted here (as in Section 6.8) that the condition of this vegetation community on the Site was such that it does not constitute the community as described under the EPBC Act.

The flora species in Table 2-4 had medium to high potential to occur on the Site. The need for further assessment of each species is summarised in the table.

Table 2-4 Candidate flora species and habitat suitability assessment

Scientific name	Common name	Associated with site PCT?	Site habitat suitability	Further assessment required?
Acacia bynoeana	Bynoe's Wattle	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Acacia pubescens	Downy Wattle	Yes. PCT 849	Given its ability to colonise disturbed sites the subject land is considered to contain potential habitat for this plant.	Targeted survey required
Caladenia tessellata	Thick Lip Spider Orchid	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Callistemon linearifolius	Netted Bottle Brush	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required
Cynanchum elegans	White-flowered Wax Plant	Yes. PCT 835, PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Dillwynia tenuifolia	-	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Dillwynia tenuifolia - endangered population	Dillwynia tenuifolia, Kemps Creek	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Eucalyptus benthamii	Camden White Gum	Yes. PCT 835, PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required

Scientific name	Common name	Associated with site PCT?	Site habitat suitability	Further assessment required?
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Yes. PCT 849	The Site is outside of this species' known distribution. In addition, the Site is too degraded to support suitable habitat for this plant.	Not required
Hibbertia sp. Bankstown	Hibbertia sp. Bankstown	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required
Marsdenia viridiflora subsp. viridiflora - endangered population	Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGAs	Yes. PCT 835, PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Persicaria elatior	Tall Knotweed	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required
Persoonia bargoensis	Bargo Geebung	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Persoonia hirsuta	Hairy Geebung	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required
Pilularia novae-hollandiae	Austral Pillwort	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required
Pimelea curviflora var. curviflora		Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Pimelea spicata	Spiked Rice-flower	Yes. PCT 849	There is potential habitat in PCT849_shrubland.	Targeted survey required
Pomaderris brunnea	Brown Pomaderris	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required
Pterostylis saxicola	Sydney Plains Greenhood	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Pultenaea pedunculata	Matted Bush-pea	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Thesium australe	Austral Toadflax	Yes. PCT 849	The Site is too degraded to support suitable habitat for this plant.	Not required
Wahlenbergia multicaulis - endangered population	Tadgell's Bluebell - Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield LGAs	Yes. PCT 835	The Site is too degraded to support suitable habitat for this plant.	Not required

Thirteen 'high threat weed' species were observed, with Fireweed (*Senecio madagascariensis*), Saffron Thistle (*Carthamus lanatus*) and Paspalum (*Paspalum dilatatum*) the most common. Four of the species found on the Site are priority weeds for the Greater Sydney region: African Boxthorn (*Lycium*

ferocissimum), African Olive (*Olea europaea subsp. cuspidata*), Fireweed and Lantana (*Lantana camara*).

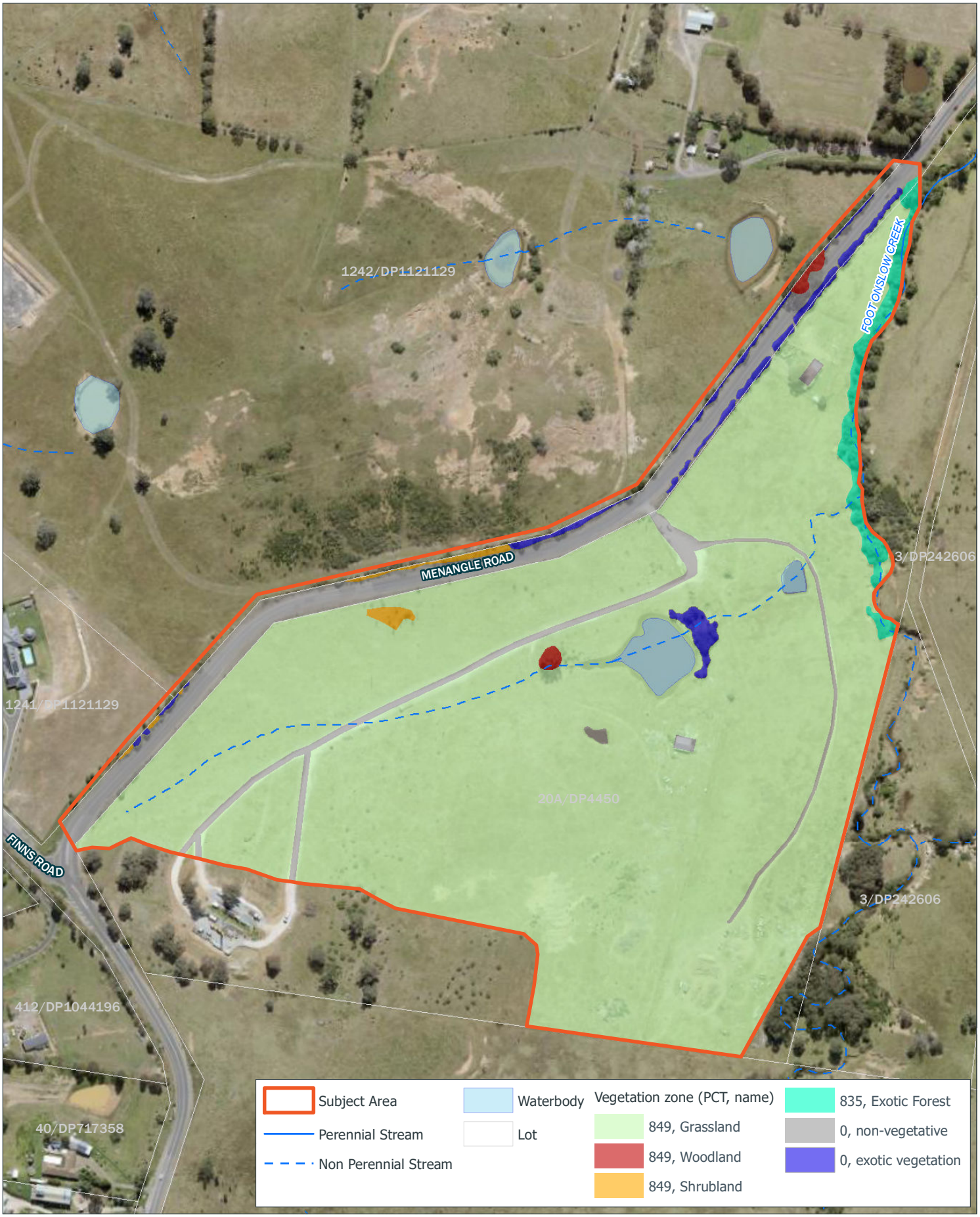
2.2.5.2 Fauna

The fauna species in Table 2-5 had medium to high potential to occur on the Site. The need for further assessment of each species is summarised in the table.

Table 2-5 Candidate fauna species and habitat suitability assessment

Common name	Scientific name	Associated with PCT present on Site?	Site habitat suitability	Further assessment required?
Birds				
Eastern Osprey	*Pandion cristatus*	Yes. PCT 835	No stick nests on site.	Not required
Regent Honeyeater	*Anthochaera phrygia*	Yes. PCT 835/ PCT 849	Site not in mapped area.	Not required
Swift Parrot	*Lathamus discolor*	Yes. PCT 835	Site not in mapped area.	Not required
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Yes. PCT 835/PCT 849	No stick nests on site.	Not required
Mammals				
Grey-headed Flying-fox	*Pteropus poliocephalus*	Yes. PCT 835/PCT 849	No breeding camps on site. Limited foraging habitat available.	Not required
Koala	*Phascolarctos cinereus*	Yes. PCT 835/PCT 849	Site habitat is not important to the Koala. The Site is isolated and distant from known populations of Koala, and mostly cleared, with one isolated mature Forest Red Gum proposed to be removed.	Not required
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	Yes. PCT 835/PCT 849	No suitable breeding habitat on site. Limited foraging habitat available.	Not required
Little Bent-winged Bat	*Miniopterus australis*	Yes. PCT 835/PCT 849	No suitable breeding habitat on site. Limited foraging habitat available.	Not required
Southern Myotis	*Myotis macropus*	Yes. PCT 835/PCT 849	No hollow-bearing trees on site.	Not required
Squirrel Glider	*Petaurus norfolcensis*	Yes. PCT 835/PCT 849	No hollow-bearing trees on site.	Not required
Amphibians				
Green and Golden Bell Frog	*Litoria aurea*	Yes. PCT 835/PCT 849	The Site is too degraded to support suitable habitat for this frog. In addition, no records occur	Not required

Common name	Scientific name	Associated with PCT present on Site?	Site habitat suitability	Further assessment required?
			within 10 km of the site.	
Invertebrates				
Cumberland Plain Land Snail	*Meridolum corneovirens*	Yes. PCT 835/PCT 849	The Site is too degraded to support suitable habitat for this snail. In addition no suitable or significant cover of course woody debris is present.	Not required
Dural Land Snail	*Pommerhelix duralensis*	Yes. PCT 849	No suitable habitat on site. Occurrence in Wollondilly Shire is unlikely.	Not required



SOUTH32

FIGURE 2-2

Vegetation zones

Appin Mine Ventilation and Access Project

N

0 50 100

m

GDA 1994 MGA Zone 56

2.2.6 Acoustic environment

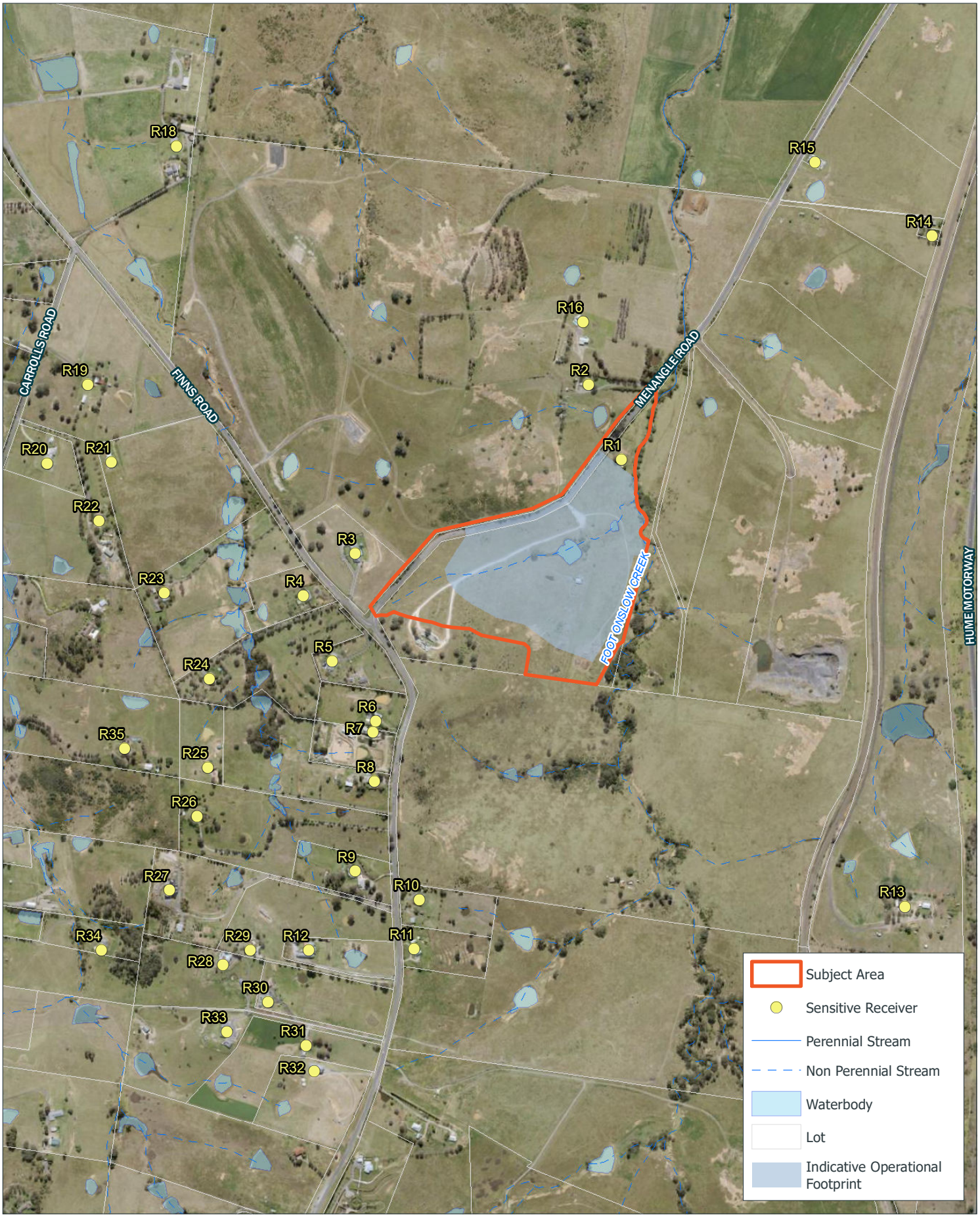
Unattended noise monitoring was conducted in October and November 2020 to quantify the existing ambient noise levels at sensitive receivers (Table 2-6). The noise monitoring locations were chosen to be representative of the nearest and most potentially affected sensitive receivers near the Site (Figure 2-3).

From the background noise levels (L_{A90}) the rating background levels (RBLs) were determined in accordance with the *Noise Policy for Industry* (NPfI).

Some level of insect noise was noted at some locations during site visits and through aural analysis of the logger data. Accordingly, the minimum RBLs for the day, evening and night time assessment periods, which have been confirmed as not being affected by insect noise via aural analysis, will be used to represent existing background noise levels at sensitive receivers considered in this assessment. These RBLs are highlighted in Table 2-6 via bold text.

Table 2-6 Noise monitoring results

Monitoring location	Monitoring period	Time of day a	Noise level (dBA)	
			RBL	$L_{Aeq,period}$
M1 — 345 Menangle Road, Menangle	19/10/20 – 03/11/20	Day	43	62
		Evening	41	62
		Night	39	56
	11/11/20 – 23/11/20	Day	40	64
		Evening	**39**	**59**
		Night	**34**	**55**
M2 15 Finns Road, Menangle	19/10/20 – 03/11/20	Day	41	65
		Evening	42	62
		Night	39	58
	11/11/20 – 23/11/20	Day	**38**	**63**
		Evening	43	60
		Night	39	59
M3 – 436 Menangle Road, Menangle	19/10/20 – 03/11/20	Day	42	64
		Evening	41	60
		Night	40	60
	11/11/20 – 23/11/20	Day	40	64
		Evening	42	59
		Night	40	55
M4 – 775 Moreton Park Road, Menangle	19/10/20 – 03/11/20	Day	48	65
		Evening	44	62
		Night	39	58



SOUTH32

FIGURE 2-3

Sensitive receiver locations

Appin Mine Ventilation and Access Project

N

0 150 300

m

GDA 1994 MGA Zone 56

2.3 Socio-economic factors

2.3.1 Community profile

Socio-economic data from the Australian Bureau of Statistics (ABS) and DPIE sources were used to develop a profile of the local area. Data from the most recent Census (2016) was used.

2.3.1.1 Socio-economic indicators

In the 2016 Census, there were 48,519 people in the Wollondilly LGA. Of these people, 49.9% were male and 50.1% were female.

As shown in Table 2-7, residents in the area had higher median weekly household incomes compared to the NSW average, which is typical of major city populations. Residents in the area had smaller median monthly mortgage repayments ($1,750 compared to $1,986), which is not consistent with other parts of NSW.

Table 2-7 Summary table of socio-economic indicators for the Wollondilly LGA and NSW

Socio-economic indicator	Wollondilly LGA	NSW
Male	49.9 %	49.3 %
Female	50.1 %	50.7 %
Median age	37	38
Aboriginal and/or Torres Strait Islander people	3.2 %	2.9 %
Average children per family (families with children)	2	1.9
Average people per household	3	2.6
Median weekly household income	$1,871	$1,486
Median monthly mortgage repayments	$1,750	$1,986
Median weekly rent	$365	$380
Average motor vehicles per dwelling	2.4	1.7

2.3.1.2 Population

Of the families in the Wollondilly LGA (Table 2-8), 52.9% were couple families with children, 33.7% were couple families without children and 12.6% were one parent families. The largest difference in family composition, compared to NSW, was in the category of couple families with children (45.7%).

Table 2-8 Comparison table of family composition statistics.

Family composition	Wollondilly LGA	%	NSW	%
Couple family without children	4,424	33.7	709,524	36.6
Couple family with children	6,960	52.9	887,358	45.7
One parent family	1,654	12.6	310,906	16.0
Other family	109	0.8	32,438	1.7

2.3.1.3 Education and employment

A comparison of census educational data showed that the Wollondilly LGA had a considerably lower proportion of people (aged 15 and over) with a bachelor degree compared to NSW (Table 2-9). However, compared to NSW, the Wollondilly LGA had a higher proportion of people with other forms of tertiary education (certificate levels III and IV; advanced diploma and diploma) (Table 2-9).

Table 2-9 Comparison table of education statistics.

Level of highest educational attainment (people aged 15 years and over)	Wollondilly LGA (number of people)	%	New South Wales (number of people)	%
Bachelor Degree level and above	4,768	12.6	1,424,716	23.4
Advanced Diploma and Diploma level	3,485	9.2	543,142	8.9
Certificate level IV	1,431	3.8	167,947	2.8
Certificate level III	7,711	20.4	730,498	12.0
Year 12	4,678	12.4	930,654	15.3
Year 11	1,388	3.7	203,574	3.3
Year 10	6,088	16.1	702,178	11.5
Certificate level II	38	0.1	4,849	0.1
Certificate level I	7	0.0	625	0.0
Year 9 or below	3,260	8.6	513,209	8.4
No educational attainment	98	0.3	54,870	0.9
Not stated	3,634	9.6	627,465	10.3

The most common occupational category in the Wollondilly LGA was technicians and trades workers (18.3%), which was higher than NSW (12.7%). There was a lower proportion of professional category workers in the Wollondilly LGA (14.9%) compared to NSW (23.6%), which generally reflects the differences in educational attainment level.

Table 2-10 Comparison table of occupational statistics.

Occupation Employed people aged 15 years and over	Wollondilly (A)	%	New South Wales	%
Technicians and Trades Workers	4,392	18.3	429,239	12.7
Professionals	3,592	14.9	798,126	23.6
Clerical and Administrative Workers	3,538	14.7	467,977	13.8
Managers	3,043	12.7	456,084	13.5
Community and Personal Service Workers	2,450	10.2	350,261	10.4
Labourers	2,266	9.4	297,887	8.8

Occupation Employed people aged 15 years and over	Wollondilly (A)	%	New South Wales	%
Machinery Operators and Drivers	2,263	9.4	206,839	6.1
Sales Workers	2,057	8.6	311,414	9.2

2.3.1.4 Income

Median weekly income in the Wollondilly LGA is generally higher for all three categories compared to NSW (Table 2-11).

Table 2-11 Comparison table of median weekly income.

Median weekly incomes People aged 15 years and over	Wollondilly (A)	New South Wales
Personal	$738	$664
Family	$2,032	$1,780
Household	$1,871	$1,486

2.3.1.5 Housing

A comparison of housing occupancy data showed that the Wollondilly LGA had a higher rate of private dwelling occupancy compared to broader NSW (Table 2-12).

Wollondilly LGA had a higher average number of people per household (3) compared to NSW (2.6).

Table 2-12 Comparison of private dwelling occupancy

Factor	Wollondilly LGA	%	New South Wales	%
Occupied private dwellings	15,099	94.1	2,604,320	90.1
Unoccupied private dwellings	949	5.9	284,741	9.9
Average people per household	3	-	2.6	-

2.3.1.6 Social disadvantage

The Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD) identifies and ranks areas in terms of people's access to material and social resources, including their ability to participate in society. A higher score on the index means a lower level of disadvantage. A lower score on the index means a higher level of advantage. The Wollondilly LGA scored 1,030, which places it in the fifth quintile (most advantaged) of LGAs.

2.3.1.7 Social infrastructure

Social infrastructure is facilities and services that enhance the social capacity of communities and may include infrastructure related to health, housing, youth, aged care, leisure, community safety facilities and road safety.

There are 13 General Practices in Wollondilly LGA (Wollondilly Health Alliance 2020). The number of General Practitioners (GP) in the Wollondilly LGA has increased from 22 GPs in 2014 (Manning and Greig 2014) to 33 GPs in 2020 (WHA 2020). The Wollondilly LGA has a GP ratio of 1 GP:1,846 people, compared to a national rate of 1 GP:894 people, which is considerably lower than the national rate (WHA 2020).

There are no public or private hospitals in the Wollondilly LGA; residents rely on those in adjoining local government areas, particularly Bowral and District Hospital, Camden Hospital and Campbelltown Hospital, as well as the specialist services provided at Liverpool Hospital and other metropolitan hospitals (WHA 2020). There are also private hospitals in Campbelltown and Bowral.

Other types of social infrastructure in the Wollondilly LGA include:

- Three residential aged care facilities - Durham Green Manor (Menangle); RSL LifeCare Taara Gardens (Thirlmere); RSL LifeCare Queen Victoria Park (Picton).
- Seventeen schools (including primary and secondary schools) (NSW Government 2021).
- One library - Wollondilly library (Picton).

2.4 Cultural factors

2.4.1 Aboriginal heritage

Biosis Research assessed the Aboriginal heritage potential and significance of the Site for the EA in 2009. The EA identified one isolated artefact site (Aboriginal Heritage Information Management System (AHIMS) ID #52-2-3687) on the Site (Figure 2-4). The assessment also predicted there could be subsurface Aboriginal objects in the eastern extent of the Site along Foot Onslow Creek.

A search of AHIMS on 13 August 2020 found the Aboriginal objects in Table 2-13 within 4 km of the Site. As described above, ID #52-2-3687 is in the Site.

Table 2-13 AHIMS results

AHIMS ID	Site name	Site features
52-2-3190	WG1	Isolated Find
52-2-3191	WG6, Wandinong	Isolated Find
52-2-3192	WG5, Wandinong	Open camp site
52-2-3053	WG4 Wandingong (unavailable)	Isolated Find
52-2-3194	Wandinong 5	Isolated Find
52-2-3056	WG4 AFT	Open camp site
52-2-3193	Wandinong 6	Open camp site
52-2-3687	Bulli Site 7	Isolated Find
52-2-3688	Bulli Site 8	Open camp site
52-2-4507	WG7	Isolated Find

AHIMS ID	Site name	Site features
52-2-4508	WG8	Isolated Find

In addition to AHIMS, the World Heritage Database, the Commonwealth Heritage List, National Heritage List, State Heritage Register, State Heritage Inventory and the Wollondilly LEP were searched on 30 October 2020. The searches did not identify any additional Aboriginal items on the Site to those previously discovered.

A cultural heritage survey and archaeological test excavation of the Site for this Project identified that Bulli Site 7 (AHIMS ID#52-2-3687) is a low-density open camp site that extends to the south of the originally recorded location and across to the eastern bank of Foot Onslow Creek. Part of Bulli Site 7 (AHIMS ID#52-2-3687) falls within the Project footprint and will be directly impacted as a result of the works program (Section 6.9 of this report describes the outcomes of the Aboriginal cultural heritage assessment for this Project).

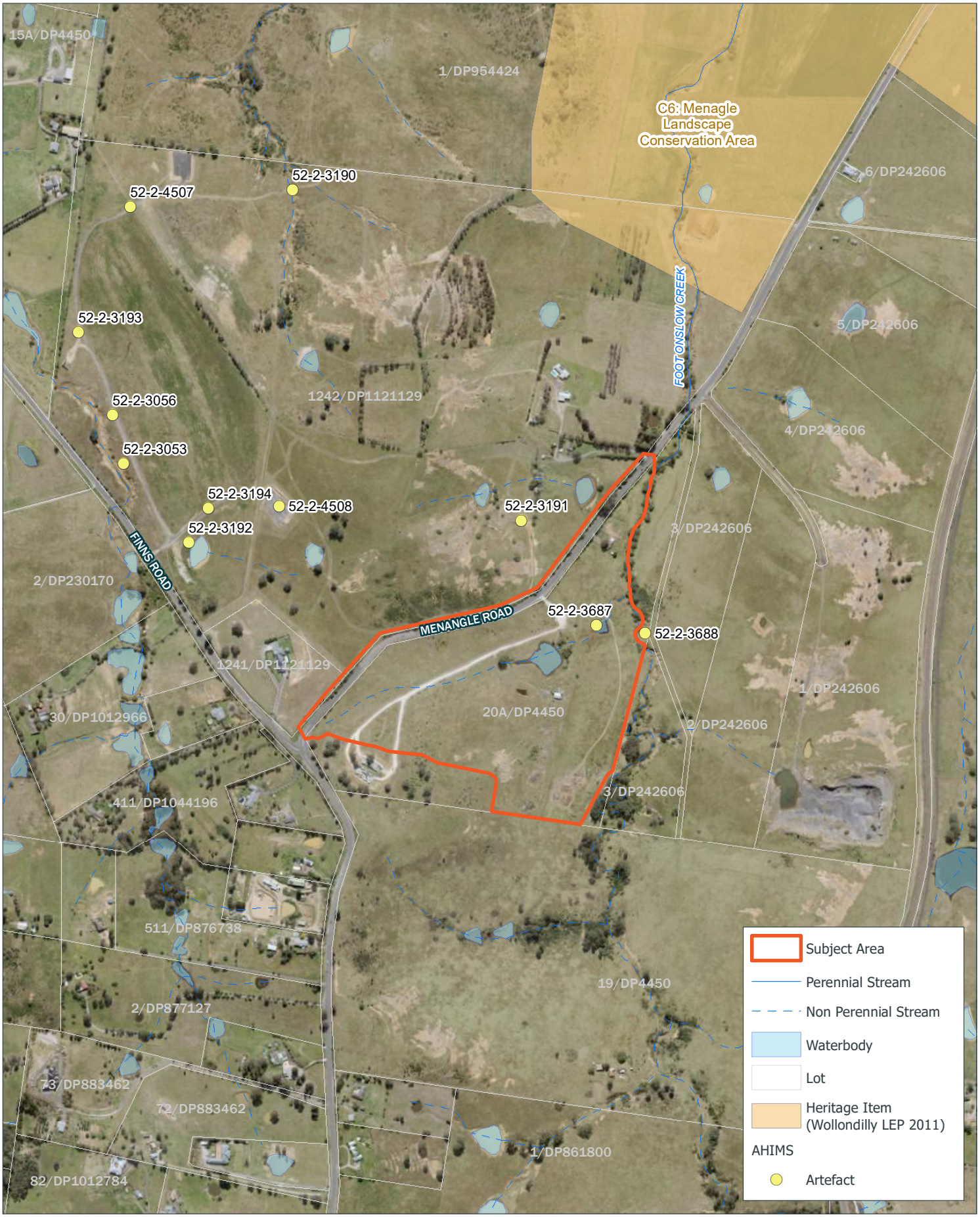
2.4.2 Historic heritage

The World Heritage Database, the Commonwealth Heritage List, National Heritage List, State Heritage Register, State Heritage Inventory and the Wollondilly LEP were searched on 30 October 2020 for heritage items in and near the Site (Table 2-14, Figure 2-4). The searches did not identify any heritage items in the Site. Section 6.10 of this report describes the outcomes of the historic heritage assessment for this Project

Table 2-14 Listed heritage items in and near the Site

Heritage register	Items in the Site	Items in wider area
World Heritage Database	None	None
Commonwealth Heritage List	None	None
National Heritage List	None	None
State Heritage Register	None	• Upper Nepean Scheme – Upper Canal (SHL ID # 4580004)
Schedule 5 of LEP	None	• Menangle Landscape Conservation Area (ID# C6) • Slab Hut (ID#I79) • Old Razorback Road (ID# A1) • Mount Hercules Homestead (ID #A12) • Upper Nepean Scheme – Upper Canal (ID #I16) • Cawdor Dairy (ID #I85)

The Site is part of the regional cultural landscape associated with early 19th Century settlement and the development of large rural estates such as South Camden. It has remained mostly unchanged from first European settlement and farming of the area, with little to no development.



Drawn by: LL File: T:\spatial\projects\as5900\as5948_Appin_MineVentilation_NSW\Maps\reportMod_Application\5948_Figure_2-4_Heritage.mxd Last updated: 24-Jun-21 12:27:44 PM

SOUTH32

FIGURE 2-4

Aboriginal and historic heritage

Appin Mine Ventilation and Access Project

N

0 100 200

m

GDA 1994 MGA Zone 56

3 DESCRIPTION OF MODIFICATIONS

3.1 Project general arrangement

The Project proposes the development of mine ventilation and mine access infrastructure to support the ongoing operations of the Mine.

The Project involves the construction of a downcast ventilation shaft (VS7), an upcast ventilation shaft (VS8) and the installation of associated extraction fans and ancillary surface infrastructure to ensure a reliable and adequate supply of MVA to personnel working underground. Approval for the modification is sought to enable operation of the proposed ventilation shafts on or before 2025 to facilitate uninterrupted mining schedules.

The Project also involves the development of mine access infrastructure (head frame and winder) within VS7 and the construction of mine access associated facilities at the Site. The establishment of mine access at the Site would provide access for personnel and consumable materials via a winder and cage. These facilities would increase the safety and efficiency for the transporting of personnel and consumable materials underground.

The Project would include the following activities (in no particular order of timing):

- Installation of temporary and permanent site access arrangements, including upgrade and improvement to the Menangle Road intersection, internal roadways, associated hardstand and car parking areas.
- Site preparation, including clearing of vegetation, demolition of existing structures and earthworks.
- Installation of appropriate security (e.g. fencing) to prevent unauthorised access to the Site.
- Installation of a water supply.
- Installation of a power supply and transmission as well as associated electrical switch rooms, transformers and ancillary infrastructure.
- Shaft material/spoil handling and emplacement activities and associated revegetation and landscaping activities to minimise visual impact of the Site.
- Installation of personnel amenities such as bathhouses (e.g. changerooms), administration facilities and mines rescue facilities.
- Installation of diesel storage tanks and associated pipelines.
- Progressive development of sumps, pumps, pipelines, water storages and other water management infrastructure including fire protection and sewerage treatment facilities.
- Installation of covered storage areas.
- Installation of communications equipment including fibre optic cable and wireless infrastructure.
- Installation of service boreholes to provide underground services.
- Controlled release of excess water and/or re-use of water where practicable.
- Progressive rehabilitation of disturbed areas post construction.
- Installation of erosion and sediment control infrastructure, where required; and
- Other associated infrastructure, plant, equipment and activities.

An indicative site general arrangement showing the proposed Project is provided on Figure 1-2.

Table 3-1 provides a summary of the key characteristics of the Project.

Table 3-1 Summary of key Project characteristics

Project Element	Project
Summary	Development of supplementary ventilation and mine infrastructure on a property in Menangle, NSW to support the Mine. The Project involves construction and operation of: • One downcast ventilation shaft (VS7); • One upcast ventilation shaft (VS8); • Associated extraction fans, evases and ancillary surface infrastructure to VS8; • Mine access facilities (e.g. head frame and winder within VS7, and associated surface infrastructure); and • Associated infrastructure and provision of services.
Setting	The proposed location for the Project is on land owned by IMC (Lot 20A DP 4450). The township of Menangle is located approximately 1.3 km northeast of the Site. The western side of the Site is bounded by Menangle Road and the eastern by Foot Onslow Creek. Works associated with the Project include the construction of site access infrastructure, connection to services etc. will occur outside the Site and within the Menangle Road corridor (subject to relevant approvals and permits from Wollondilly Shire Council). The vegetation on the Site has been historically cleared, and comprises mainly exotic pasture, but contains remnants of native vegetation. Existing land uses in the area include stock grazing, rural residential, residential township, mixed agriculture, and small business.
Project Hours of Operation	Construction of the shafts would occur 24 hours per day, seven days per week, while the remainder of construction activities associated with the facilities (e.g. installation of surface infrastructure) would generally be limited to daytime construction hours (7 am to 6 pm Monday to Saturday)*. The Site would continue to operate 24 hours per day, seven days per week in accordance with the operation of the Mine under the Mine Approval.
Site Access	Access to the Site is from Menangle Road, north of its intersection with Finns Road. The Project would include an upgrade of the Site access point at its intersection with Menangle Road.
Site establishment	Site establishment works would include: • Preparation of the construction footprint which could include clearing up to 18.78 ha of highly modified native vegetation. • Demolition of existing structures, buildings and redundant services (including powerlines and poles) within the Site boundary. • Civil works, such as construction of hardstands, access roads, bunds, required road upgrades, temporary utility connections. • Establishment of amenities, site offices and storage areas, spoil management and dewatering pads. • Establishment of the ventilation shaft construction pads and commencement of the pre-sink ahead of main shaft construction. • Construction water management including erosion and sediment controls, construction of sumps and/or dams for surface water management.
Provision of services to Site	Works proposed to supply services to the Site would include: • Construction power is anticipated to be supplied via an existing 11 kV powerline along Menangle Road. Augmentation of this line will be required to connect power to the Site, subject to Endeavour (EE) approval. • Operational power supply will be required from an external 66 kV powerline (augmentation and construction of this EE asset is outside the scope of the Project). The supply will be connected to the Site via a new 66 kV/11 kV electrical switchyard and substation as part of the Project. • Reticulation of power to auxiliary power infrastructure associated with ventilation fans, winder, transformers and site infrastructure. • Connection to new Sydney Water potable water supply and reticulation of water supply onsite. • Water supplied via water trucks during construction phase.
Ventilation Shaft Construction	The shafts would be constructed using conventional shaft sinking methodology which employs a combination of mechanical excavation and controlled blasting. The increments and rate of excavation is dependent on rock strata properties and stability and the expertise of the contractor. The pre-sink stage involves the construction, or pre-sinking of the shaft to required depth, before the main shaft construction can commence. The pre-sink would involve using either mechanical excavation methods or controlled blasting to excavate the shaft for the initial 30 - 50 m, depending on geological conditions.

Project Element	Project
	The main shaft excavation will be undertaken using small, controlled blasts to break rock incrementally from the final pre-sink depth to the final depth of approximately 591 m for VS7 and 560 m for VS8. The approximate internal diameter for VS7 is ~8.1 m (internal diameter once lined ~7.5 m) and VS8 is ~6.1 m (internal diameter once lined ~5.5 m). The shaft would be lined with an in-situ lining system, nominally of 300 mm thick reinforced concrete (as appropriate). Spoil from the excavation is proposed to be reused as engineered fill on the Site. Machinery would move the spoil to designated emplacement areas. The spoil will be revegetated and used for future rehabilitation of the Site upon decommissioning.
Construction of infrastructure associated with VS8	Construction of infrastructure associated with VS8 would include: • Three electric powered ventilation fans and associated motor control centres (MCC). • Emergency diesel powered generators. • Fan housing and ducts.
Construction of infrastructure associated with VS7, including Mine Access infrastructure	Construction of infrastructure associated with VS7 would include: • Downcast evase (flared ventilation air diffusers). • Personnel and materials winder and headframe. • Service bore holes for passage of electrical and communications cabling. • In-shaft services. • Amenities, including storage areas, bathhouses, offices and storage areas.
Management of Dangerous Goods	The storage of explosives would be conducted in accordance with the NSW *Explosives Act 2003* and the Explosives Regulation 2013. Explosives will be stored at either the explosives contractor's or IMC's existing facilities, where requirements of *Australian Standard 2187.1-1998: Explosives – Storage, transport and use, Part 1: storage (AS 2187.1-1998)* and *Australian Standard 2187.2-2006: Explosives – Storage and use, Part 2: Use of explosives (AS 2187.2-2006),* are complied with. During detailed design, the location and specifications of the explosives storage area will be determined. Dangerous goods required for the Project would be transported and stored in accordance with updated Australian Dangerous Goods Code and associated updates to the NSW dangerous goods transport Act and regulations (*Dangerous Goods (Road and Rail Transport) Act 2008*.
Rehabilitation	Complete site rehabilitation is anticipated to take approximately 5 years following the decommissioning of the Project (anticipated to occur between 2041 and 2046 based on current approvals). The emplaced shaft spoil would be used to fill the shafts. IMC will progressively rehabilitate the Project disturbance area.
Employment	The construction workforce will peak at approximately 74 workers being on site at the same time. Once operational, approximately 308 personnel will access the Site on the busiest day (a maintenance weekday which occurs 1 day per week). A significant proportion of the operational workforce will consist of existing employees/contractors who currently access the mine via a different site, however a small number of personnel will be required to operate the Site.

*Some road works potentially requiring traffic management measures, such as cutting in the access road to Menangle Road, line marking the intersection and installation of asphaltic concrete, may be undertaken outside these hours (subject to Council's approval) to take advantage of reduced traffic volumes.

3.2 Comparison of modifications with approved project

This section provides a comparison summary of the Project and the existing and approved Mine (Table 3-2).

Table 3-2 Comparison of approved and proposed aspects of the Mine.

Project component	Summary of Existing/Approved Mine	Summary of the Modification
Mining method	Conventional longwall mining techniques	No change
ROM coal production	Up to 10.5 million tonnes of ROM coal from the Mine in a financial year	No change
Mine life	31 December 2041	No change

Project component	Summary of Existing/Approved Mine	Summary of the Modification
Project Area	All land to which the Project application applies, including the longwall mining domains and the surface facilities sites, as listed in Appendix 1 and shown in Appendix 4 of the Mine Approval	This modification application will incorporate the Site into the Project Area
ROM coal handling and transport	Up to 9.3 million tonnes of product coal from the Mine in a financial year. ROM coal delivered to WCCPP directly via conveyor from Appin North or via truck from Appin East	No change
Ventilation shaft sites	Appin East No.1 and No. 2 ventilation shaft site Appin East No. 3 ventilation shaft site Appin West No. 6 ventilation shaft site	Proposed new VS7 and VS8 shaft site (the Site is yet to be named in accordance with IMC site naming conventions)
Personnel access to underground workings	Appin West (Access Shaft) Appin East (Access Drift) Appin North (Access Drift)	Addition of mine access infrastructure at the Site (within VS7) (Access Shaft)
Hours of operation	24 hours per day, 7 days a week	No change
Electricity supply	Douglas Park substation site	Construction power is anticipated to be supplied via an existing 11 Kilovolt (kV) powerline along Menangle Road. Augmentation of this line will be required to connect power to the Site. Operational power supply will be required from an external 66 kV powerline (location and specifications will be confirmed during the detailed design phase of the Project). This will be connected to the Site via a new 66 kV/11 kV electrical switchyard and substation as part of the Project. Backup diesel power generation would be included in both construction and operational phases of the Project
Water supply	A potable water supply is purchased from Sydney Water.	Construction phase: Water will be delivered to the Site via water trucks. Operational phase: A permanent water supply is proposed to be established during the construction phase. An application has been made to Sydney Water for the extension of the Menangle water supply network, following required water mains network upgrades. Connection to this supply would be undertaken as part of the Project.
Employment	At full development the Project would employ in the order of 1,170 people.	The construction workforce will peak at ~76 workers on site at the same time. Once operational, ~308 personnel will access the Site. A significant proportion of the operational workforce will consist of existing employees/contractors who currently access the Mine via a different site

3.3 Comparison of Mine Approval statement of commitments and the Project

This section provides a comparison of the statement of commitments in the Mine Approval that are represented in the Mine Approval as Table SOC-3, and the Project.

Table SOC-3 refers to the statement of commitments relevant to the construction and operation of the Mine that are primarily completed from the surface. These commitments are relevant to any such subsequent projects, and as such are relevant to this Project.

Table 3-3 Mine Approval Statement of Commitments compared with the Project

Environment or Community Aspect	Commitments	Report section
Working hours and noise	• Construction hours will minimise the impact on the community where practical.	3.6
	• Activities will be undertaken as per the hours in the relevant project assessment (except emergencies), with a preference to undertake audible activities during day- light hours where possible	
	• Works will be designed with consideration to minimising impacts on the community.	
Public Consultation	• Illawarra Coal will continue to liaise with and provide information regarding surface activities via the Illawarra Coal Community Consultative Committee, or any other such community group that is deemed appropriate.	5.4
	• Illawarra Coal will continue to operate the 24-hour telephone line to provide an alternative method for public information.	
Noise	• Noise will be mitigated as per the relevant project assessment and/or management plans.	6.3.3
	• Project layout will give consideration to the mitigation of noise impacts as practicable.	3.7.3.7; 3.7.3.8
	• Noise performance will be incorporated into contractor performance requirements for surface projects in noise sensitive areas.	6.3.3
	• Illawarra Coal will undertake noise monitoring as per the relevant project assessment document or management plan.	6.3.3
	• Consultation will be undertaken with receivers subject to significant noise impacts from projects. Consultation will address any additional noise mitigation measures proposed.	5.4
Air quality and Greenhouse Gas	• Construction activities will be managed to minimise the generation of dust.	3.7.2.4; 3.7.3.6; 6.4.3; 6.5.5
	• Suitable measures, such as site layout design, dust suppression, stockpile management, appropriate road surfaces and rehabilitation of disturbed areas will applied to projects to minimise dust generation.	
	• Plant and operating equipment will be maintained appropriately to minimise fuel consumption and associated emissions.	
	• Electrical power consumption will be minimised during the operational phases of the Project where at all practicable.	
Water resources	• Stormwater runoff, soil and erosion control measures will be managed in accordance with guidelines detailed in the publication Soils and Construction, Volume 1, 4th Edition and Controlled Activities on Waterfront Land. Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land, 2012, where relevant. Water controls will be employed as per the applicable project assessment or management plan documentation.	3.7.2.5; 3.7.3.6
	• Service supply boreholes will be cased and grouted to address any known regionally significant aquifers.	3.7.6
	• Drilling process waste water will be managed as per the relevant project assessment.	3.7.3.6
	• Water required for projects will be sourced from appropriate sources, such as: o Recycling captured water where possible, o Water Licence in accordance with the requirements of the Water Sharing Plan 2010 (DECCW 2009) and the Water Management Act 2000; o An authorised Sydney Water supply; or o Appin Mine Filtration Plant.	4.5.1.1
Biodiversity	• Biodiversity will be managed as per the relevant project assessment and/or management plans.	6.8.3
	• Projects will be designed and constructed to minimise the amount of clearing of native vegetation and mature trees where practicable.	1.4.5.1
	• A two-stage clearing process will be undertaken for the felling of any hollow bearing trees.	N/A

Environment or Community Aspect	Commitments	Report section
	• Where native vegetation has been cleared, rehabilitation activities will include representative native seed where at all practicable.	3.7.2.1; 3.7.3.7
Heritage (Aboriginal)	• Heritage will be managed as per the relevant project assessment and/or management plans.	6.9.3
	• Where identified sites are located adjacent to proposed activities a barrier will be installed to prevent interaction.	
	• Where unexpected sites are identified during construction activities, works in vicinity of the Site shall stop and a qualified archaeologist engaged.	
Heritage (Non-Aboriginal)	• Illawarra Coal will manage and conserve the Mountbatten Group in a manner consistent with its heritage values and in accordance with the Conservation Management Plan.	N/A
	• Illawarra Coal will ensure the sympathetic placement of new buildings and structures on properties subject to heritage infrastructure (such as the Morton Park: Mountbatten Group).	N/A
	• Vegetation clearing for project activities will be minimised and should not include historic plantings	N/A
	• Any relics discovered during project activities will be assessed and documented by an appropriately qualified cultural heritage expert. Where it is relevant to do so, relics will be retrieved and managed in accordance with any recommendations made by the cultural heritage expert.	6.10.3
	• Where surface projects interact with heritage items owned by other parties (e.g. the Water NSW Upper Canal), the infrastructure owner will be consulted and relevant approvals obtained prior to works.	N/A
Traffic	• Traffic will be incorporated into environmental assessment documentation. Where relevant, a Traffic Management Plan will be developed and implemented to minimise impacts and ensure continued road safety.	6.6.3
	• Illawarra Coal will ensure any measures within a Traffic Management Plan will be implemented.	6.6.3
	• For large projects Illawarra Coal will advise local residents of the commencement of works and any related potential disruptions to local traffic.	5.4
Risks and Hazards	• Illawarra Coal will ensure contractors abide by Company HSEC policies and management systems.	6.11.3
	• Illawarra Coal will ensure contractors undertake the appropriate investigations with regards to underground service locations prior to the commencement of excavation works.	6.15.1
	• Diesel storages and pipelines shall be constructed and maintained in accordance with the relevant standards.	3.7.7.3, 3.7.10.1
	• Appropriate risk management equipment (such as firefighting facilities and spill kits) will be present and maintained, with staff trained in their use.	3.7.10.1
	• Safety fencing will be installed around excavations and high risk areas of project sites to mitigate risks associated with unauthorised access. Vehicular accesses will be gated and locked when not in use.	3.1; 3.7.2
Waste	• To minimise waste generation material generated from construction works will be utilised on site or as capping material at West Cliff emplacement area, where suitable.	3.7.3.7
	• Waste will be appropriately captured and transferred to suitable re-use, recycling or disposal locations.	3.7.9; 6.12.3
Visual Amenity	• Clearing of native vegetation and mature trees will be minimised at projects where possible.	1.4.5
	• For long term infrastructure Illawarra Coal will look to avoid the use of highly reflective materials or materials not commensurate with the surrounds, as is practicable.	6.13.4
	• Screening trees will be included in revegetation works, as and where appropriate for long term projects.	6.13.4
	• Permanent lighting will be installed as per the relevant standards but will consider visual amenity and light spill.	6.13.5.1
	• Temporary lighting will be arranged to minimise light spillage as much as possible without compromising safety or operations.	6.13.5.1
Rehabilitation	• Illawarra Coal will undertake rehabilitation of any areas disturbed by the Project to ensure the environment is returned as close as possible to pre-project condition and/or to meet landowner specific requirements.	3.7.12

Environment or Community Aspect	Commitments	Report section
	• De-commissioning of boreholes and shafts will be undertaken in accordance with the requirements of the relevant government department/s.	3.7.12

3.4 Proposed modifications to conditions of approval

In addition to the changes associated with the Project, a number of minor administrative changes outlined in Table 3-4 are required to the Mine Approval (as modified).

Table 3-4 Summary of proposed administrative changes to project approval.

Current Condition	Proposed Modification (changes shown in strikethrough and red text)	Reason for Modification
Schedule 3, Condition 5(k), Extraction Plans 5. The Proponent shall prepare and implement an Extraction Plan for first and second workings within each longwall mining domain to the satisfaction of the Secretary. Each extraction plan must: (k) include a Heritage Management Plan, which has been prepared in consultation with OEH and relevant stakeholders for both Aboriginal and historic heritage, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage items, and which: • includes additional investigations (such as surveys and current register searches) for Aboriginal heritage items (including previously known sites) and historic heritage items, sufficient to identify the significance (including "special significance") of all sites which may be impacted by subsidence and to identify any actions required to ensure that the performance measures in Table 1 are met; and • is prepared in accordance with the relevant requirements for preparation of the Heritage Management Plan required under condition 23 of Schedule 4;	**Schedule 3, Condition 5(k), Extraction Plans** 5. The Proponent shall prepare and implement an Extraction Plan for first and second workings within each longwall mining domain to the satisfaction of the Secretary. Each extraction plan must: (k) include a Heritage Management Plan, which has been prepared in consultation with OEH and relevant stakeholders for both Aboriginal and historic heritage, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage items, and which: • includes additional investigations (such as surveys and current register searches) for Aboriginal heritage items (including previously known sites) and historic heritage items, sufficient to identify the significance (including "special significance") of all sites which may be impacted by subsidence and to identify any actions required to ensure that the performance measures in Table 1 are met; and • is prepared in accordance with the relevant requirements for preparation of the Heritage Management Plan required under condition ~~23~~24 of Schedule 4;	The proposed condition reflects that the Heritage Management Plan is required by Condition 24 of Schedule 4, rather than Condition 23.
Schedule 4, Condition 10, Air Quality Acquisition Criteria 10. If the particulate matter emissions generated by the project exceed the criteria in Tables 7, 8 and 9 at any residence on privately-owned land or on more than 25 percent of any privately owned land, then upon receiving a written request for acquisition from the landowner the Proponent shall acquire the	**Schedule 4, Condition 10, Air Quality Acquisition Criteria** 10. If the particulate matter emissions generated by the project exceed the criteria in Tables 7, 8 and 9 at any residence on privately-owned land or on more than 25 percent of any privately owned land, then upon receiving a written request for acquisition from the landowner the Proponent shall	The condition contains a reference to *Condition 6 , Schedule 5,* which does not exist. The procedures for land acquisition are within *Conditions 4-5, Schedule 5*. This minor error was raised with DPIE in a letter dated 16 September 2019. Concurrence from DPIE was received in a letter dated 25 September 2019. The condition is further updated to clarify that *Conditions 4-5, Schedule 5* relate to a landowner with

Current Condition	Proposed Modification (changes shown in strikethrough and red text)	Reason for Modification
land in accordance with the procedures in Conditions 5 - 6 of Schedule 5.	acquire the land in accordance with the procedures in Conditions ~~5 - 6~~ 2-5 of Schedule 5.	acquisition rights. The independent review processes outlined in *Conditions 2-3, Schedule 5* is relevant to confirm the property owners acquisition rights, prior to enacting the land acquisition procedures in Schedule 5. We note particularly Condition 3, Schedule 5 is relevant: "If the independent review determines that any relevant acquisition criteria in schedule 4 are being exceeded and that the project is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent shall acquire all or part of the landowner's land in accordance with the procedures in Conditions 4-5 below."
Schedule 4, Condition 15, Surface Water Discharges 15. The Proponent shall ensure that all surface water discharges from the site (including from the Brennans Creek Dam) comply with the discharge limits (both volume and quality) set for the project in any EPL.	**Schedule 4, Condition 15, Surface Water Discharges** ~~15. The Proponent shall ensure that all surface water discharges from the site (including from the Brennans Creek Dam) comply with the discharge limits (both volume and quality) set for the project in any EPL.~~	It is proposed that Condition 15 is removed. This condition is made redundant by the conditions of the EPL, which require compliance with the surface water discharge limits.

Current Condition	Proposed Modification (changes shown in strikethrough and red text)	Reason for Modification
Schedule 6, Condition 1, Environmental Management Strategy 1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must: (a) be submitted to the Secretary for approval by 30 September 2012; (b) provide the strategic framework for environmental management of the project; (c) identify the statutory approvals that apply to the project; (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project; (e) describe the procedures that would be implemented to: • keep the local community and relevant agencies informed about the operation and environmental performance of the project; • receive, handle, respond to, and record complaints; • resolve any disputes that may arise during the course of the project; • respond to any non-compliance; • respond to emergencies; and (f) include: • copies of any strategies, plans and programs approved under the conditions of this approval; and • a clear plan depicting all the monitoring required to be carried out under the conditions of this approval.	**Schedule 6, Condition 1, Environmental Management Strategy** 1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. This strategy must: (a) be submitted to the Secretary for approval by 30 September 2012; (b) provide the strategic framework for environmental management of the project; (c) identify the statutory approvals that apply to the project; (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project; (e) describe the procedures that would be implemented to: • keep the local community and relevant agencies informed about the operation and environmental performance of the project; • receive, handle, respond to, and record complaints; • resolve any disputes that may arise during the course of the project; • respond to any non-compliance; • respond to emergencies; and (f) include: • ~~copies of any strategies, plans and programs approved under the conditions of this approval; and~~ • a clear plan depicting all the monitoring required to be carried out under the conditions of this approval.	The proposed condition reflects that, in accordance with Schedule 6, Condition 11, all strategies, plans and programs required under the conditions of this approval are generally available on the company website. To also include copies of these documents within the EMS document makes the EMS overly large and impractical. This modification was recommended in the Independent Environmental Audit (December 2019): "Suggest request removal or reword of condition 6.1 (f) dot point 1."
Appendix 4, Key Surface Facilities Sites		The Stage 4 Emplacement footprint in Figure 2- 2, Appendix 4 of the Project Approval depicts a larger footprint than what was approved in the Preferred Project Report (PPR). Under Condition 3 of Schedule 2, the conditions of the Project Approval prevail to the extent of any inconsistency between the PPR and the Project Approval. IMC propose that Figure 1 from the PPR Supplementary Information is added to Appendix 4 of the Project Approval, to more accurately depict the footprint of the Stage 4 Coal Wash Emplacement.

Current Condition	Proposed Modification (changes shown in strikethrough and red text)	Reason for Modification
		Figure 2-2 should be retained, as a depiction of the surface facilities at Appin North (West Cliff).

3.5 Anticipated project schedule

The Project will comprise multiple stages of construction and operation, however this section of the report outlines the five main phases of the Project:

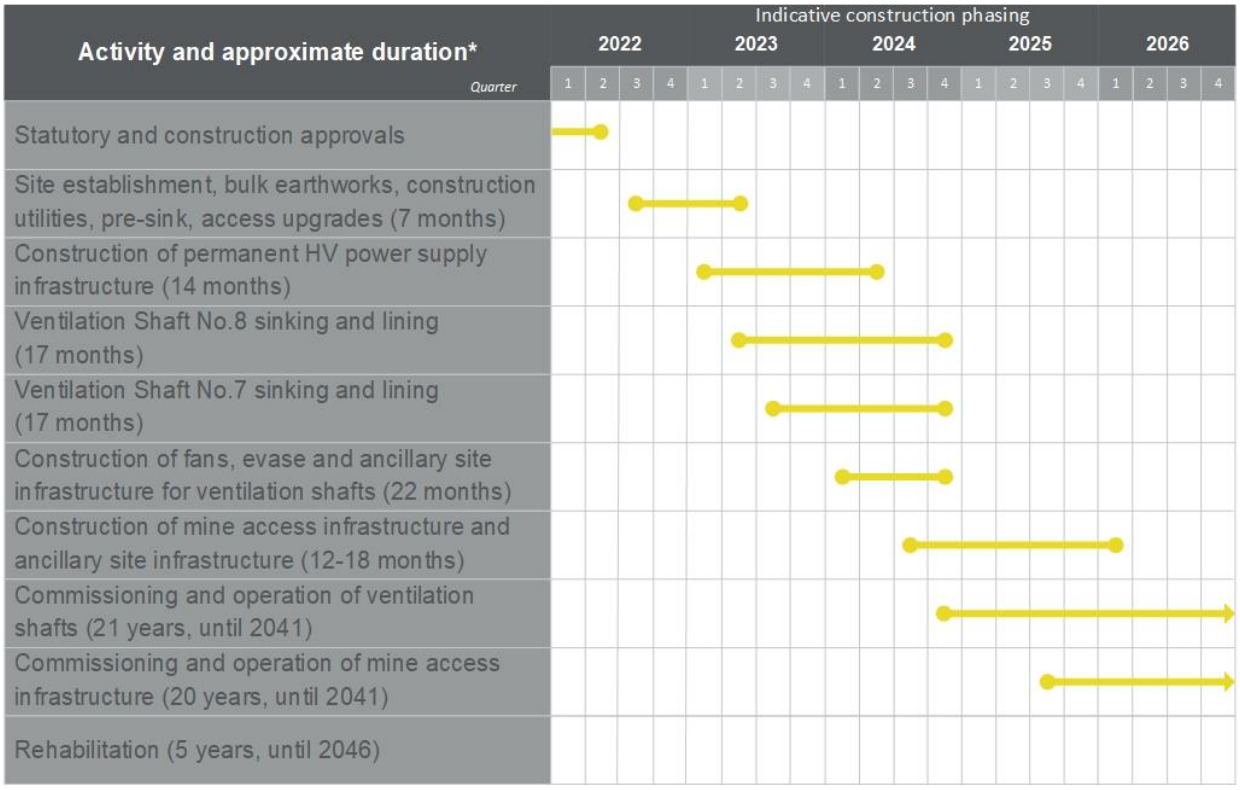
- Site Establishment phase.
- Construction phase: Ventilation Shaft 8.
- Construction phase: Ventilation Shaft 7.
- Construction phase: mine access infrastructure.
- Operational phase.

An indicative Project schedule is provided in Table 3-5, including a more detailed breakdown of the tasks required in the construction phases of the Project, along with the anticipated timeframes for the operational phase. Once operational, the infrastructure would be expected to be utilised for as long as the Mine is operational. The finish dates provided are based on current approvals for the Mine. Some construction and operational phase activities will run concurrently.

Construction of the ventilation shafts is critical to the ongoing safe and efficient operation of the Mine, and as such, will take priority for the construction phases. Construction of the downcast shaft will commence first and will take priority during the construction phases.

Once the shaft sinking is complete and the ventilation infrastructure is installed, each shaft will commence commissioning and operation immediately.

Table 3-5 Indicative Project schedule



* These timeframes are indicative. Construction of mine access infrastructure will be influenced by scheduling and timing of longwall operations over the life of the BSO Project and will be developed in parallel with the requirements of the ongoing mining operations. The shaft sinking schedule is subject to specialised shaft sinking equipment and expertise being available at the time of construction.

3.5.1 Construction phases

The construction phases include the installation of infrastructure and equipment required for the operation of ventilation shafts and mine access facilities.

Figure 3-1 to Figure 3-5Figure 3-4 shows a series of indicative site layouts during the construction phase.

3.5.2 Operational phase

The operational phase includes the commissioning and operation of the Site as a ventilation and mine access facility. The operational phase for the ventilation shafts and auxiliary infrastructure will commence ahead of the operational phase for the mine access components.

There is the possibility that, as mining progresses, the ventilation requirements of the Mine may change. Depending on ventilation requirements and location of the longwall operations over the life of the Project, ventilation shafts and access points may switch from upcast to downcast ventilation shafts or be upgraded to higher air flow rates. Approval of upgrades/changes to ventilation shafts described above is being sought as part of the Project, which is consistent with the Mine Approval for all existing ventilation shafts. Section 2.5.6 of the EA states:

'Depending on ventilation requirements and location of the longwall operations over the life of the Project, the existing ventilation shafts and access points may also switch from upcast to downcast ventilation shafts or be upgraded to higher air flow rates. Approval of upgrades/changes to existing ventilation shafts described above is being sought as part of the Project.'

The site disturbance activities of the operational phase are expected to be significantly lower than those associated with the construction phase.

Figure 1-2 shows the general arrangement for the Site. Figure 3-16 shows an artist's impression of the Site during the operational phase.

3.6 Hours of construction and operation

This section provides a breakdown of the anticipated times of activities associated with the Project. Detail of the Project sequencing is provided in Section 3.5.

Proposed construction and operational hours for the Project are shown in Table 3-6. These hours have been developed based on a balanced consideration of reducing the overall length of the construction program and the need to minimise noise and traffic related impacts, consistent with the commitments within the Mine approval. Construction activities required for the Project would be managed in four broad categories:

- Surface construction activities, including site establishment and construction of permanent surface infrastructure and services. These activities would be carried out during daytime construction hours.
- Minor activities that would not result in noise levels at receivers above acceptable levels or that are inaudible at residential premises would be carried out at any time.
- Shaft sinking and shaft sinking support activities would be carried out up to 24 hours per day and seven days per week.
- Construction blasting would be conducted in two phases, subject to development and approval of a Blast Management Strategy (refer Section 3.7.3.4):
    - Phase 1: Construction blasting conducted during standard construction hours during the early stages of shaft construction when activities are at or near to the surface. This phase would generally align to the pre-sink phase of shaft sinking when the acoustic shed and other noise mitigations are under construction. During this phase, a monitoring program

would closely monitor for impacts generated by the construction blasts and seek feedback from potentially affected receivers.

- Phase 2: Construction blasting conducted 24 hours per day, seven days per week once shaft construction has progressed to a depth where construction related disturbance can be managed. This phase would generally align with the main-sink phase of shaft sinking, when the working area of the shaft has reached a depth of approximately 30-50 metres and noise mitigations are in place.

Consistent with other similar facilities operated as part of the Mine, during the operational phase, the Site would be required to operate 24 hours per day, seven days per week.

Table 3-6 Proposed hours of construction and operation

Activity	Hours[1]	Comments or exceptions
Surface construction activities		
Demolition and surface construction actives (including Menangle Road upgrades, provision of services, installation of ventilation and mine infrastructure, and rehabilitation)	7am to 6pm, Monday to Friday 8am to 1pm on Saturdays No construction works on Sundays or public holidays	Surface construction activities that do not lead to an exceedance of the applicable noise management level (evening) at an affected receiver may be carried out between 1pm and 6pm on Saturdays. Some activities requiring the temporary possession of roads or to accommodate road network requirements may need to be carried out outside daytime construction hours during periods of low demand to minimise safety impacts and inconvenience to motorists (e.g. the delivery of oversize plant/ structures, works within Menangle Road corridor)), subject to Council's approval where required.
Delivery of plant and materials to the Site and associated surface operations		
Minor activities and any works that are inaudible at residential premises.	At any time	Works that are inaudible at residential premises, non-disruptive preparatory work, repairs or maintenance may be carried out outside standard construction hours.
Shaft sinking, shaft sinking support and underground construction activities		
Construction blasting (Phase 1)	7am to 6pm, Monday to Friday 8am to 1pm on Saturdays No work on Sundays or public holidays	Blasting will be undertaken as per the Blast Management Strategy. Blasting is planned to occur at a rate of one detonation[2] per shaft, per 24-hour period.
Shaft sinking (including drilling, blast preparation works, shaft lining, water management, mucking out, spoil handling, spoil emplacement, lining material deliveries (e.g.	24 hours per day, seven days per week	Aboveground work supporting shaft sinking activities required 24 hours per day, up to seven days per week. Spoil emplacement would be carried out during periods anticipated to have the least impact on receivers. This is expected to be during daytime construction hours (7am to 6pm, Monday to Saturday). Construction blasting will be undertaken as per the Projects Blast Management Strategy.

Activity	Hours[1]	Comments or exceptions
concrete) and associated activities)		Blasting is planned to occur at a rate of one detonation[2], per shaft, per 24-hour period. Underground construction and integration work required to connect the shafts to the existing mine workings would occur 24 hours, 7 days a week as per the current Mine Approval.
Construction blasting (Phase 2)		
Operational Phase		
Operation of the Site, fans and mine access equipment (including commissioning), personnel access and deliveries	24 hours per day, 7 days per week	Operation of the Site is consistent with other Appin Mine Collieries.

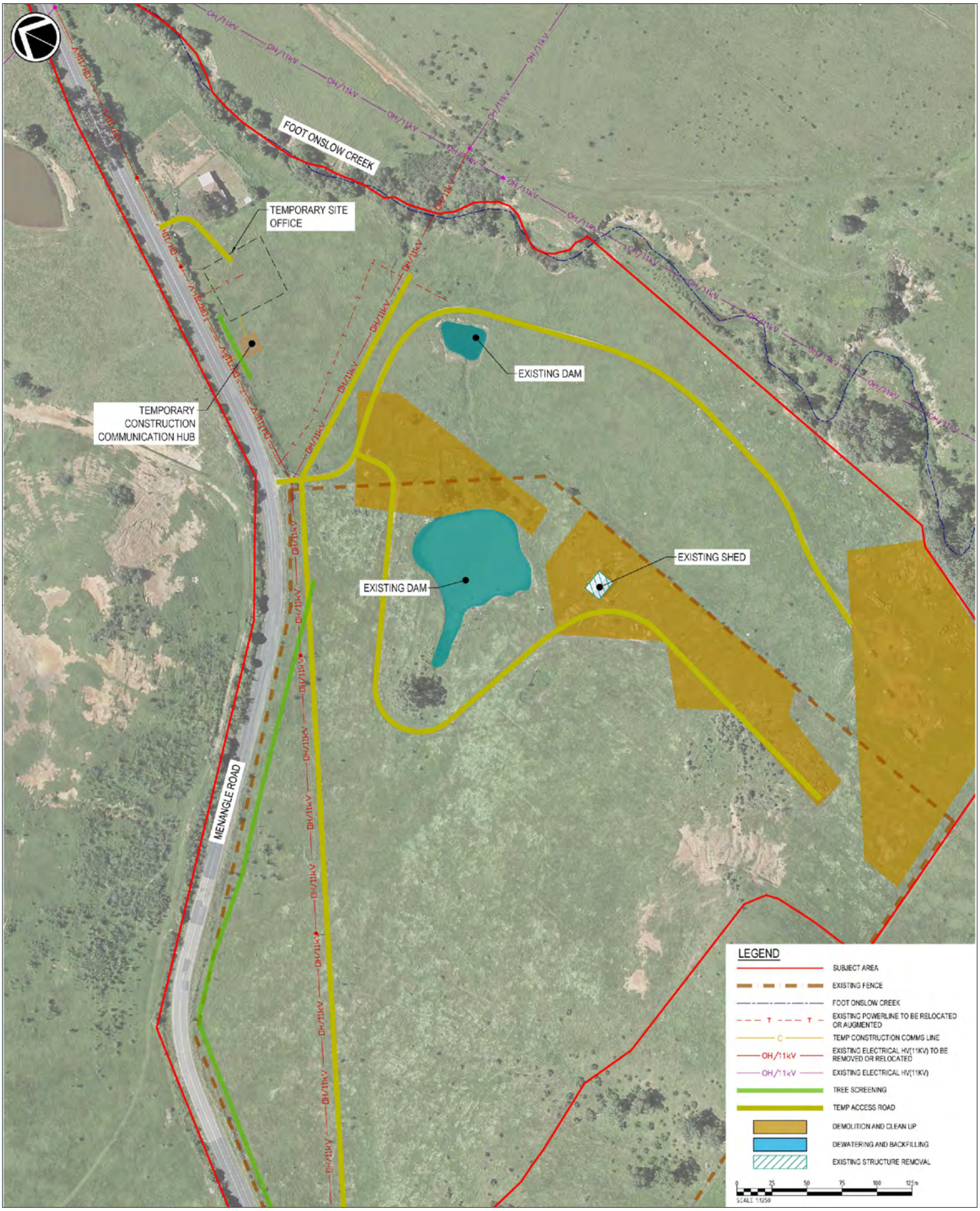
[1]Other than for emergency purposes. 'Emergency purposes' refers to instances where the cessation of construction or operating activities would have the potential to generate serious harm to the environment or serious safety issues.
[2]A single detonation may involve a number of individual blasts fired in quick succession in a discrete area. In the event of a misfire event, additional detonations may be required to complete the construction blast.

3.6.1.1 Works outside standard construction hours

Some activities cannot be conducted during standard or daytime construction hours for safety, traffic or operational reasons. These activities would include works affecting parts of the surface road network, activities conducted under direction from a relevant authority or works that are required to prevent a significant safety risk or environmental damage.

Other than those described in Table 3-6, activities that would be carried out outside of the standard construction hours would include:

- Work determined to comply with the relevant noise management level at the nearest sensitive receiver.
- The delivery of materials outside approved hours as required by the NSW Police or other authorities for safety reasons.
- Emergency situations where it is required to avoid significant safety risk, loss of property and/or to prevent environmental harm.
- Situations where agreement is reached with affected receivers.



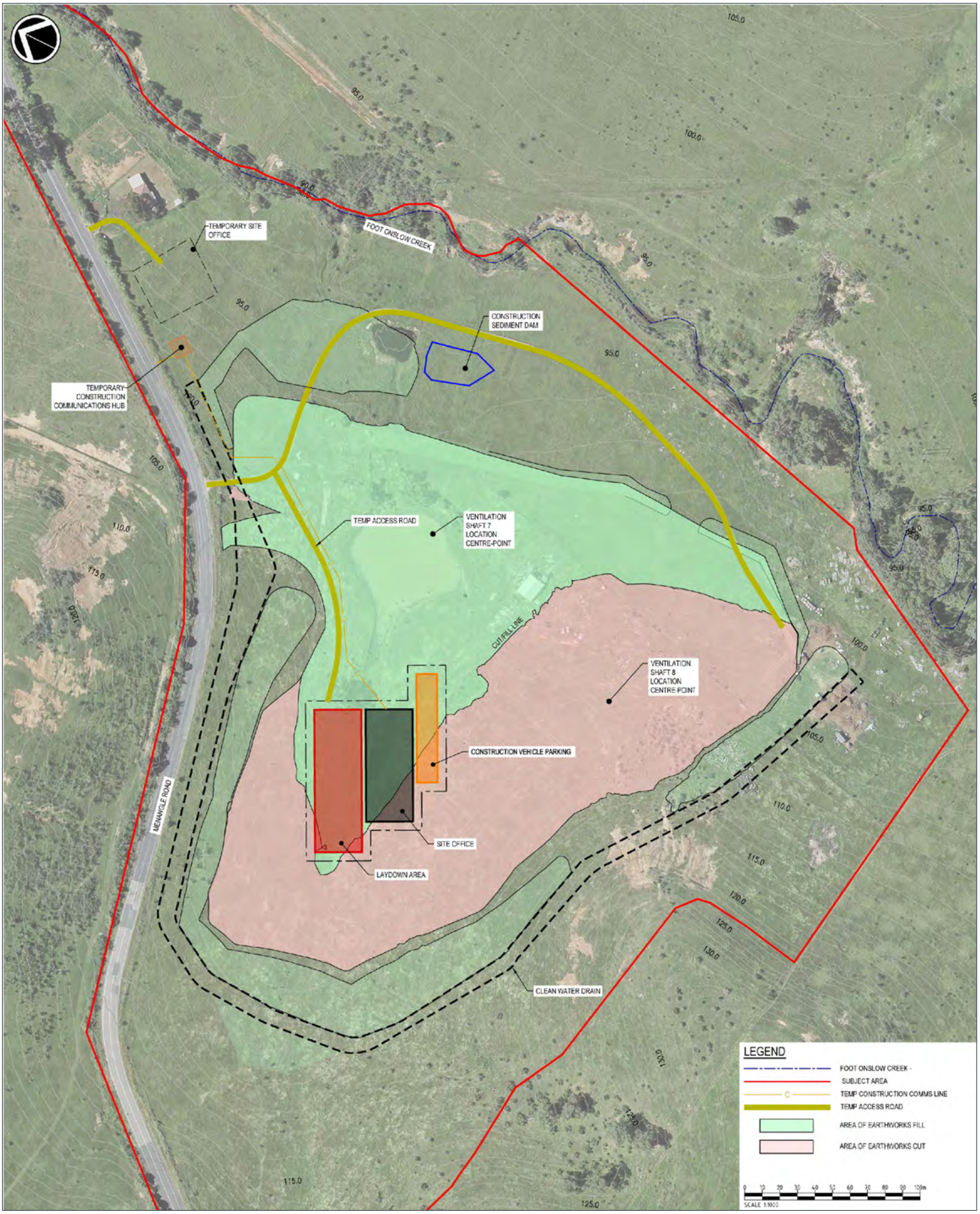
Drawn by: File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_3-1_EarlyWorks.mxd Last updated: 29-Jun-21 11:57:31 AM

SOUTH32

FIGURE 3-1

Construction phase layout - early works

Appin Mine Ventilation and Access Project

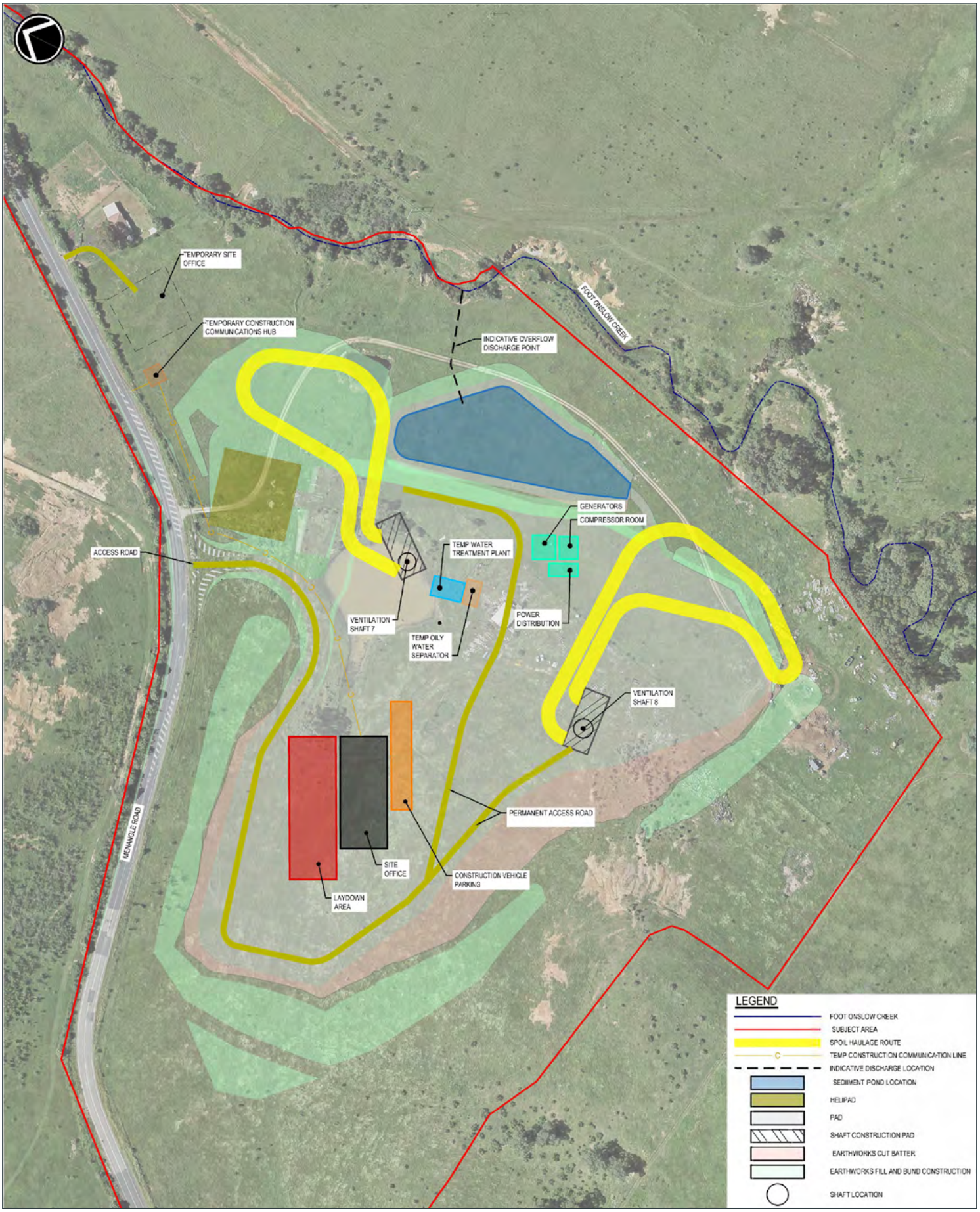


SOUTH32

FIGURE 3-2

Construction phase layout - bulk earthworks

Appin Mine Ventilation and Access Project

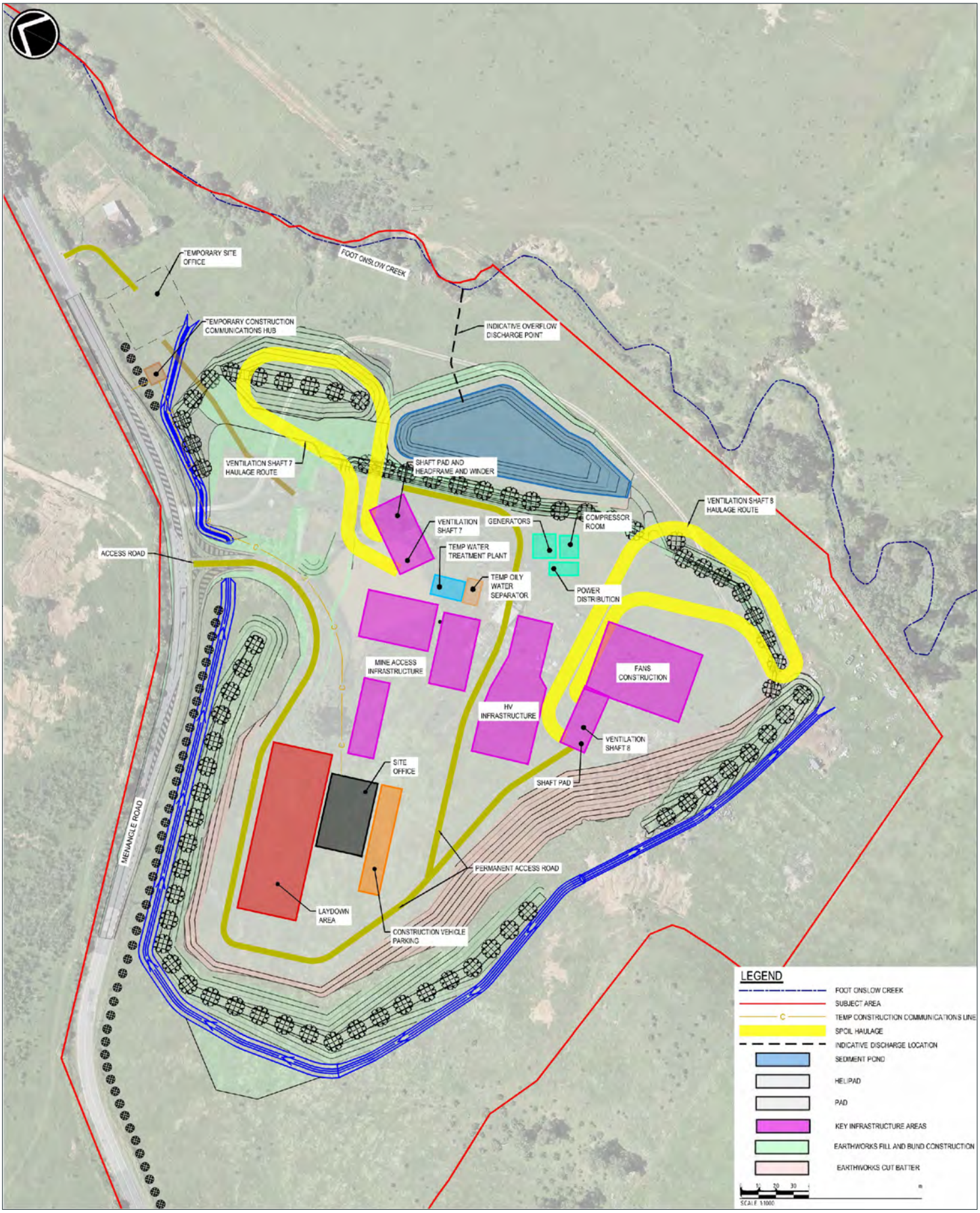


SOUTH32

FIGURE 3-3

Construction phase layout - shaft construction

Appin Mine Ventilation and Access Project



Drawn by: File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_3-4_ShaftInfrastructure.mxd Last updated: 29-Jun-21 12:09:09 PM

SOUTH32

FIGURE 3-4

Construction phase layout - shaft infrastructure

Appin Mine Ventilation and Access Project

v2.0

Drawn by: File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_3-5_Construction.mxd Last updated: 29-Jun-21 12:21:37 PM

SOUTH32

FIGURE 3-5

Phase showing active ventilation shafts and surface facilities in construction

Appin Mine Ventilation and Access Project

v2.0

3.7 Project description

3.7.1 The Site

Regarding the Site:

- It's location is described in Section 2.1.
- The Project would involve the disturbance of 21.44 ha of land, including 18.78 ha of native vegetation. The largest area of site disturbance from the Project will be associated with the ventilation shaft construction phase. The disturbance area would be progressively rehabilitated, where possible, to an operational footprint of 14.01 ha.
- The Site is bounded to the immediate east by Foot Onslow Creek, a third order stream (Strahler classification), draining in a northerly direction into the Nepean River.
- The Nepean River is located to the east of the Site, on the eastern side of Moreton Park Road.
- The Site is located outside the Nepean River 1 in 100 year flood zone mapping, provided by Wollondilly Shire Council (Figure 3-6).
- A small area in the southeastern corner of the Site, is mapped as a bushfire hazard zone (Figure 3-6).
- This area will be avoided by the Project.
- Vegetation on the Site is comprised of exotic pasture and native vegetation with small stands classified as *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CPW). A detailed description of biodiversity on the Site is provided in Section 2.2.5.
- The Project has been designed to avoid or minimise impacts to better quality native vegetation and would be located on land that has been historically cleared and grazed.
- The Project has been designed to avoid or minimise impacts to aboriginal cultural artefacts, which are described in Section 2.4.1.

3.7.2 Site establishment

Site establishment works are enabling works required to prepare the Site for the construction phase. However, some of these activities will extend into the construction phase. Site establishment is anticipated to consist of the following tasks:

- Establishment of tree screens along the Site boundary adjacent to Menangle Road.
- Pre-construction activities for areas to be cleared of vegetation, such as delineating "no-go" zones for conservation.
- Establishing temporary and permanent amenities including ablutions, site offices, storage areas, temporary construction communications hub, spoil management areas, site security and fencing.
- Mobilisation of contractor plant and equipment to site.
- Vegetation clearing and topsoil stripping in stages, stockpiled on site for post construction rehabilitation activities.
- Demolition of existing structures and buildings within the Site.
- Upgrading of the Site access intersection to Menangle Road and creation of a permanent site access.
- Decommissioning of the farm dams and construction of water management infrastructure including erosion and sediment controls, construction sediment dams, tanks, temporary oil/water separator, water treatment plant, sumps and/or dam.
- Relocation or removal of existing services or third-party assets.
- Civil works, including bulk excavation and cut and fill for shaft construction pads, laydown areas, hardstands, carparking, bunds, site drainage and internal roads.
- Importing of engineered fill materials and concrete for the civil works.
- Pre-sink of the ventilation shafts for establishment of the construction winder and headframe.

- Establishment of temporary and permanent utility connections including generators, compressors and power distribution facilities.

3.7.2.1 Tree screening

Tree planting in targeted areas along the Site boundary adjacent to Menangle Road has commenced to screen the future proposed Site from the local community and motorists using Menangle Road. Additional tree screening would be established during site establishment works, where the existing screening has failed to establish.

Tree screening consists of locally endemic native plant species. In planning for the tree screening, IMC will be mindful of the Wollondilly DCP, particularly Part 11.2, *Recommended Species* (for landscaping) and will engage a bush regeneration expert to plan the screening program. In accordance with BAM 2020 (Appendix D, Section D.1, question 5), in the event that planted vegetation is later removed from the Site, assessment of that vegetation under the BAM is not required and therefore biodiversity offsets are not required to be considered for that vegetation removal[9].

3.7.2.2 Demolition and clean up

The demolition and clean-up of the Site consists of the removal of existing site structures (dilapidated farm sheds and stock yards and fencing), historical earthworks, fencing and the dewatering and back filling of the existing dams. Dimensions of the features for demolition and clean-up would include:

- Existing structures - 170 m^2
- Earthworks - 15,666 m^2
- Existing site fence - 1513 m
- Existing dams - 2,856 m^2.

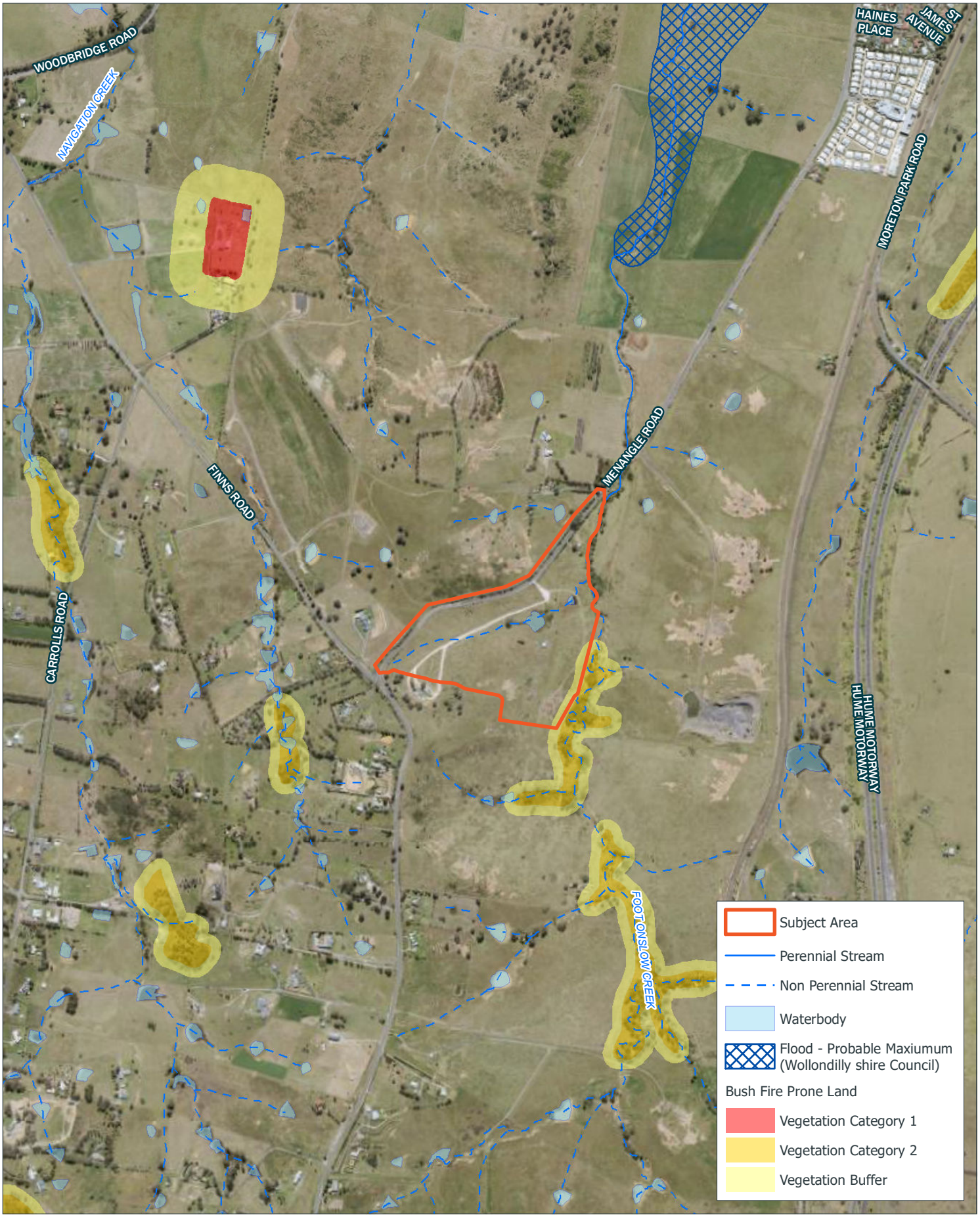
3.7.2.3 Site access

Access to the Site is currently provided via a gated, gravel driveway and track from Menangle Road. Menangle Road consists of two 3.5 m wide traffic lanes on a single undivided carriageway.

IMC recognises that the existing access into the Site is unsuitable for long term use by both heavy and light vehicles. An upgraded intersection on Menangle Road is proposed to be constructed to ensure safe entry and exit from the Site throughout both the construction and operational phases of the Project.

IMC has undertaken investigations into a range of alternative, practicable and sustainable access options into the Site. In consultation with Wollondilly Shire Council (WSC), IMC has developed a preliminary design for the upgrade of the intersection of the proposed site access and Menangle Road Figure 3-7. Consideration was given to traffic types and volumes in the intersection design with details provided in Section 6.6.

9 Under the BC Act, according to BAM 2020, biodiversity offsets are not required for the removal of vegetation planted on a site. This information was confirmed in correspondence with the NSW Biodiversity Conservation Division (BCD) via bam.support@environment.nsw.gov.au (email dated 24 November 2020).



SOUTH32

FIGURE 3-6

Flooding and bushfire hazard mapping for the Wollondilly LGA

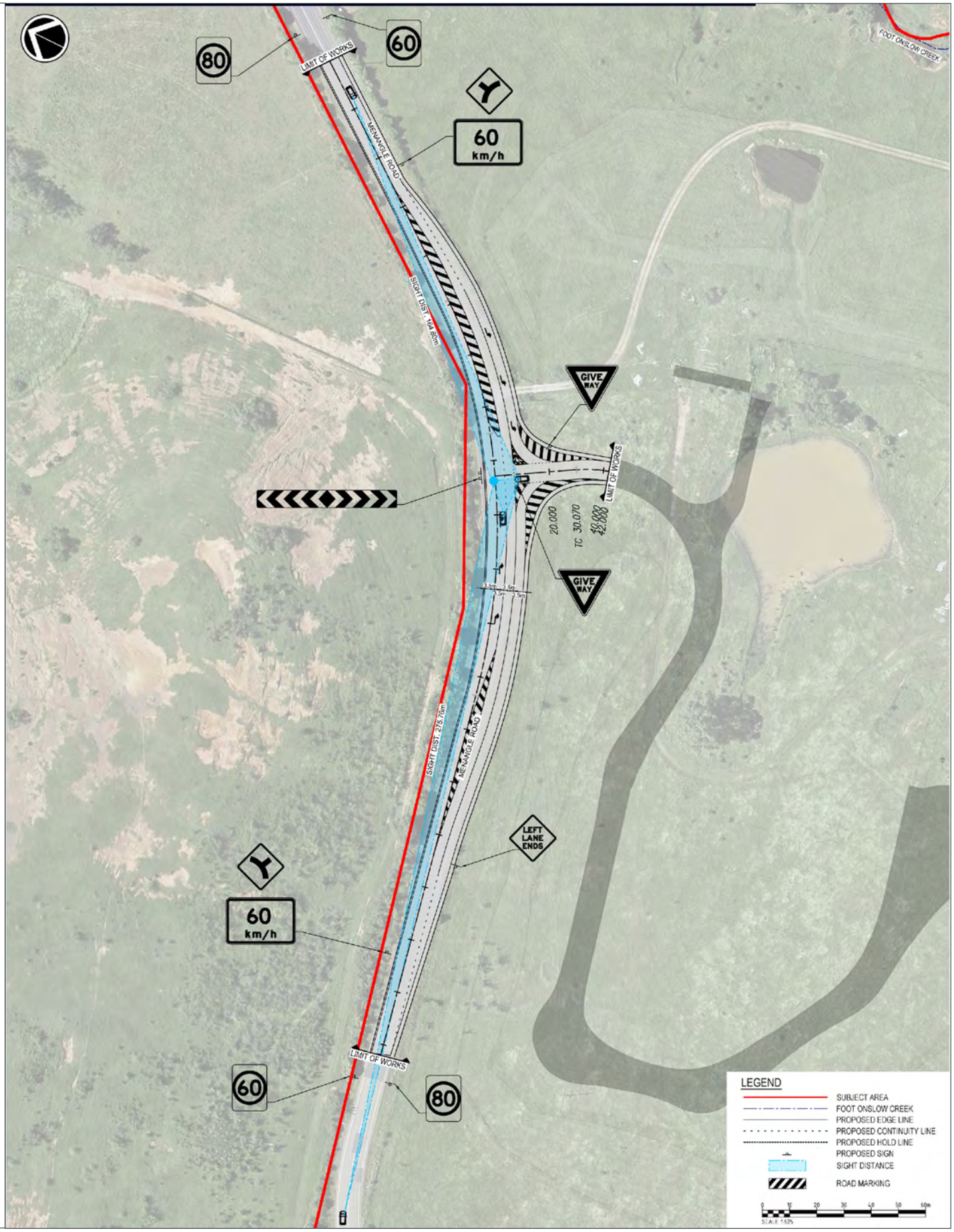
Appin Mine Ventilation and Access Project

N

0 200 400

m

GDA 1994 MGA Zone 56



Drawn by: File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSWMaps\report\Mod_Application\5948_Figure_3-7_SiteAccess.mxd Last updated: 29-Jun-21 12:28:03 PM

SOUTH32

FIGURE 3-7

Proposed Site access upgrades (concept design)

Appin Mine Ventilation and Access Project

v2.0

An auxiliary left turn treatment, a channelized right turn and an acceleration lane are anticipated to be required. The preferred intersection design would:

- Minimise impact to the existing road network, whilst providing adequate vehicle manoeuvrability in and out of the Site.
- Identify all areas that require a pavement upgrade.
- Designate a suitable pavement type based on the existing Menangle Road pavement thicknesses.
- Identify any grading of the roads and intersection to allow sheet flow of surface water.
- Provide adequate protection along the road.
- Provide the necessary signage and line-markings.
- Provide a safe design in accordance with the relevant Australian Standards and NSW Regulations.

Within the Site, internal roads, haulage roads, carparks and laydown areas would also be constructed.

The light vehicle carpark would be used to store light vehicles of both the operation's staff and visitors to the Site. Several laydown areas are included around the Site for the delivery and storage of materials.

The internal roads would generally be two 3.5 m wide traffic lanes and 1.5 m shoulders, which will be either sealed or unsealed and they will be graded to allow sheet flow of surface water away from the trafficable areas. In reduced traffic access areas (around the headframe and winder area, fans and sediment pond) traffic lanes will reduce to a single laneway road. Internal roads have been designed to B-double standards (even though B-double heavy vehicles are not proposed for use in the construction or operational phase of the Project) as a conservative measure to ensure sufficient capacity and road geometry for any heavy vehicle access to the Site.

3.7.2.4 Bulk earthworks

The bulk earthworks would encompass civil works including:

- Early works, which would include all works associated with the preparation of the Site before the commencement of the main earthwork activities including the demolition and clean-up of all existing infrastructure and rubbish, tree planting and relocation or removal of existing services.
- Bulk earthworks pad, which would comprise a platform for the civil and operational infrastructure.
- Construction sediment dams and eventually the site sediment pond, which would be positioned downstream of the bulk earthworks pad, designed to collect and manage sediment-laden water.
- Surface water drainage, which would be used to convey clean water around the Site; and dirty water on the Site to the sediment pond.
- Landscaping and rehabilitation.

Dust management and suppression are planned to accompany bulk earthworks activities to minimise fugitive dust emissions from the Site, as described in Section 6.4.3.

Erosion and sediment control

A sediment fences would be installed immediately downslope of the fill embankment to capture any sediment-laden run-off during construction. Runoff would be directed to the construction dams as required. The total length of the sediment fence is approximately 400 m. Additional erosion and sediment controls would be installed during the construction phases, as described in Section 6.7.

Clearing and grubbing

The extent of clearing and grubbing has been defined as a 10 m offset around the bulk earthworks pad, sediment pond and stockpile/visual bunds. The extent of clearing and grubbing, is estimated to be up to a total area of 21.44 ha (total construction footprint), including up to 18.78 ha of highly modified native vegetation.

Clearing of native vegetation will be minimised wherever practicable, including a small stand of remnant CPW near Menangle Road, which will be avoided. A detailed description of the vegetation on the Site is provided in Section 2.2.5. A discussion of the potential impact of the proposed vegetation clearing is provided in Section 6.8.

Topsoil stripping

Topsoil stripping would be required for the area covered by the bulk earthworks pad, construction sediment dams and the sediment pond, drainage and stockpiles/visual bunds. A nominal thickness of 200 mm was assumed to calculate the total volume of stripped material, which is estimated to be 18,220 m^3. This topsoil will be stockpiled on Site, for use in landscaping and progressive rehabilitation.

Cut and fill

There is a natural ridge on the Site that falls west to east (draining towards Foot Onslow Creek). Therefore, the eastern side of the earthworks pad would be in-fill and the western side would be in-cut. Figure 3-2 shows the cut and fill design of the bulk earthworks pad. The maximum anticipated cut will be approximately 6.15 m and the maximum anticipated fill will be approximately 3.55 m. No benching is required as the cuts are less than 10 m in depth.

3.7.2.5 Surface water management

The Project requires the construction of a range of surface water management infrastructure, which would be installed during site establishment. These measures have been designed to mitigate possible water quality impacts to Foot Onslow Creek and the Nepean River from the construction phase of the Project, and would continue to be utilised during the operational phase where required.

During construction of the access road and other site infrastructure, standard clean and dirty water diversion drainage, careful staging and minimisation of disturbed areas and sediment and erosion control measures (Landcom 2004) will be used to minimise the generation and discharge of dirty water from construction activities. Other surface water management measures that would be installed as part of the construction phase include:

- Construction sediment dam/s, located downstream of the bulk earthworks pad, would receive dirty water runoff from the general construction site.
- Construction of the primary sediment pond for the Site (see below).
- Clean water diversion swales and culverts that divert clean water runoff around the construction site towards Foot Onslow Creek (Figure 3-8).
- Dirty water swales that capture and direct dirty water runoff from the construction site areas into the sedimentation pond (Figure 3-8).
- Clean water diversion swales and culverts that divert clean water runoff from the vegetated bunds around the construction site towards Foot Onslow Creek (Figure 3-8).
- Mobile flocculant dosing plants for the sedimentation ponds, if required.
- Oil/water separation sumps would be installed in areas likely to be in contact with hydrocarbons.
- Additional construction phase water management structures or diversions, construction sediment dams or tanks to temporarily manage surface water or construction process water for various activities.

A licenced discharge point would be required to manage controlled releases from the sedimentation pond. Releases would only occur when there is excess runoff collected in the sedimentation pond, which cannot be reused on site.

It is anticipated that all surface water management infrastructure would be decommissioned and removed upon project completion.

Sediment pond

The primary sediment pond would be located towards the downstream end of the bulk earthworks pad and has been designed to capture a 1 in 10-year, 72-hour duration storm event.

The pond is anticipated to have a maximum capacity of 12,660 m^3, a depth of 4.93 m and a wall height of 2.5 m. For the pond lining, a 300 mm treatment of the finished clay surface is proposed. The sediment pond would be constructed with an emergency spillway, with rock underlined by geofabric as scour protection. The sediment pond was designed with consideration to the requirements of the South32 Dam Management Standard and to ensure the total rainfall volume would be captured. The design will be refined further during detailed design.

The water level of the sediment pond would be regulated by a pump, which would be located in a pad area adjacent to the pond. IMC intends to vary EPL 2504 to address conditions for water quality monitoring and discharge from the proposed sediment basin to Foot Onslow Creek. The location of the discharge point would be confirmed during detailed design. An indicative location is shown in Figure 3-8.

External drainage

The external drainage for the Site will be inclusive of all clean water diversion drains, which would be located around the perimeter of the Site (Figure 3-8). All drains would be designed for a 1 in 10-year event with a 150 mm freeboard.

Internal drainage

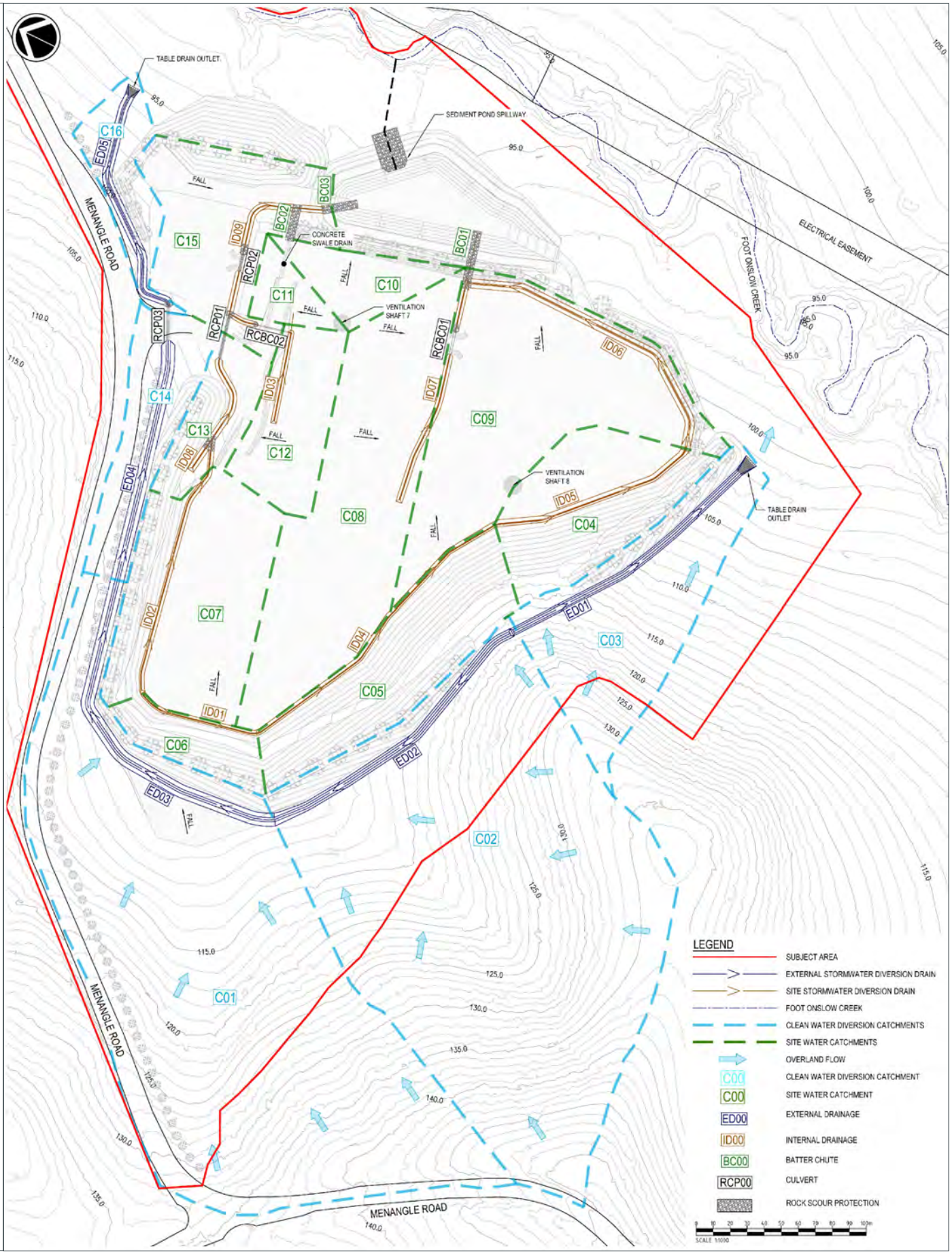
The internal drainage for the Site would be inclusive of all potentially sediment-laden drains (Figure 3-8). The internal drainage has been designed to direct sediment-laden water around the bulk earthworks pad and prevent inflow of water into the ventilation shafts. Drains located adjacent to the western cut face of the pad would have a batter ratio of 1:2 (to reduce the drains overall widths) and allow for greater vehicle manoeuvrability. All drains are designed for a 1 in 10-year flood event with a 150 mm freeboard. Rock protection would be employed at various drain intersections to mitigate flow velocities entering the drain.

Culverts

A series of culverts would be installed within the external and internal drainage networks (Figure 3-8). All culverts would have a precast concrete headwall and wing wall in the upstream and downstream end, with additional rock armouring (rock underlined by geofabric) on the downstream side of all culverts. All culverts have been designed to accommodate a 1 in 10-year event.

Batter chutes

Concrete batter chutes, with additional rock armouring, would be positioned within the drainage network to convey water from the internal and external drainage networks into the sediment pond (Figure 3-8). All batter chutes are designed for a 1 in 10-year flood event with a freeboard of 150 mm.



Drawn by: File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_3-8_Stormwater.mxd Last updated: 29-Jun-21 2:46:04 PM

SOUTH32

FIGURE 3-8

Site stormwater drainage plan

Appin Mine Ventilation and Access Project

3.7.3 Ventilation shaft construction

3.7.3.1 Ventilation shaft construction overview

The shafts would be constructed using conventional shaft sinking methodology, using mechanical excavation and controlled blasting. Conventional shaft sinking (also known as blind sinking) involves excavating from the surface down to the required depth.

Mechanical excavation would involve the use of excavation equipment to break apart the rock. Sometimes additional methods such as jack-hammering or controlled blasting are required to break apart sections of harder rock. The broken material is then removed from the shaft using machinery such as excavators.

Controlled blasting involves the pre-planned and safe use of small explosive charges to break up hard rock into removable pieces. The method involves pre-drilling a series of small diameter holes in the rock face, loading the holes with small explosive charges and electronically detonating them. It is a common excavation methodology that has been safely used on many other Australian projects, including relatively shallow tunnelling projects. The controlled blasting method would be conducted incrementally from the final pre-sink depth to the final depth. The headframe[10], winding equipment, kibble[11] and stage[12] would provide access to the shaft for personnel, equipment and removal of broken rock.

One of the key advantages of controlled blasting is that it can result in reduced duration of ground borne noise and vibration impacts for local communities as well as a reduction in the overall construction time in comparison to using boring techniques or mechanical excavation. Controlled blasting reduces the impact of vibration as each controlled blast only lasts for approximately 10 seconds.

The increments and rate of excavation is dependent on the method, rock strata properties and stability. These aspects would be determined in conjunction with the contractor during detailed design.

The sequencing of construction of VS7 and VS8 will be determined during the detailed design phase of the Project. Impact assessments have taken a conservative approach and assessed a 'worst case scenario', assuming concurrent shaft construction.

Figure 3-1 to Figure 3-5 shows a series of indicative site layouts during the construction phase.

3.7.3.2 Shaft construction phases

After site establishment, the shaft will be constructed in a number of distinct engineering phases:

- pre-sink
- main shaft construction
- demobilisation.

10 The headframe is the structural frame constructed above an underground mine shaft so as to enable the hoisting of machinery, personnel, or materials.

11 The kibble is the 'bucket' used in the shaft, secured to the winding equipment and the headframe which is used to convey the fractured rock from the shaft bottom to the surface.

12 The stage is a secure platform, lowered into the shaft, from which shaft construction activities including drilling, shot hole packing and shaft lining can occur.

Pre-sink

The pre-sink phase would involve the construction of a temporary headframe and winder, establishment of a shaft collar and intake evase, and excavation of the shaft to the required depth for the installation of the sinking stage in preparation for the main shaft construction. During the detailed design phase, it will be determined if the pre-sink would commence from the final bulk excavation fill level or from ground level (with subsequent backfilling). The pre-sink will commence during site establishment.

The pre-sink would involve both mechanical excavation and controlled blasting to excavate the shaft for the initial 30-50 m (approximately), depending on geological conditions. The pre-sink shaft sinking rate is expected to be approximately 0.30 m/day for VS7, and 0.46 m/day for VS8.

Once broken by mechanical means or controlled blasting, broken rock would be removed from the shaft via standard civil excavation methods. Once the shaft collar and shaft excavation headframe are installed, broken rock would be removed via kibbles (Figure 3-9).

The shaft collar would be installed to support the temporary headframe and final ventilation ducting. This collar is constructed of heavily reinforced concrete designed to withstand the stress loads and vibration during the shaft excavation and prevent surface water ingress into the shaft.

Prior to the commencement of works for the main shaft, the following plant and equipment would be assembled and installed for each shaft:

- shaft sinking head frame
- winder, winder house and associated control systems
- kibble and kibble winder
- stage.

Installation and operation of this plant equipment provides the means for the main shaft construction team to access progressively deeper shaft depths during the main shaft construction phase.

It is proposed that acoustic sheds will be constructed over the VS7 and VS8 shaft construction areas to mitigate noise emissions associated with the out of hours construction of the VS7 and VS8 shafts. The sheds would be constructed following the pre-sink phase to allow for the sinking headframe and stage to be installed, although opportunities to install prior to the pre-sink will be investigated during detailed design.

Main shaft construction

The main shaft construction phase will be undertaken using the controlled blasting method. The established headframe, winding equipment, kibble and stage provide access to the shaft for personnel, equipment and removal of broken rock. A schematic of the process is provided in Figure 3-9.

Excavation by controlled blasting would generally include the following shaft sinking cycle:

- Progressive incremental drilling and loading of boreholes into the base of the shaft with explosive charges and stemming material.
- Controlled blasting using electronically sequentially timed detonation of explosives to manage the amount of energy released.
- Removal (mucking out) of the spoil via the kibble.
- Installation of rock support.
- Installation of permanent shaft lining (see below).

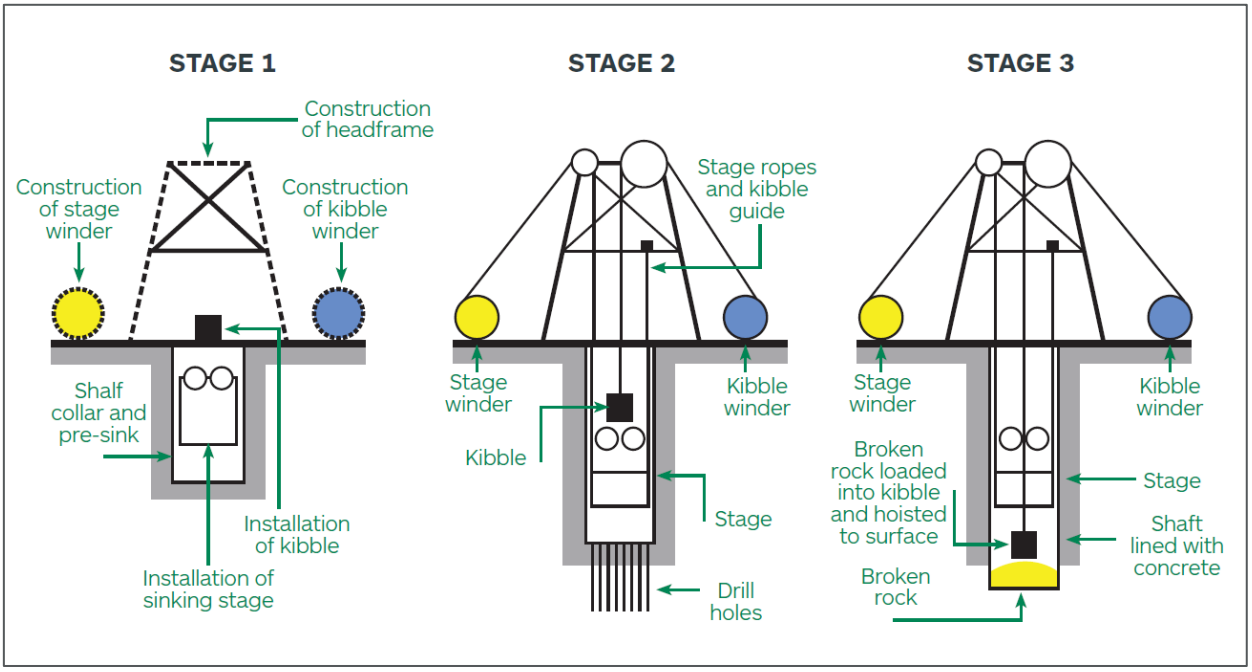


Figure 3-9 Staged schematic of conventional shaft sinking method using controlled blasting

The sinking cycle is repeated as shown in Figure 3-10Figure 3-10, with excavation occurring incrementally from the final pre-sink depth to the final shaft depth. The rate of excavation is expected to range from approximately 1.0 m/day to 3 m/day. The increments and rate of excavation would be dependent on rock strata properties and stability. These aspects would be determined in conjunction with the contractor during detailed design.

At the final depth, the shaft will breakthrough into the underground workings (refer to Figure 3-11). This process will be undertaken to meet the Mining Regulator requirements. It is anticipated that a grout or cement plug would be installed at the intersection of the base of the shaft and the underground workings, prior to breakthrough to support the mine workings and separate the activity from the operating ventilation circuit. Once the shaft construction has been completed the plug will be removed to connect the shaft to the overall ventilation circuit. Specifications of the shaft plug will be determined during detailed design.

Demobilisation

Demobilisation will involve removing all structures and equipment used for the shaft sinking from the Site to allow for the tie in installation of above ground infrastructure.

3.7.3.3 Approach to blast management

The proposed approach to blast management has been developed considering the environmental assessment completed by RWDI Pty Ltd (Section 6.3), expert advice provided by specialist consultants Heilig and Partners Pty Ltd, and a preliminary blasting impact assessment for the Project, prepared by Prism Mining Pty Ltd. Predictions from the impact assessments have identified that conservative assessment criteria for sensitive receivers were able to be achieved. The assessment recommended further refinement and development of the site law during the detailed design, as is standard industry practice.

Figure 3-10 Diagram of shaft sinking cycle via controlled blasing

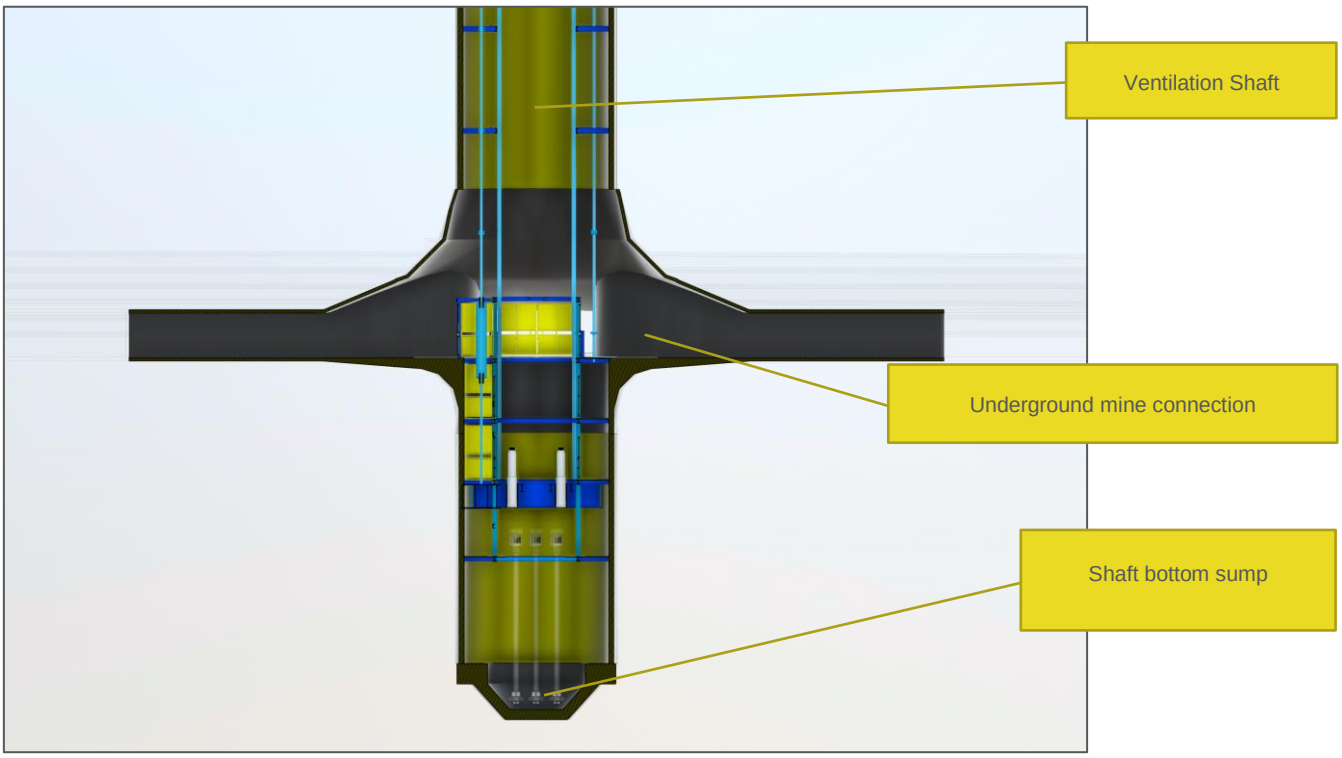


Figure 3-11 Shaft bottom sump and underground mine connection

A trial blast involves firing a number of small explosive charges in the ground to be blasted and monitoring the resultant vibrations at key monitoring locations around the Site. The purpose of a trial blast is to:

- Confirm the site law (the site-specific relationship between explosive charge weight, distance to sensitive receivers and magnitude of vibration);
- Confirm blast design parameters on a smaller scale prior to full scale construction blasting;
- Confirm monitoring results are in-line with predictions; and
- Optimise the site blasting procedures.

During detailed design, its proposed that a trial blast will be undertaken to further refine the site law, subject to relevant approvals. Monitoring will include but not limited to:

- Overpressure (dB)
- Vibration (PPV)
- Frequency (Hz)
- Geotechnical Conditions.

Additional site investigations (trial blasts) may be conducted prior to construction blasting commencing to refine suitable blast designs to comply with project blasting noise, overpressure and vibration criteria.

The trial blasts and construction blasts shall be designed by a specialist blasting consultant. Subsequent construction blast designs shall consider the performance of previous construction blasts thus enabling IMC to continuously improve the efficiency and technical performance of the blasts whilst controlling environmental impacts such as vibration and overpressure.

3.7.3.4 Blast management strategy

A Blast Management Strategy will be prepared in accordance with relevant guidelines before blasting begins. The Blast Management strategy will include:

- Details of blasting to be performed, the program and method.
- Identification of all potentially affected receivers.
- Establishment of appropriate criteria for blast overpressure and ground vibration levels at each receiver.
- Establishment of appropriate criteria to transition from Phase One to Phase Two construction blasting (refer to 3.6).
- Details of the storage and handling arrangements for explosive materials and the proposed transport of those materials to the construction site.
- Identification of hazardous situations that may arise from the storage and handling of explosives,
- The blasting process and recovery of the blast site after detonation of the explosives.
- Determination of potential noise and vibration and risk impacts from blasting and appropriate best management practices.
- Details of the proposed blast monitoring program.
- Consultation, impact mitigation and notification procedures for all potentially affected receivers.

The Blast Management Strategy would be developed in consultation with relevant stakeholders and reviewed by a suitably qualified and experienced person. Consultation with receivers identified as potentially affected would occur throughout all phases of the blasting program.

Blast monitoring would be carried out in accordance with the guidelines provided in *Australian Standard 2187.2-2006: Explosives – Storage and use, Part 2: Use of explosives (AS 2187.2-2006)* and be

undertaken by a specialist consultant. It is proposed to implement an automated monitoring system whereby monitoring data is instantly and automatically uploaded to a central server.

Construction Blasting Phased Approach

Shaft sinking using controlled blasting is a cyclical process which relies on a repetitive sequence of activities (as described in Section 3.7.3.2). Depending on variables such as the ground conditions, size of the round and depth of the working face, the cycle can take between 24 and 32 hours to complete. In order to reduce the overall length of the shaft construction phase, construction blasts should occur regularly in accordance with this sequence (a construction blast in each shaft every 24 to 32 hours) wherever possible.

To support this cycle, activities that support shaft construction may need to occur 24 hours per day, up to seven days per week. Spoil handling and emplacement would be carried out during periods anticipated to have the least impact on sensitive receivers. This is expected to be during standard construction hours.

Generally during construction, exposure to noise and vibration would be greater when works are close to a receiver location and would decrease when the work is further away. Due to the vertical nature of shaft-sinking, as excavation is progressing down the shaft the distance increases and exposure to impacts from each detonation would typically decrease at a receiver.

In consideration of the construction program, blasting cycle and the need to minimise impacts, a two phased management approach to undertaking blasts is proposed, as outlined below. In both phases, typically up to one construction blast per shaft, per day is anticipated.

Construction Blasting Phase One

During Phase One of the blasting program, construction blasting would be restricted to standard construction hours only. This phase would generally align to the pre-sink phase of shaft sinking when the acoustic shed(s) and other potential noise mitigations are under construction. During this phase, a monitoring program would closely monitor for impacts generated by the construction blasts and seek feedback from potentially affected receivers.

The data and feedback collected during Phase One would be used to review and revise the Blast Management Strategy, prior to commencement of Phase Two.

Construction Blasting Phase Two

During Phase Two of the blasting program, construction blasting would occur 24 hours a day, 7 days a week. This phase would generally align with the main-sink phase of shaft sinking, when the acoustic shed(s) and other noise mitigations are in place and the working area of the shaft has reached a depth of approximately 30-50 metres.

Due to the length of the shaft sinking cycle, during Phase Two, the construction blasts will not occur every night and not at the same time each day. Where possible, construction blasts would be carried out during periods anticipated to have the least impact on receivers.

Construction blasting in both phases will be undertaken as per the Project's Blast Management Strategy to be developed during detailed design. A detailed blast design will also be completed during detailed design.

3.7.3.5 Shaft lining (preparation and installation)

Each shaft would be lined with an in-situ concrete lining system, installed progressively down the shaft as the shaft is excavated. As lining materials are brought to the Site, they would be placed on a suitable lay-down area located adjacent to the shaft. Concrete for the liner would be brought to the Site as needed.

The liner would nominally be 300 mm thick reinforced concrete, installed such that the internal diameter of each shaft is maintained throughout the shaft construction. Generally, the lining would be placed in-situ with mass concrete. The liner would be fabricated by placing a formwork in the shaft and pouring the concrete behind the formwork. The formwork would then be removed when the concrete has set. Where required, a temporary lining for ground support would be sprayed onto the shaft from within the shaft; however, prefabricated lining pieces may be used where spray grouting is not effective.

The shaft lining system is required to provide a smooth, finished surface that reduces friction from the flow of air through the shaft during operation. It is also required to provide structural capacity to reinforce/restrain the strata surrounding the shaft from breaking out, blocking the shaft and disrupting the air flow from the mine workings and also reducing the ingress of groundwater into the shaft.

3.7.3.6 Water management during shaft construction

During shaft sinking, water will be required to facilitate the excavation, for activities such as drilling and dust suppression. Water may also be used in the controlled blasting process as a noise abatement measure, if required.

Surface water tanks and/or construction sediments dams will be employed to service the shaft sinking operation. Shaft sinking water would be managed via a closed loop system, whereby shaft sinking water is pumped from the shaft in a rising main to the construction sediments dams or holding tank, treated or filtered as required, and returned to the shaft for continued shaft sinking activities. During this process, excess water will either be pumped to a storage pond for assessment prior to discharge as per any required discharge criteria, or where the discharge criteria is not met, appropriately disposed offsite.

Detailed processes for management of construction water will be developed during detailed design in conjunction with the shaft sinking contractor and in accordance with established surface water management processes detailed in the Mine Surface Water Management Plan. The shaft sinking process water tanks or ponds will be designed and managed with adequate reserve freeboard for a significant storm event.

3.7.3.7 Spoil emplacement

Spoil from the excavation would be used as engineered fill and for the construction of earthen screening bunds and a Site sediment dam. The spoil would be brought to the surface and placed in a temporary stockpile near the shaft collar before excavators and trucks move the spoil to designated emplacement areas (Figure 3-3). VS7 and VS8 are expected to generate 30,454 m^3 and 16,365 m^3 of spoil respectively.

The spoil emplacement area would be progressively revegetated to minimise the area of exposed soil, stabilise the spoil and reduce the sediment load on the primary sedimentation pond. This will also assist in allowing the spoil emplacement to blend into the natural topography of the Site. During the construction of the bunds, smaller sedimentation dams, sumps or traps will be installed to capture runoff from the spoil.

The emplacement of the shaft spoil within the Site is proposed so that this material can be used to backfill the shaft at the completion of the operational phase. Emplacement within the Site also minimises truck movements and associated environmental impacts such as noise, traffic and GHG emissions in the construction and rehabilitation phases of the Project.

The spoil emplacement would also negate the requirement to find a suitable disposal site for the spoil or to find a source for the large volumes of fill required to backfill the shaft at the completion of operations. An allowance has been made to dispose of 5% of in-situ material off-site where the material is found to be unsuitable for onsite storage. This would be transported by truck to a licenced disposal facility.

3.7.3.8 Acoustic sheds

As noted above, it is proposed that acoustic sheds would be constructed over the VS7 and VS8 shaft construction areas to mitigate noise emissions associated with the out of hours construction of the VS7 and VS8 shafts. The sheds would be constructed following the pre-sink phase to allow for the sinking headframe and deck to be installed, although opportunities to install prior to the pre-sink will be investigated during detailed design.

At this stage of the Project, detailed designs for acoustic sheds have not been developed and a typical shed construction has been used, with indicative shed concept designs provided in Figure 3-12 and Figure 3-13. The design of the acoustic sheds will be finalised during detailed design, but typically, it will be designed to cover the shaft sinking equipment, kibble/spoil unloading area, and allow space for entry and exit of heavy vehicles, such as concrete delivery and spoil handling trucks.

Ventilation would be designed to maintain the acoustic integrity of the shed, which would require attenuators for supply and return air ducting. When the main doors of the acoustic shed are opened to allow heavy vehicle access, noise emissions would potentially increase. Should it be predicted during detailed design that opening the shed doors outside normal construction hours would result in noise management level exceedances, a two-stage 'airlock' door may be required to provide additional mitigation. Once construction of the shafts is complete the sheds will be removed.

An assessment of noise and vibration impacts is provided in Section 6.3. The specific noise mitigation measures would be determined during detailed construction planning and would take into account the construction program, construction working hours and construction traffic management.

Figure 3-12 Acoustic shed example (internal view)

Source: IMC

Figure 3-13 Acoustic shed example (external view)

Source: https://metrotunnel.vic.gov.au/construction/building-the-tunnels-and-stations/acoustic-sheds

3.7.4 Ventilation and mine access infrastructure associated with the ventilation shafts

Once the sinking and lining of the ventilation shafts is completed, surface based infrastructure will be constructed for each ventilation shaft, specific to their intended purpose.

3.7.4.1 Downcast ventilation evase (VS7)

The ventilation evase structure would be comparable to other downcast evases operated by IMC. The evase for VS7 would consist of a raised protective cover with a roof over the collar and barricading around the sides to prevent access. Intake air would be drawn into the shaft via the intake evase and delivered to the operations by the shaft, which would extend down to the underground workings.

Figure 3-14 shows an artist impression of the evase in relation to the other proposed operational phase mine access infrastructure and the surrounding area.

This infrastructure, along with the mine access infrastructure described in Section 3.7.4.2, would have a footprint of approximately 50 m by 50 m however, these dimensions will be refined during detailed design.

Other work will occur in the underground workings to connect the bottom of the shaft to the underground workings. Utility (power, water, communications) upgrades and installation will also occur in and around the shaft. The exact location and capacity of the new services required, in addition to reticulation routes and any upgrades required to the existing systems to support the changes would be determined during detailed design.

Figure 3-14 VS7 operational cross-section

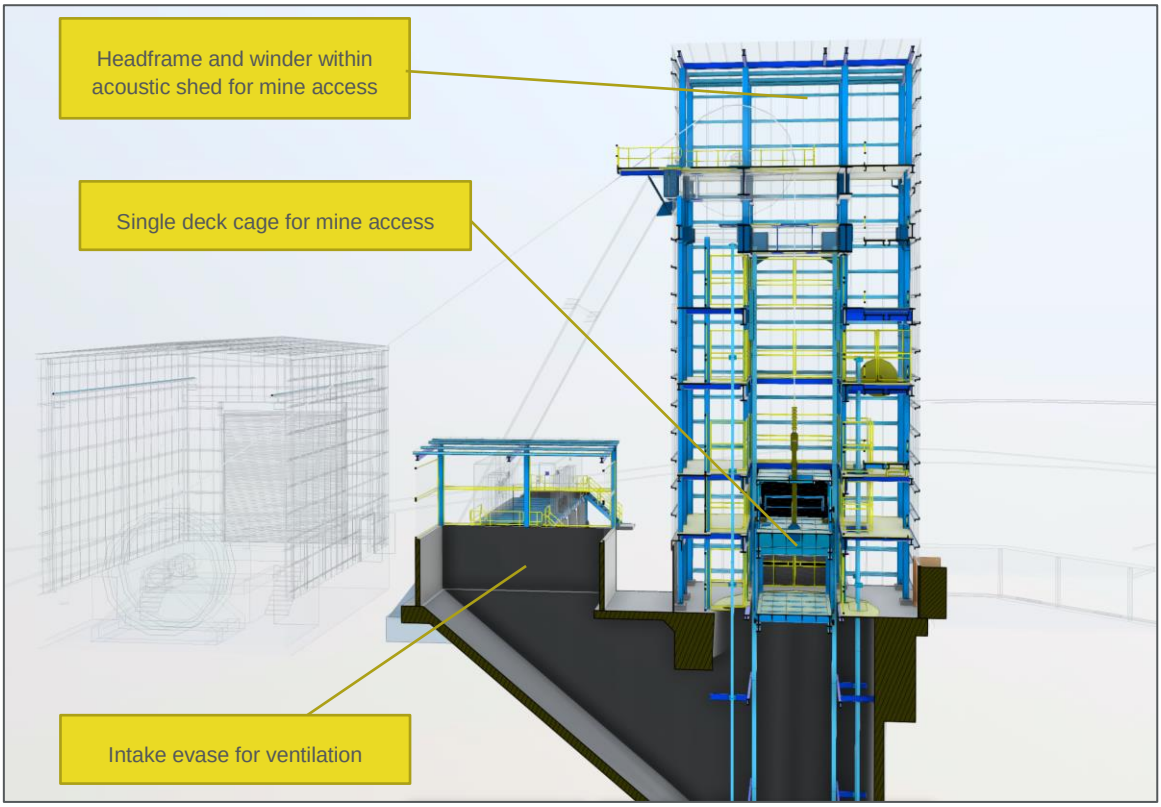
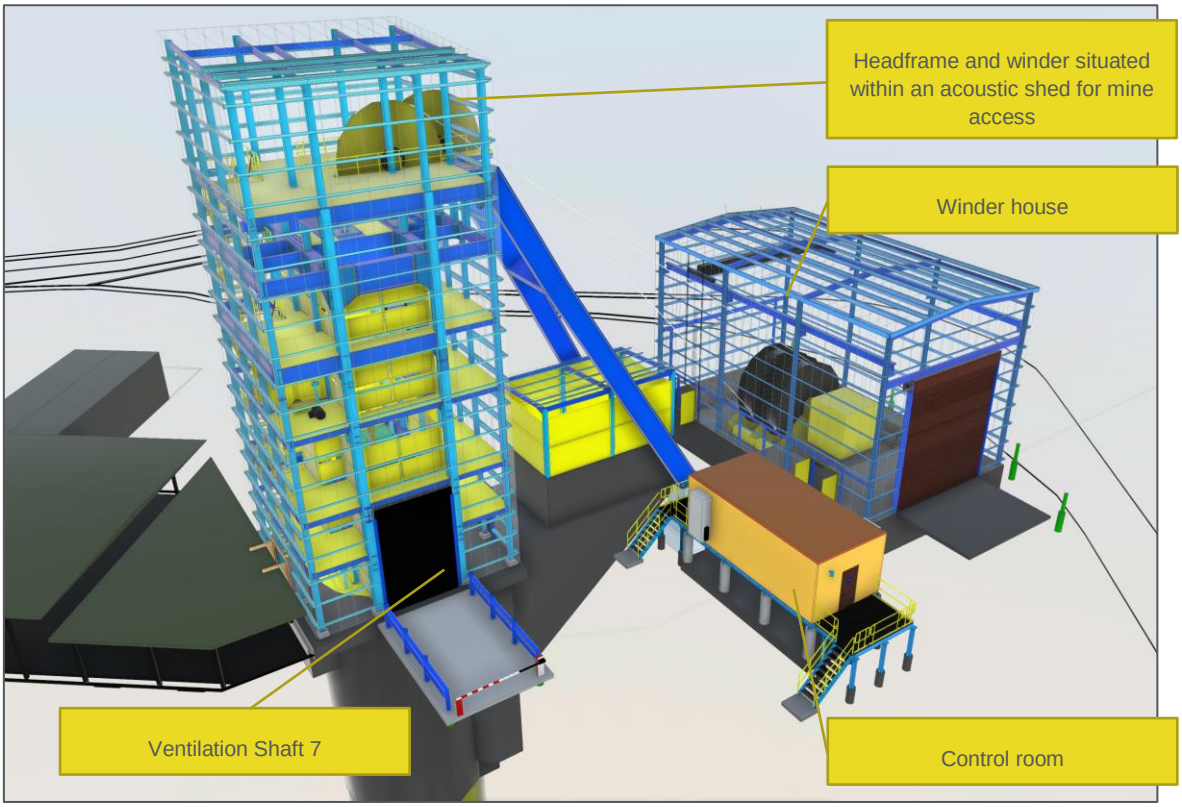


Figure 3-15 VS7 layout and design



3.7.4.2 Headframe and winder (VS7)

The downcast ventilation shaft VS7 would provide mine access to the underground workings via a headframe and winder system. Only personnel, materials and small equipment would be conveyed through the shaft via a single deck cage.

The headframe tower and the intake evase would be mounted on the shaft collar. The headframe tower would be approximately 25 m in height, which would be lower than similar towers at other Mine sites. This has been designed in order to minimise visual impact. Inside the shaft, personnel, materials and small equipment would be conveyed down the shaft via a single deck cage. The cage would have a payload of approximately 15 tonnes, capable of accommodating at least 80 personnel. The cage would have three-sided access roller doors at the surface to allow vehicles or forklifts to safely and ergonomically load the cage (Figure 3-14).

A winding device would power the conveyance and would be located in the winder building or within the head frame structure; this would be determined in the detailed design. An overhead travelling gantry crane would facilitate maintenance inside the winder building. The winder building would have an adjacent switch room/MCC, transformer and controls system. The winding system would be operated from the shaft collar or from the winder building.

Supporting infrastructure would be installed, including an emergency egress cage with a tower-mounted single drum winder, maintenance platforms, safety systems, boom gates and guideposts. Emergency equipment, such as shaft sealing capability, will be developed for the shafts during detailed design.

The tower and winder building would be clad with a neutral colour selection to match the local environment, similar to the Mines other towers. Further information on potential visual impact and proposed mitigation is provided in Section 6.12.

3.7.4.3 Upcast ventilation infrastructure (VS8)

The ventilation fan infrastructure would be connected to the shaft collar of VS8 with a trifurcating bend system. The proposed location of the fans is shown in Figure 3-18. Figure 3-16 shows an artist's impression of the extraction fans in relation to the other proposed operational phase infrastructure and the surrounding area. The ventilation fan infrastructure is anticipated to have a footprint of approximately 100 m by 60 m.

The top of the shaft would be completely enclosed with inlet ducting that would lead directly to the fans. Three individual fans would be installed; generally two fans would be continuously operational, and one would be on standby. The discharge ducting, which leads to the evase from each fan, houses silencers to reduce noise emissions.

Each fan would have a dedicated MCC, housing a switchroom, control room, Variable Speed Drive (VSD) transformer, auxiliary transformer and a VSD chiller. The fan facilities would be electrically powered from the new switchyard constructed adjacent to the shaft (detailed in Section 3.7.7). The fans would include a ventilation air monitoring system to comply with National Greenhouse and Energy Reporting requirements.

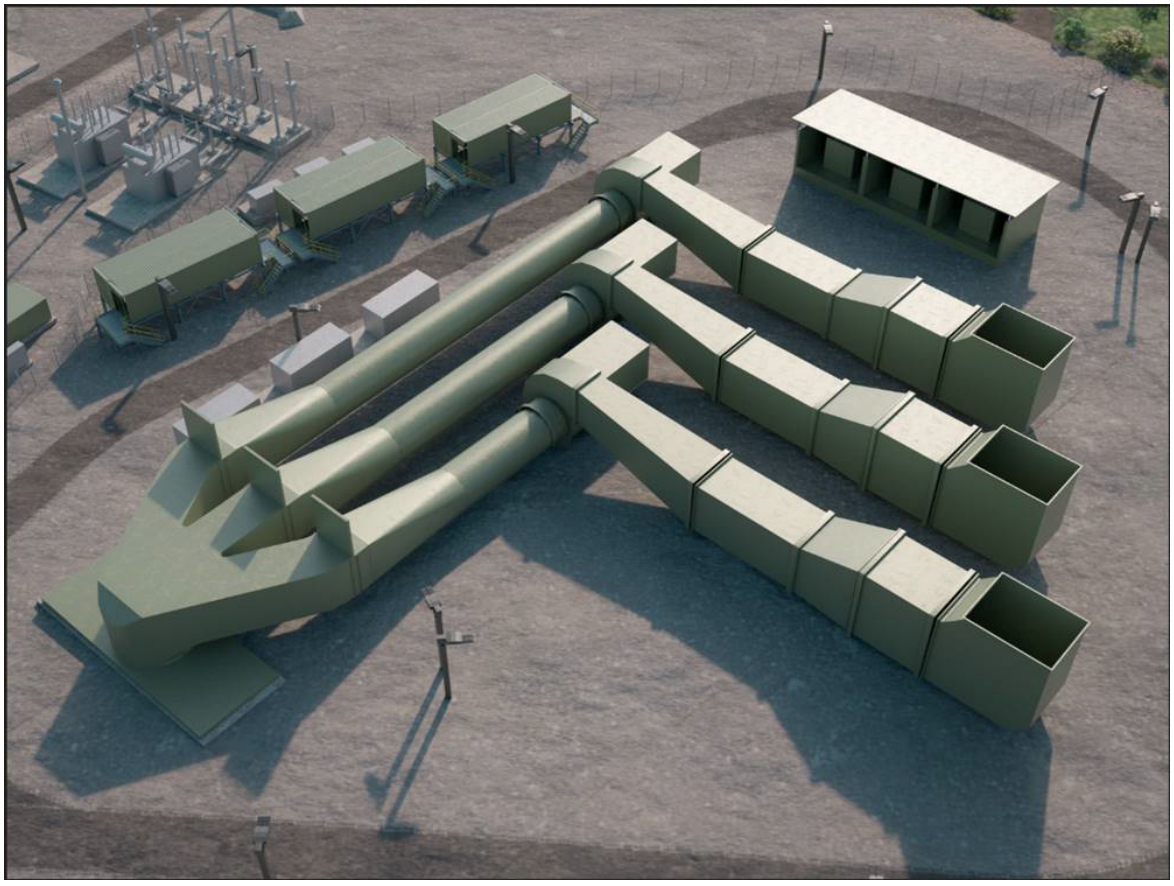
The fan evases have been designed such that they would be located away from residential receivers and in consideration of the predominant wind direction. The fan evases (angled upwards between 45 and 90 degrees) would have capacity to discharge approximately 440 m^3/s of MVA.

Utility (power, water, communications) upgrades and installation would also occur as part of the fan installation. The exact location and capacity of the new services required, in addition to reticulation routes and any upgrades required to the existing systems to support the changes would be determined during

detailed design. Electrical and communications cable connections would be made to the underground workings from the bottom of the shaft to the underground workings.

The VS8 fan set would be integrated into the Mine wide ventilation control system.

Figure 3-16 Artists impression of VS8 ventilation fan infrastructure



3.7.5 Administration buildings, bathhouses, workshops and surface facilities

The Site infrastructure would include all buildings at the surface level to support the ventilation and mine access operations (Figure 1-2 andFigure 3-18). The surface facilities would include:

- Administration office space and all associated amenities such as a reception, meeting rooms, kitchen, and Personal Protective Equipment (PPE) room. This also includes other facilities to be established as separate modules including toilet block, lamp room, PPE and equipment storage and communications room.
- Undercover storage area for the unloading and storage of goods. The undercover storage area would comprise both covered storage and an open laydown yard as well as an office area to facilitate inventory management. The area would be approximately 800 m^2 in area, and minimum 6 m height clearance.

- Sewage Treatment Plant (STP) to treat all wastewater generated on-site to an appropriate standard for the receiving environment, in accordance with relevant guidelines[13]. The treatment plant is sized with a capacity for up to 25 m^3/day, discharging via an irrigation spray field.
- An irrigation spray field, developed to facilitate the discharge and evaporation of the wastewater generated on the Site in accordance with the Mine Water Management Plan. The irrigation rates would be determined during the detailed design and be based on the underlying soil properties[14]. The design would be comparable to the existing spray field at Appin West and two locations (A1 and A2 in Figure 1-2Figure 3-18) have been identified as feasible options, pending further investigation. Area A1 is 8,500m^2 and Area A2 is 7,700m^2. Both areas are offset by more than 100 m from Foot Onslow Creek. The irrigation spray field would be suitably vegetated. A licenced discharge point would be required to manage the irrigation discharge.
- Helipad to facilitate the landing and take-off of rescue helicopters in the event of an emergency. The helipad would be located as close as practicably possible to the mine access shaft to enable swift extraction of any injured personnel.
- Bathhouse and changeroom complex housing changerooms, lockers and showers to facilitate personnel commencing and completing a shift.
- Firewater tanks, diesel and electric pumps and shelter to provide an adequate water supply to the mine access facilities for firefighting.
- Muster station required for the assembly of all personnel for pre-starts, safety talks and other communication events. The area is enclosed to provide a weatherproof space between critical support amenities.
- First aid room.
- Mine rescue shed for the storage of rescue equipment used by the emergency response team. The shed is required to allow for all weather access to the emergency response vehicles.
- Undercover walkways to provide the safe, all-weather access and movement of personnel between the facilities.
- Carparking facilities to cater for the maximum number of personnel expected on site on the peak day of any week (typically this will be at day-shift changeover on the regular maintenance day when additional maintenance personnel will be expected to attend the Site).

Design of these facilities will consider the potential visual impact on the community and where practicable, the facilities will be designed to fit in with the natural environment. This will include the use of a subdued colour palette unless there is a colour requirement for safety purposes. Visual bunding and tree planting surrounding the Site would reduce visibility of these structures from street level. Further details on visual amenity mitigation measures are provided in Section 6.13.

Visual and noise mitigation barriers would be constructed on the western, southern and northern sides of the Site; between the Site and residential receivers. These barriers would be preferentially constructed from spoil generated from excavation of the shafts. Where required, the barriers may be constructed from coal wash suitable for engineering use or prefabricated walls or concrete walls. The characteristics of the barriers are described further in the noise impact assessment in Section 6.3.

Other temporary facilities may be installed as part of any significant maintenance or operational events planned on the Site during construction and operations.

---

[13] Including *Recycled Water Management Systems* (Department of Primary Industries Office of Water 2015) *and Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1),* Environment Protection and Heritage Council, the Natural Resource Management Ministerial Council and the Australian Health Ministers' Conference (2006)

14 Where volumes of waste water exceed site capacity, a licensed waste removal contractor will remove and dispose of waster water / effluent at a licensed discharge facility.

3.7.6 Supply, storage and delivery of underground materials and services

VS7 will be used to convey potable water, fuel and lubricants via transportable trailer pods (500 to 2000 litres) in the mine access conveyance. Trailer pods will be stored in the dedicated storage area adjacent to the undercover storage shed for ease of filling as well as transport to and from the shaft. VS7 will also be used to convey other consumables to the Mine such as:

- timber
- mesh
- mega bolts
- rock bolts (and chemicals for the rock bolts)
- stone dust bulk bags
- cement bags (grout)
- hydraulic oils
- transmission oil
- fuel
- pipes.

These materials will be transported to the Site via road.

The Project also includes the development of service boreholes to provide communications (fibre optic) connection to the underground communications network, as well as 11kV power supply from the surface HV switchyard to the underground HV supply network. The boreholes are drilled using appropriate drilling/boring equipment, before being lined and grouted.

3.7.7 Electrical infrastructure

3.7.7.1 High voltage electrical infrastructure

High Voltage (HV) power would be supplied from a 66 kV power supply line adjacent to the Site, owned by Endeavour Energy (EE). IMC has engaged with EE to confirm the location of the connection point. Preliminary feedback from EE indicates that future system upgrades are proposed as part of work to support the Greater Macarthur Growth Area[15]. EE have advised a 66 kV connection point may be established either on the north-eastern end of the property, in line within the existing power line easement that runs along the eastern side of the property, or from a new easement to be established. These developments are outside the scope of the proposed modification and will be developed further by EE in conjunction with IMC, subject to the appropriate legislative approvals pathways.

Activities to connect to the 66kV power supply are within the Project scope, and include the landing structure, Point of Connection (PoC) switchgear and metering units. A 66 kV overhead line (OHL) would run from the connection point within the EE easement into the Site before being transitioned to a buried cable which will terminate at the 66/11 kV substation (Figure 1-2Figure 3-18), The substation and switchyard will step the power down to 11 kV for site distribution.

The 66/11 kV substation would comprise of transportable skid mounted units, including air break switches, 66 kV busbars, 23/31.25 Mega Volt Ampere transformers, current transformers, circuit breakers, earth switches, isolators, surge arrestors, lightning arrestors, and neutral earth resistors. Dual

[15] Refer to Page 19 of https://www.endeavourenergy.com.au/wps/wcm/connect/aa08bdad-060a-4d07-9d05-dd8aa339d094/Endeavour+Energy+Growth+Servicing+Plan+2018+FINAL.pdf?MOD=AJPERES.

transformer redundancy will supply the surface and underground loads totalling an average of approximately14.4 Mega Volt-Amps and maximum of 20 Mega Volt-Amps.

The 66/11 kV substation would supply power to the switchroom, with three ring main units that would reticulate power to the surface infrastructure and shaft bottom. The 11 kV power would be distributed via buried cables to the ventilation fans, winder building and two 11 kV/415 volt (V) transformers with associated low voltage distribution boards. The ventilation fans and the winder building would have dedicated 11 kV/3.3 kV/415 V transformers for powering the associated low voltage loads.

The HV electrical infrastructure would continue to provide electrical power for the operation of the ventilation fans, mine access equipment, pit bottom and other surface infrastructure over the operational life of the Project.

3.7.7.2 Low voltage electrical infrastructure

For construction, the existing 11 kV service owned by EE in the Menangle Road reserve, would be used for the power supply. IMC has engaged with EE to confirm the location of the connection point and requirements to relocate existing OHL on the site. Engagement with EE will continue through detailed design. Temporary transformers would be installed on site for low voltage (LV) supply for construction activities. Temporary generators would be used to supplement the LV power supply during the initial phases of site establishment and construction, prior to establishment of the augmented LV network.

The operational phase LV network would supply low voltage power to buildings and services on the Site that require LV electrification and auxiliaries. The 11 kV network is designed as a buried network, which would run within trenches around the Site.

3.7.7.3 Backup generation – diesel

Emergency infrastructure, including up to five emergency diesel power generators, would be installed adjacent to the 11 kV switchyard (Figure 1-2). This provision would ensure a minimum required level of mine ventilation and access capability during any possible unplanned main power outages. The backup power capabilities would also assist with mitigating the duration of mine outages upon restoration of mains power.

Diesel storage tanks would be located adjacent to the generators (Figure 1-2Figure 3-18). The design of the immediate foundation area surrounding the diesel unit will incorporate satisfactory bunding to capture and contain any fuel or oil spills during filling operations or potential tank ruptures. Emergency spill kits and appropriate fire extinguishers will be kept in the vicinity of all fuel storage containers. Further details on management measures are provided in Section 6.7.3.

3.7.8 Site utilities and security

Additional permanent utilities will be established on the Site including communication, lighting, fire protection, potable water connection, sewage reticulation (noted above), high and low voltage reticulation, and the required trenching to establish these utilities. Several trench arrangements are required to protect the water, communications, electrical and sewerage services, and will be constructed to relevant Australian standards.

Communications infrastructure

Communications infrastructure for the Site would include key infrastructure to communicate with Mine areas, via the offsite communication links (underground fibre primary; offsite Telstra secondary). This includes radio communication for the surface facilities and radio communication link for the underground facilities. Infrastructure to communicate with the Mine, would include:

- Fibre and Wi-Fi access to buildings and services requiring communication to other buildings and services, including corporate network for onsite personnel including telephony services, servers and storage, LAN, WAN, and CCTV.
- Dual fibre network connection to underground within VS7 and via a service borehole installed during the construction phase.
- Radio communication facilities for the surface and radio communication link to underground facilities.
- Hard-wire fibre connection for the ventilation fans to the Mine control room.

An existing Telstra fibre optic cable runs along the north side of Menangle Road and onto the Site. This cable will be relocated along the proposed site access road and provide a secondary fibre connection for the Site.

Lighting and security

The lighting network on the Site would provide power and lighting to all working areas onsite that need to meet the required lighting levels set by AS1680 and AS2293, including emergency lighting. The lighting design will be developed during detailed design phase of the Project and will consider glare and obtrusive lighting on neighbouring properties and minimise power use whilst achieving the required standards.

Site security fencing and gates would be installed along the Site boundary and surrounding high-risk infrastructure areas (as required), including buildings, headframe and winder, fans and substation. The perimeter fence would have a total length of approximately 1387 m and would be located 2 m from the boundary of the Site. The fence would typically be a 2.4 m high barb wire and chain wire security fence, in line with installations at other Mine facilities. The fencing has been designed to ensure access by the public is restricted to the Site, and access to high-risk zones is only for authorised personnel. The perimeter fencing has also been designed to deter access to fauna, identified in the ecological survey (See Section 2.2.5.2).

Boom gates would be installed at the main access gate adjacent to the Menangle Road intersection and within the Site surrounding high-risk zones. Chain wire vehicle access gates would be installed for other amenities. Personnel turnstiles and access facilities would be installed between the Site carpark and main infrastructure area. CCTV security cameras would be installed throughout the Site.

Water supply

A reliable supply of water would be required to facilitate construction and operation phases. There are currently no water connection or supply points within the vicinity of the Site. An application has been made to Sydney Water for the extension of the Menangle water supply network, following required water mains network upgrades.

Preliminary feedback from Sydney Water indicates that there is no uncommitted spare capacity in the Menangle system to supply the Project; however, future system upgrades are proposed for the Menangle Park Growth Area. Discussions are continuing with Sydney Water to align these upgrades with the proposed Project. Any required upgrade and extension would be undertaken by Sydney Water. Works required to connect the new supply point to the Site would be completed by IMC as part of this Project. The connection point would be located within the Site boundary; the final location and specifications are to be determined in conjunction with Sydney Water during detailed design.

The estimated water usage during the Site establishment and construction phases would be approximately 25 kilolitres (kL) per day. However, water usage would fluctuate depending on the type of construction activity.

Given the time required to establish a permanent supply, construction water would need to be delivered to site via water cart. It is proposed that water will be sourced from the existing water supply at the

Ventilation Shaft 6 (VS6) site (refer to Section 4.5.1.1) and transported to the Site via water cart. Minor upgrade or augmentation to the existing tanks, pipeline and standpipe (and associated infrastructure) at the VS6 site may be required to provide adequate water supply.

SOUTH32

FIGURE 3-17

Proposed power, communications and water infrastructure

Appin Mine Ventilation and Access Project

N

0 50 100

m

GDA 1994 MGA Zone 56

Alternative construction water supply for the Project includes an authorised Sydney Water supplier (a potable water fill point) or surplus raw water from the Mine Water Treatment Plant (WTP). The Appin West WTP produces surplus raw water suitable for construction use, in variable volumes.

During the operational phase, the overall water required would be approximately 6.6 megalitres (ML) per year, based on a 21.8 kL/day peak demand. The predominant uses of water are for underground pods, administration buildings, bathhouses, storage areas and cooling of the variable speed drives for the fans. Water will also be required to be available for firefighting.

Should the permanent water supply be unavailable or delayed for the Project requirements, the water supply established during construction will remain for the operational phase of the Project until the permanent supply is established.

Alternatively IMC has considered a contingency option to run a dedicated pipeline from the VS6 pump station to the Site. This proposal would also require upgrades to the VS6 site, associated storage tanks and a water treatment plant. If required, this pipeline and associated upgrades would be separately assessed under the Mine Surface Activities Management Plan.

3.7.9 Waste management

The Project would generate waste streams of a similar nature to current waste generation at the Mine. Waste sorting would be limited on-site with the majority of recyclable and general waste being recycled or disposed of off-site at an approved waste management facility. IMC would continue to apply general waste minimisation principles (i.e. reduce, re-use and recycling where practicable) to minimise the quantity of wastes that require disposal.

General waste produced by the Project at the surface facilities would continue to be deposited into general waste bins. General waste surface bins would be disposed of by a licensed waste contractor. General waste produced at the underground mining areas would continue to be transported from underground general waste bins to an off-site approved waste handling facility for sorting and recycling or disposal.

An overview of the waste types likely to be generated by the Project is presented in Table 3-7.

Table 3-7 Waste streams likely to be generated by the Project

Waste stream	Indicative waste class[1]	Management method
Timber, cardboard, paper, steel, scrap metal, commingle, food waste, etc.	General Solid Waste (non-putrescible)	Transported to an approved waste handling facility and recycled as required.
Used oil filters	General Solid Waste (non-putrescible)	Temporarily stored on-site in designated bins prior to removal from site by an appropriately licensed waste contractor.
Used particulate filters		
Other workshop wastes (e.g. rags and oil-absorbent materials that only contain non-volatile hydrocarbons and do not contain free liquids)		
Tyres	Special	Used tyres would be segregated and collected either for repair (if possible) or disposal by a licensed waste contractor.
Bathhouse water	Liquid	Onsite treatment within the Site STP and irrigated on site as per any required discharge criteria. Where volumes of effluent exceed site capacity, a licensed
Sewage effluent	Liquid	

Waste stream	Indicative waste class[1]	Management method
		waste removal contractor will remove and dispose of effluent at a licensed discharge facility.
Waste oil and grease	Liquid	Used containers would be drained into bulk containers and temporarily stored prior to collection by a licensed contractor for processing off-site.
Wastewater from ventilation shaft construction, compressor plant and gas plant	Liquid	Temporarily contained on-site, and then either pumped pumped to a storage pond for assessment prior to discharge as per any required discharge criteria, or where the discharge criteria is not met, appropriately disposed offsite for treatment and disposal by an appropriately licensed waste contractor.
Hazardous waste (e.g. explosives, lead-acid or nickel-cadmium batteries and containers that have not been cleaned containing residue of dangerous goods)	Hazardous	Temporarily stored on-site in a designated area prior to removal from the Site by licensed contractors.
Contaminated waste or asbestos (if identified)	-	Further assessment and advice would be sought regarding waste classification, handling, treatment, disposal and reporting requirements prior to appropriate disposal.

1 Described or pre-classified waste in Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014).

3.7.10 Management and transport of dangerous goods

The transportation, handling and storage of all dangerous goods for the Project would be conducted in accordance with the requirements of the NSW *Work Health and Safety Regulation, 2017*.

The dangerous goods stored for the Project would include compressed gases, flammable and combustible liquids, and corrosive substances. Based on the quantities proposed to be stored for the Project, it is not anticipated that a Dangerous Goods Licence would be required.

Dangerous goods required for the Project would be transported in accordance with the appropriate State legislation.

Section 6.11 addresses management of dangerous goods in greater detail.

3.7.10.1 Hydrocarbon storage

Hydrocarbon bunded areas would be constructed on site to be used for the Project. Existing procedures at the Mine to maintain safe working conditions of the bunded areas, including regular inspections, would continue to be employed for the Project.

The Project will develop bulk chemical storage containers within the bunded areas for hydraulic oil storage (approximately 5,000 L storage capacity) and diesel storage (approximately 40,000L storage capacity). Hydrocarbon storages would be operated in accordance with the requirements of AS 1940 The Storage and Handling of Flammable and Combustible Liquid.

In addition to the above permanent bunded areas, portable bunds would be used for transient storage or for transportation of oils and fuels around the Site.

Where there is potential for hydrocarbon spillage, spill kits and/or bins containing oil absorbent material would be present. Surface personnel would be made aware of the locations of these spill kits and absorbent material bins in their work area. The contents of the spill kits and the oil absorbent material bins would continue to be inspected on a regular basis.

3.7.10.2 Explosives storage

The storage of explosives would be conducted in accordance with the NSW *Explosives Act 2003* and the Explosives Regulation 2013. Explosives will be stored at either the explosives contractor's or IMC's existing facilities, where requirements of *Australian Standard 2187.1-1998: Explosives – Storage, transport and use, Part 1: storage (AS 2187.1-1998)* are complied with. During detailed design, the location and specifications of the explosives storage area will be determined.

3.7.11 Surface facilities and supporting infrastructure upgrades

In accordance with the EA, over the life of the BSO Project depending on the scheduling and timing of the longwall operations, the underground operational workforce may redistribute between mine access locations. This will include Appin West, Appin East, Appin North and the Site once operational.

Progressive upgrades of the mine access facilities are therefore proposed to be undertaken during the life of the Project to accommodate the progression of the Mine. This would include upgrades of the existing surface facilities (ventilation infrastructure, buildings, bathhouses, storage areas) and supporting infrastructure, additional car parking facilities, additional water management or security facilities, which would be progressively developed in parallel with ongoing mining operations.

Surface construction/development activities during the operational phase would generally be undertaken during normal construction hours up to seven days per week, in accordance with the Mine Approval. Additional mobile equipment would be required for short periods during the Project construction/development activities including mobile cranes, excavators, loaders and delivery trucks. The number and type of equipment would be expected to vary depending on the activity being undertaken.

3.7.12 Rehabilitation and remediation activities

Taking into account IMC's legal obligations and South32's purpose, values and standards, IMC's overarching objectives for rehabilitation, remediation and site closure are:

- Safe landforms suitable for future land uses as agreed with relevant stakeholders.
- Landforms that are stable in the long term without significant additional management being required post-relinquishment.
- No unacceptable impacts to people and the environment through pollution or other changes to environmental factors.
- Positive legacy for the community post-closure.

The BSO Mine Operations Plan (MOP), including the BSO Closure Plan as an Appendix, addresses requirements and objectives for all domains associated with the Mine. The MOP outlines a range of post land use options that are available for the Mine domains upon completion of operations. If approved, rehabilitation and closure planning for VS7 and VS8 will be incorporated into the BSO Mine Closure Plan as a separate domain.

A final land use of rural and/or residential use, consistent with current and surrounding land use, is proposed for the Site. However, in recognition of the location and setting of the Site and the potential benefits of alternative uses such as residential development, light industrial or employment generating activities, the proposed final land uses will be reviewed over the mine life in consultation with government and the relevant, future, stakeholders.

3.7.12.1 Rehabilitation requirements

Due to the proposed operational life of the Project, it is premature to set specific rehabilitation and closure completion criteria prior to undertaking relevant studies at the (future operational) Site or undertaking consultation with the relevant, future, stakeholders.

The Project, if approved will be managed in accordance with BSO Project Approval (as modified) which contains a number of conditions related to closure and rehabilitation of ventilation shaft and mine access facilities. Table 3-8 below outlines the current Mine Approval conditions that will apply to the Project. The MOP meets the requirements of the Rehabilitation Management Plan required by Schedule 4, Condition 33.

Figure 3-18 Site layout and design for the operational phase (artists impression)

Table 3-8 Summary of Mine Approval conditions relevant to closure and rehabilitation

<table>
<tr><th>Schedule</th><th>Condition no</th><th colspan="2">Condition</th></tr>
<tr><td>2</td><td>11</td><td colspan="2">Demolition
Ensure that all demolition work is carried out in accordance with Australian Standard 2601-2001: The Demolition of Structures (AS 2601-2001).</td></tr>
<tr><td>4</td><td>31</td><td colspan="2">Rehabilitation objectives
Rehabilitate the Site to the satisfaction of the Executive Director Mineral Resources. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA [Environmental Assessment] and the PPR [Preferred Project Report], and comply with the objectives [below].</td></tr>
<tr><td></td><td></td><td>Feature</td><td>Objective</td></tr>
<tr><td></td><td></td><td>Mine site (as a whole)</td><td>Safe, stable and non-polluting.</td></tr>
<tr><td></td><td></td><td>Project surface infrastructure</td><td>To be decommissioned and removed, unless the Executive Director Mineral Resources agrees otherwise.</td></tr>
<tr><td></td><td></td><td>Portals and ventilation shafts</td><td>To be decommissioned and made safe and stable.
Retain habitat for threatened species (e.g. bats), where practicable.</td></tr>
</table>

Schedule	Condition no	Condition	
		Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: • local native plant species (unless the Executive Director Mineral Resources agrees otherwise); and • a landform consistent with the surrounding environment.
		Built features damaged by mining operations	Repair to pre-mining condition or equivalent unless: • the owner agrees otherwise; or • the damage is fully restored, repaired or compensated for under the *Mine Subsidence Compensation Act 1961*.
		Community	Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.
4	32	The proponent shall carry out the rehabilitation of the Site progressively, that is, as soon as reasonably practicable following disturbance.	
4	33	The Proponent shall prepare and implement a Rehabilitation Management Plan for the Project, with specific reference to all surface facilities sites, to the satisfaction of the Executive Director Mineral Resources. This plan must: Be prepared in consultation with the Department, OEH [Office of Environment and Heritage, now NSW Environment, Energy and Science], DPI [Department of Primary Industry, now Department of Planning Industry and Environment], WaterNSW, Council and the CCC [Community Consultative Committee]; Be prepared in accordance with any relevant DRE [now DPIE] guideline and be consistent with the rehabilitation objectives in the Environmental Assessment and above; Provide for detailed mine closure planning, including measures to minimise socio- economic effects due to mine closure, to be conducted prior to the Site being placed on care and maintenance; and Build, to the maximum extent practicable, on the other management plans required under this approval.	
6	3	**Adaptive Management** The Proponent must assess and manage Project-related risks to ensure that there are no exceedances of the criteria and / or performance measures in Schedules 3 and 4. Any exceedance of these criteria and / or performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation. Where any exceedance of these criteria and / or performance measures has occurred, the Proponent must, at the earliest opportunity: • take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur; • consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and • implement remediation measures as directed by the Secretary, to the satisfaction of the Secretary.	
Appendix 6 Statement of Commitments		**Rehabilitation** Illawarra Coal [now IMC] will undertake rehabilitation of any areas disturbed by the project to ensure the environment is returned as close as possible to pre-project condition and / or to meet landowner specific requirements. De-commissioning of boreholes and shafts will be undertaken in accordance with the requirements of the relevant government department/s.	

3.7.13 Workforce

Additional personnel would be required for construction and ongoing operational activities throughout the life of the Project.

The construction workforce will vary based on the activities being undertaken. During the peak construction period where a number of activities overlap for a period of 6 to 8 weeks, up to 76 construction workers will be on site at the same time.

Once operational up to 308 personnel will access the Mine site on the busiest day (a maintenance weekday which occurs 1 day per week) over 3 shifts per day. A significant proportion of this workforce is expected to consist of existing employees/contractors who currently access the Mine via a different site.

During the operational phase of the Project, the Site would provide access to the underground mining operations in the current Appin Area 7, and future mining areas, for underground personnel and mine equipment and supplies. The current shift arrangements at the Mine are proposed to be continued at the Site. In accordance with Section 2.14 the EA, during the life of the Mine, alternative shift configurations to those currently in place would be required to meet operational and industry best practice requirements.

During the operational phase, in accordance with Section 2.14 the EA, upgrades of surface and underground infrastructure may occur, requiring an additional construction workforce of up to 100 people for short periods. Surface construction/ development activities would generally be restricted to daylight hours. Underground construction works would be undertaken up to 24 hours per day.

3.7.14 Detailed design and innovation

IMC will continue to refine and improve aspects of the Project throughout detailed design. This will include aspects of the Project identified in this report to be further developed and improved during this period, such as the construction blast design and mitigations required for construction blasting out of hours described in Section 3.7.3.3.

As specialised construction contractors are engaged it is anticipated that innovations and efficiencies will be identified that will lead to Project design and methodology improvements. IMC is committed to adopting improvements, efficiencies and innovations where they can be demonstrated to comply with the Mine Approval (as modified). Innovations which reduce environmental and community impacts of the Project will be prioritised.

4 STATUTORY CONTEXT

4.1 Introduction

This chapter:

- Provides an overview of the project approvals, mining leases, licences and exploration leases associated with the Mine.
- Summarises the Commonwealth and NSW regulatory and policy framework required to modify the Mine Approval under Section 4.55 of the EP&A Act.
- Describes the assessment pathway under this framework and identifies other approvals under State and Commonwealth legislation which are required.

4.2 Overview of existing approvals

Table 4-1 below details the project approvals, mining leases, licences and exploration leases associated with the Mine.

Table 4-1 Development approvals associated with the Mine

Approval	Issue date	Expiry date
MP08_0150 - BSO Project Approval under Section 75J of the EP&A Act 1979	22 Dec 2011	31 Dec 2041
EPBC 2010/5350 - Federal Government approval of the BSO Project under Sections 130(1) and 133 of the EPBC Act 1999	15 May 2012	15 May 2042
No. 6 Ventilation Shaft (NSW Government)	Modification under former section 75W (now repealed) of the Environmental Planning and Assessment Act 1979 granted on 28 October 2016 incorporated the VS6 Approval requirements into the Project Approval.	31 Dec 2041
EPBC 2010/5722 - Federal Government approval of the Appin Mine Ventilation Shaft No. 6 under Sections 130(1) and 133 of the EPBC Act 1999	1 Apr 2011	1 Apr 2041

Table 4-2 Mining leases and licences associated with the Mine

Mining lease / sub-lease	Number	Issue date	Expiry date
Coal Lease	388	22 Jan 1992	22 Jan 2034
Mining Lease	1382	20 Dec 1995	20 Dec 2037
Mining Lease	1433	24 Jul 1998	23 Jul 20191
Mining Lease	1574	09 Jul 2008	30 Dec 2023
Mining Lease	1678	27 Sep 2012	26 Sep 2033
Mining Lease	1698	26 Jun 2014	25 Jun 2035
Consolidated Coal Lease	724	4 Jul 1991	18 Dec 2031
Consolidated Coal Lease	767	29 Oct 1991	08 Jul 2029
Coal Lease	381	24 Oct 1991	24 Oct 2033

Mining lease / sub-lease	Number	Issue date	Expiry date
Mining Purposes Lease	200	13 Jan 1982	13 Jan 2024
Mining Purposes Lease	201	13 Jan 1982	13 Jan 2024
Mining Lease	1473	20 Nov 2000	19 Nov 2021
Environment Protection Licence	2504	14 Feb 2001	No expiry
Water Approvals	10WA117999	15 Nov 2012	14 Nov 2027
	10WA103794	1 Jul 2011	30 Jun 2024
	10WA118778	1 Jul 2013	18 Feb 2028
	10WA118766	1 Jul 2013	24 Jun 2028
	10WA117285	15 Nov 2011	14 Nov 2026
Groundwater Access Licence	36481 – West Cliff	N/A	
Groundwater Access Licence	36477 - Appin	N/A	
Groundwater Access Licence	37464 - Appin	N/A	
Surface Water Access Licence	35519 – Brennans Creek Dam	N/A	
Surface Water Access Licence	30145 – Mountbatten	N/A	
Radiation Licence West Cliff Washery (EPA)	5061052	26 Jul 2020	Renewed annually

[1]ML1433 renewal was applied for on 18/07/2018 and is still pending.

Table 4-3 Exploration leases associated with Mine

Mining Lease / Sub-Lease	Site	Issue Date	Expiry Date
A199	West Cliff	27 Jun 1980	27 Jun 2024
A201	Appin	27 Jun 1980	27 Jun 2024
A248	Appin	13 May 1981	13 May 2021 3
A306	West Cliff	19 Jul 1983	27 Jun 2024
A312	Appin	10 Aug 1983	10 Aug 2023
A370	Appin	8 May 1986	27 Jun 2024
A395	Appin	23 Nov 1987	10 Aug 2023
A396	Appin/West Cliff	28 Jun 1988	27 Jun 2024
A397	West Cliff	4 Aug 1987	27 Jun 2024
A432	West Cliff	12 Feb 1991	31 Aug 2023
EL 4470	Appin	5 Jan 1993	5 Jan 2021
EL 8972	Appin	29 Apr 2020	29 Apr 2026

4.3 Commonwealth legislation

4.3.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

4.3.1.1 Matters of National Environmental Significance

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the principal environmental legislation which protects and manages matters of national significance. There are nine matters of national environmental significance (MNES), as defined under the EPBC Act, as follows:

- world heritage properties;
- places listed on the National Heritage Register;
- wetlands of international significance listed under the Ramsar Convention;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, actions that will, or are likely to, have a significant impact on a MNES are deemed to be controlled actions and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that has the potential to significantly impact a MNES has to be referred to the Department of Agriculture, Water and the Environment (DAWE) for determination as to whether it is a controlled action.

The only MNES that are relevant to the Project is threatened flora and fauna species, ecological communities and water resources, in relation to large coal mining development.

As outlined in Section 6.8 and Section 4.3.1.2 the Project will not have a significant impact on any MNES and therefore an EPBC referral has not been made to the DAWE, and no further approval is required.

4.3.1.2 Water resources

Section 24D of EPBC Act provides the “requirement for approval of developments with a significant impact on water resources”. These requirements apply to a constitutional corporation taking an action that involves:

(i) coal seam gas development; or

(ii) large coal mining development;

Where the action:

(i) has or will have a significant impact on a water resource; or

(ii) is likely to have a significant impact on a water resource.

A ‘large coal mining development’ is defined under the EPBC Act (section 528) as:

any coal mining activity that has, or is likely to have, a significant impact on water resources (including any impacts of associated salt production and/or salinity):

a) in its own right; or

b) when considered with other developments, whether past, present or reasonably foreseeable developments.

The Significant impact guidelines 1.3: Coal seam gas and large coal mining developments — impacts on water resources (Guidelines) published by the Australian Department of the Environment and Energy provides guidance on the definition of a 'large coal mining development'. The Guidelines make the following comments with respect to 'associated infrastructure' at section 3.5:

> The development of associated infrastructure that is not part of the extraction process is not included in the definitions of 'CSG development' or 'large coal mining development'. This may include:
>
> - Transport infrastructure, such as pipelines, road or rail infrastructure.
> - Office/housing and amenity construction.
> - Environment protection, monitoring and associated land management activities.
>
> The development of infrastructure that is associated with CSG or large coal mining development, but which is not sufficiently proximate that it can be said to involve the extraction of CSG or coal, does not need to be referred for its impacts on a water resource. Note that the action may need to be referred if it impacts on other matters of national environmental significance.
>
> [...] if the CSG development or large coal mining development does not itself have a significant impact on a water resource, then the action does not need to be referred under the water trigger, even if other parts of the action could be considered to have a significant impact on a water resource.

The Guidelines state the following at 3.6:

> An expansion or modification to existing facilities may be within the definition of 'CSG development' or 'large coal mining development' if the expansion or modification involves extractive CSG or coal mining activities which are likely to have a significant impact on a water resource.

The Guidelines make the following comments with respect to 'expansions or modifications' at section 4.2.1:

> If a referral for a proposed expansion or modification to a project does not involve extraction of CSG or coal, then it will not be within the definition of 'coal seam gas development' or 'large coal mining development', and the water trigger will not apply. Note however that where an expansion or modification is referred as part of a broader action that involves the extraction of CSG or coal, the water trigger may apply to the expansion or modification. If an expansion or modification involves extractive activities that are likely to have a significant impact on a water resource, the water trigger may apply.

The Project is properly characterised as "associated infrastructure" or a "proposed modification that does not involve the extraction of coal" neither of which trigger the approval requirement in section 24D of the EPBC Act based on the Guideline.

4.3.2 Commonwealth Native Title Act 1993

The Commonwealth *Native Title Act 1993* recognises and protects native title rights in Australia. It allows a native title determination application (native title claim) to be made for land or waters where native title has not been validly extinguished. Native title is often extinguished by the grant of freehold title to land. Where native title hasn't been extinguished, the Native Title Act 1993 provides a mechanism that allows development to occur on land where native title may exist, whether or not determined, and sets out

acceptable minimal standards of consultation with native title groups. These range from notification, agreements with native title groups to approval.

As the land on which the Project is proposed is freehold title, native title has been validly extinguished. Notwithstanding, the National Native Title Register, Register of Native Title Claims, Unregistered Claimant Applications register, and Register of Indigenous Land Use Agreements were searched in May 2021 for reported native title claims across the Site. There were no results for declared native title on the Site.

4.3.3 Commonwealth National Greenhouse and Energy Reporting Act 2007

The Commonwealth National Greenhouse and Energy Reporting Act 2007 (NGER Act) provides a single national framework for the reporting and dissemination of information about the greenhouse gas emissions, greenhouse gas projects, and energy use and production of corporations. It makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds.

IMC triggers the threshold for reporting under the NGER Act, and accordingly energy use and greenhouse gas emissions from its operations.

IMC will continue to monitor and report energy use and greenhouse gas emissions associated with the Mine (as modified by this Project) under its obligations under the NGER Act.

4.4 NSW Environmental Planning and Assessment Act 1979

4.4.1 Overview

The EP&A Act and NSW *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) form the statutory framework for planning approval and environmental assessment in NSW. Implementation of the EP&A Act is the responsibility of the Minister for Planning and Public Spaces, statutory authorities and local councils.

Part 4, Division 4.7 of the EP&A Act provides for the assessment of SSD. The Minister for Planning and Public Spaces (or delegate) or the Independent Planning Commission (IPC) is identified as the consent authority.

Section 4.55 of the EP&A Act provides the planning pathway for the modification of SSD consents.

Whether a development or use of land is permissible (subject to grant of development consent or otherwise) is set out in environmental planning instruments (EPIs), being State environmental planning policies (SEPPs) or local environmental plans (LEPs).

4.4.2 State Significant Development

Project Application 08_0150 (BSO Project) was approved under Section 75J, Part 3A of the EPA&A Act on 22 December 2011.

Part 3A (Major Infrastructure and Other Projects) of the EP&A Act was repealed by the NSW *Environmental Planning and Assessment Amendment Act 2011* (Part 3A Repeal Act) 27 June 2011.

Former Part 3A projects continued to enjoy the benefit of the Part 3A transitional provisions (via Schedule 6A of the EPA Act), enabling the modification to be made and determined under the previous regime until 1 March 2018. The transitional arrangements for former Part 3A projects have now ceased. This means that all future modifications to Part 3A projects after this date are to be assessed under the

SSD and SSI pathways under Part 4 of the EPA Act. The regime requires a transfer from a transitional Part 3A project to SSD or SSI (as relevant). The mechanism for transferring a transitional Part 3A project to SSD or SSI is set out in Schedule 2 of the EP&A Regulation clauses 5 and 6, involving an order of the Minister (published in a Gazette) declaring the project to be SSD or SSI. Relevantly, the Project ceases to be a transitional Part 3A project on the making of the declaration. The BSO Project (08_0150) was gazetted as SSD for the purposes of future modifications on 23 November 2018.

Therefore, modification applications to the BSO Project (08_0150) are to be made under Section 4.55 of the EP&A Act and application of the 'substantially the same' test applies to the BSO Project as at the time it is declared to be a SSD. According to DPIE (2019) *Preparing a modification report – State significant development guide (exhibition draft)* (the draft modification guideline) an application to modify an SSD project must be accompanied by a modification report.

It was confirmed in correspondence from DPIE dated 29 October 2020 that the approval pathway for the Project is under Section 4.55(2) of the EP&A Act for “Other modifications”.

4.4.2.1 Consistency with Section 4.55(2) & (3)

The threshold test at section 4.55(2) of the EPA Act for Part 3A Projects is moderated by the qualification to the test contained at clause 3BA(6) of Schedule 2 of the EPA Regulations, which provides:

> *(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,*
>
> *(b) development that was taken to be an approved project pursuant to clause 8J of the Environmental Planning and Assessment Regulation 2000 and whose consent was modified under section 75W.*

According to Section 4.55(2) of the EP&A Act, a consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if—

> *(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all).*

The Mine Approval (08_0150) approves amongst other things:

- the underground longwall mining operations, which extract coal from the Bulli Seam using underground longwall mining methods, and the associated surface activities.
- Upgrade of existing and construction of new surface facilities and supporting infrastructure (e.g. access roads, ventilation shafts, sumps, pumps, pipelines, water treatment and waste water disposal or treatment).

The Project is substantially the same development as the BSO Project as it involves the construction and operation of mining infrastructure subject to PA 08_0150, that is, *ventilation and mine access shafts, on land within the longwall mining domain.*

> *(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a*

concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent.

The Project is SSD and therefore concurrence is not required, however, it is assumed DPIE will consult relevant authorities as required.

(c) it has notified the application in accordance with—

(i) the regulations, if the regulations so require

The community and government stakeholders were notified about the Project through the thorough community and stakeholder engagement process as described in Section 5. DPIE will publicly exhibit the modification report to allow the community and government stakeholders the opportunity to review and provide comments on this report.

(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent.

Not applicable as the council is not the consent authority.

(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be

Stakeholder feedback has been considered as described in Section 5.

According to Section 4.55(3) of the EP&A Act, in determining an application for modification of a consent under this section, the consent authority must take into consideration such of the matters referred to in section 4.15(1) as are of relevance to the development the subject of the application. The consent authority must also take into consideration the reasons given by the consent authority for the grant of the consent that is sought to be modified.

Section 4.15(1) *Matters for consideration* are addressed in Section 4.4.7.

4.4.3 Permissibility

The Site is zoned RU2 (a rural zone that encourages agriculture and other supporting uses) under the land use table in the Wollondilly Local Environmental Plan 2011 (LEP). Mining is a prohibited land use in this zone.

Notwithstanding the above, clause 7(1)(a) of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP) makes underground mining permissible on any land. Clause 3 of the Mining SEPP defines underground mining as:

a) mining carried out beneath the earth's surface, including bord and pillar mining, longwall mining, top-level caving, sub-level caving and auger mining, and

b) shafts, drill holes, gas and water drainage works, surface rehabilitation works and access pits associated with that mining (whether carried out on or beneath the earth's surface).

Therefore, the Project is permissible pursuant to the Mining SEPP on the land following from the fact that the Mine is an underground mine and the Project involves the development of shafts and access pits associated with the mine.

In addition to the above. cl 7(1)(b) of the Mining SEPP permits mining on land where development for the purposes of agriculture or industry may be carried out (with or without development consent).

Clause 3 of the Mining SEPP defines mining as the winning or removal of materials by methods such as excavating, dredging, or tunnelling for the purpose of obtaining minerals, and includes:

a) the construction, operation and decommissioning of associated works, and

b) the stockpiling, processing, treatment and transportation of materials extracted, and

c) the rehabilitation of land affected by mining.

Coal is a prescribed 'mineral' for the purpose of 'mining' under the Mining SEPP.

Given the zoning of the land, and that the Project includes construction, operation and decommissioning of associated works, the Project is also permissible by way of cl 7(1)(b) of the Mining SEPP.

4.4.4 Objects of the Act

The objects of the EP&A Act are specified in Section 1.3 of the EP&A Act and seek to promote the management and conservation of natural and artificial resources, while also permitting appropriate development to occur. The consistency of the Project with the objects of the EP&A Act is considered in Table 4-4.

Table 4-4 Objects of the EP&A Act

Objectives of the EP&A Act	Consistency of the Project
1. 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,	Specialist consultants have been engaged to assess and report on the potential for the Project to impact upon the natural and artificial resources of the Project area. Notably impacts on the natural environment have been addressed in Section 1 of this report.
2. to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	The Project is consistent with the principles of ecological sustainable development (ESD) as described in 4.4.5.
3. to promote the orderly and economic use and development of land,	The orderly and economic use of land is best served by development which is permissible under the relevant planning regime and predominantly in accordance with the prevailing planning controls. The Project comprises a permissible development which is consistent with the statutory and strategic planning controls, as described in sections 3 and 4.4.3. As detailed in this report, the Project will result in positive economic impacts, with appropriate mitigation measures and management strategies being proposed to reduce any adverse environmental and social impacts.
4. to promote the delivery and maintenance of affordable housing,	Not applicable to the Project.
5. to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	Specialist consultants have been engaged to assess and report on the potential for the Project to impact upon the local environment. Notably, the impacts on flora and fauna have been addressed in Appendix E and Section 6.8.
6. to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	As described in Section 6.9 and 6.10, there are no items of State and local heritage significance on the Site. The Aboriginal Cultural Heritage Assessment completed for the Project identified that part of an archaeological site, Bulli Site 7 (AHIMS ID#52-2-3687), falls within the Project footprint and will be directly impacted as a result of the works program. The Site is

Objectives of the EP&A Act	Consistency of the Project
	assessed to hold low scientific (archaeological) significance. The Registered Aboriginal Parties (RAPs) have advised that all sites have cultural significance. Aboriginal and historic heritage are considered further in Section 6.9 and 6.10 respectively.
7. to promote good design and amenity of the built environment,	Specialist consultants have been engaged to assess potential noise, air quality and visual impacts on sensitive receivers, as described in sections 6.3, 6.4 and 6.13. Design changes have occurred to avoid impacts in the first instance and management measures proposed to minimise and mitigate residual impacts.
8. to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	Structures will be constructed in accordance with their corresponding Building Code of Australia class and Australian standards.
9. to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	As outlined in Section 4.1, the Project is subject to the provisions of Part 4 of the EP&A Act, and the Minister for Planning and Public Spaces will be the consent authority. Despite this, council, as local government authority, has been regularly consulted throughout the planning phase of the Project and preparation of this report (refer to Section 5). As such, it is deemed that both local and State levels of government have been provided with sufficient opportunities to share in responsible environmental planning of the Project.
10. to provide increased opportunity for community participation in environmental planning and assessment.	As outlined in Section 5, government agencies, the local community and other stakeholders have been consulted. This consultation process is ongoing. Any relevant public representations will need to be considered by DPIE during the assessment of the modification application.

4.4.5 Ecologically sustainable development

One of the objects in Section 1.3 of the EP&A Act is "to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment". Section 1.4 (Definitions) of the EP&A Act defers to the NSW Protection of the *Environment Administration Act 1991* (POEA Act) for a definition of ESD. Section 6.2(2) of the POEA Act defines ESD as:

> *…ecologically sustainable development requires the effective integration of social, economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *a) 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.*

In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

a) 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,

b) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

c) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:

   (i) polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

   (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

   (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The following sections consider the relation of the Project to ESD.

4.4.5.1 Precautionary principle

Where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent such damage.

As described in chapters 0 and 1, baseline environmental characteristics have been monitored to understand the condition of the existing environment at and around the Site, and to understand the environmental impacts of previous operations. This data in combination with publicly available data for the region has been used by the technical specialists to predict the Project's environmental impacts.

As described in Section 1, environment aspects requiring assessment were considered and the level of assessment detail for each aspect was proportional to environmental risk.

Project options were considered throughout the design and assessment process, which resulted in optimisation of components based on the interactions of economics, location/layout of components and environmental constraints.

The technical assessments have evaluated the potential for harm to the environment associated with the development of the Project. A range of mitigation measures have been adopted as components of the Project design to minimise the potential for serious and/or irreversible damage to the environment, including the development of environmental management and monitoring programs, and ecological offsets based on conservative assumptions (Section 6.8). Measures designed to mitigate potential environmental impacts arising from the Project are summarised in Attachment 3: .

4.4.5.2 Inter-generational equity

Inter-generational equity is the concept that the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

As described in chapters 1 and 3, the Project will allow for the continued operation of the Mine. This will allow the continued employment of mine personnel as well as the employment a small number of additional site personnel (associated with the operation of the Project). At peak construction, approximately 76 people will be employed to construct the Project. Construction and operation of the Project as well as the continued operation of the Mine will also result in other economic benefits to the region through the purchase of goods and services and associated employment.

Ensuring the continued operation of the Mine will contribute to the viability of major local users of metallurgical coal such as the BlueScope Steelworks at Port Kembla which is a major employer in the region. Any disruption of supply of coal to the BlueScope Steelworks may adversely affect the economic viability and benefits of this facility, through impacts on operational costs, output and employment.

The principles of inter-generational equity are further addressed through:

- management measures to be implemented in relation to the potential impacts of the Project on water resources, heritage, land resources, noise, air quality, ecology, transport, hazards and risks, greenhouse gas emissions and socio-economics.
- implementation of environmental management and monitoring programs. to minimise potential environmental impacts (which include environmental management and monitoring programs covering the Project life).
- implementation of measures during the life of the Project to offset potential localised impacts that have been identified for the development.

4.4.5.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity should be a fundamental consideration in the assessment and determination of development applications. These matters were already considered in the original application for Mine, notwithstanding, the proposed Project will be substantially the same as the approved project and, as described below, any minor impacts to biodiversity will be offset.

The layout and location of surface facilities required for the proposed Project have been through a thorough design process to avoid and/or reduce impacts to biodiversity values. This includes avoidance (as far as practicable) of threatened ecological communities and threatened fauna habitat, as well as minimisation of the disturbance footprint and re-design of the infrastructure to avoid threatened flora and fauna values.

As described in Section 6.8, the Project will have a minor impact on a highly degraded threatened ecological community that is listed in the *Biodiversity Conservation Act 2016*. The vegetation does not meet the thresholds for consideration under the EPBC Act. The Project will offset that impact through the appropriate retirement of biodiversity offsets.

4.4.5.4 Improved valuation, pricing and incentive mechanisms

Environmental factors should be included in the valuation of assets and services when assessing the merits of a development application.

IMC has included a number of environmental and social design mitigation and management measures during project planning and assessment, to minimise environmental impacts from the Project as outlined in chapters 3 and 1.

In consideration of the polluter pays principle, that is those who generate pollution and waste should bear the cost of containment, avoidance or abatement, IMC will apply for a variation to the Mine Environment Protection License (EPL) as described in Section 4.4.8.3. The EPL will specify pollutant loads IMC will be lawfully able to discharge to the environment. EPLs are issued subject to payment of a fee.

4.4.6 Environmental Planning and Assessment Regulation 2000

Clause 20 of the draft Environmental Planning and Assessment Amendment (Major Projects) Regulation 2020 amends Schedule 2, clause 3(2) of the EP&A Regulation by specifying that an application must “for State Significant Development–be prepared having regard to the State Significant Development Guidelines”.

Relevant draft guidelines, *Preparing a modification report – Guidance for State significant projects (DPIE, June 2019)* (the draft modification guideline) have been reviewed. Section 4 of the draft modification guideline specifies the required content of a modification report, which is provided with section references in Table 4-5 and Table 4-6.

Table 4-5 Draft modification guideline requirements

Draft modification guideline section		Report section
3.1	**Introduction** • This section must set the context for the detailed assessment and evaluation of the modified project in the next sections of the Modification Report, and include:	1
	• the applicant's details	1.2
	• a short summary of the approved project, including a map of the Site in its regional setting	Figure 1-1
	• a simple description of the proposed modifications, including:	1.4
	○ the background to the proposed modifications	
	○ the reasons why the modifications are required.	
3.2	**Strategic context** The applicant must prepare this detailed description having regard to the relevant guidance in the Department's Preparing an Environmental Impact Statement guide.	2
	• the justification of the project, including whether any Government strategies, policies or plans (such as environmental planning instruments) provide strategic support for the project	1.4
	• key features of the Site and surrounds that could affect or be affected by the project, including:	2.1
	○ the local and regional community, having regard to land ownership and uses in the area and the proximity of population centres and residences to the site	2.3.1
	○ important natural or built features, such as National Parks, scenic landscapes, conservation areas, culturally important landscapes, and major infrastructure (e.g. roads, railway lines, airports, ports, pipelines, transmission lines)	2.2.3; 2.2.5; 2.4
	○ key risks or hazards for the project, such as flooding, bushfire prone land, contaminated land, steep slopes and landslips, mine subsidence prone land, coastal hazards and climate change	3.7.1
	• whether the Project is likely to generate cumulative impacts with other development in the area (see the Department's Assessing Cumulative Impacts guide);	6.14
	• identifying whether the applicant has entered into any agreements with other parties to mitigate or offset the impacts of the Project such as:	-
	○ voluntary planning agreements	None
	○ negotiated agreements with any landowners, including any terms of these agreements that are relevant to the assessment of the impacts of the Project (see the Department's Voluntary Land Acquisition and Mitigation Policy)	None
	○ any benefit-sharing schemes	None
3.3	**Description of the modifications** This description must include:	-
	• a simple overview of the modifications, including a table comparing the modified project to the approved project	Table 3-2
	• a detailed description of each of the modifications, having regard to the relevant guidance in the Department's Preparing an Environmental Impact Statement guide (see	Table 4-6

Draft modification guideline section		Report section
	• Table 4-6).	
	A consolidated, detailed description of the modified project must be included as an appendix to the Modification Report.	As the proposed modification doesn't change any components of the approved project a consolidated description of the modified project is not provided. The project description provided in this report is proposed to be incorporated into the current Mine description.
3.4	**Statutory context** This section must identify the relevant statutory requirements for assessing and evaluating the modifications to the project, having regard to the relevant guidance in the Department's Preparing and Environmental Impact Statement guide.	4
	The applicant must also include a detailed statutory compliance table for the modified project as an appendix to the Modification Report, which identifies all the relevant statutory requirements for the modified project and indicates where they have been addressed in the Modification Report.	Table 4-7
3.5	**Community engagement** If community engagement was carried out for the modifications, this section must summarise:	-
	• the engagement that was carried out	5.1.1
	• the key issues raised during this engagement	5.2
	• any changes to the approved engagement that would be carried out if the modifications are approved.	5.4
3.6	**Assessment of impacts** The summary must be prepared having regard to the relevant guidance in the Department's Preparing and Environmental Impact Statement guide.	-
	• the condition of the existing environment	2.1
	• the ability to avoid, mitigate and/or offset the impacts of the Project having regards to:	-
	○ mitigation measures incorporated into the detailed design of the Project (e.g. changes to the Project area, project layout and design, key uses and activities carried out on site, timing)	6 1.4.6.6
	○ the other reasonable and feasible mitigation measures that will be implemented	Section 6 of the report outlines various mitigation measures.
	○ any negotiated agreements or offsets proposed to address any residual impacts of the Project following mitigation	None
	• the scale and nature of the predicted impacts, including any cumulative impacts, and whether these impacts will comply with the relevant statutory requirements, standards or performance measures	6
	• key uncertainties associated with the assessment (e.g. lack of baseline data, doubts about the effectiveness of the proposed mitigation measures, limitations of the methodology used to predict impacts, lack of agreed criteria for evaluating impacts)	3.7.14
	• the proposed measures to deal with these uncertainties (e.g. monitoring, review, further technical investigation, staging, adaptive management).	6.3.3.2
	the applicant must include an updated table of the proposed mitigation measures for the modified project and any detailed technical reports as appendices to the Modification Report	Attachment 1Attachment 3:

Draft modification guideline section		Report section
3.7	**Evaluation of the modified project** This section must provide an evaluation of the modified project as a whole, having regard to the economic, environmental and social impacts of the modified project and the principles of ecologically sustainable development having regard to the relevant guidance in the Department's Preparing an Environmental Impact Statement guide.	
	Key issues to consider in this section may include:	
	• the design of the Project and what action has been taken to avoid or minimise the impacts of the Project (e.g. objectives of the project, alternatives considered, project area, physical layout and design, uses and activities, timing, proposed mitigation measures)	1.4.5; 1.4.6; 6
	• the consistency of the Project with the strategic context (e.g. supported by Government policy, consistent with regional plans, avoids impacts on key natural and built features with significant conservation value, provides economic benefits to regional community, the Site is suitable for the project)	1.4.5
	• compliance with any relevant statutory requirements	4
	• community views about the Project and how they have been addressed in the design of the Project or the assessment of the impacts of the project	5.2
	• the scale and nature of the economic, social and environmental impacts of the project, including any cumulative impacts	6.14
	• key uncertainties associated with this impact assessment and the actions proposed to address these uncertainties.	3.7.14

Table 4-6 Draft EIS guideline project description requirements

Draft EIS guideline requirement		Report section
Project area	The description must include: • the land on which the Project will be located, including any land required as a buffer area	3.7.1
	• the land that will be physically disturbed within the Project area, and any changes to this disturbance area over time	
	• the land within the Project area with environmental constraints (e.g. high conservation value, subject to flooding) where no development will occur, or development will be minimised	
	• plans showing the Project area, disturbance area and any constraints in plan-view and cross section	
Physical layout	The description must include the following for both the construction and operation of the project: • the layout of all the physical elements of the Project within the Project area, including all buildings, structures, works, landscaping, open space and biodiversity offsets (if applicable)	3.7 Figure 1-2; Figure 3-1 to Figure 3-5; Figure 3-7; Figure 3-18; Figure 6-3
	• all mitigation measures that will be built into the physical layout and design of the Project (such as noise walls)	3.7; 6
	• any ancillary infrastructure for which approval is being sought (such as upgrades to utilities or surrounding roads)	3.7.2.3; 3.7.7; 3.7.8; 3.7.5
	• the design of the various physical elements of the project, including the form, materials and finishes	3.7.4; 6.13.4

Draft EIS guideline requirement		Report section
	• identify those components of the physical layout and design that may change during the detailed design of the project, and set clear limits within which this change may occur without requiring amendments to the DA or modifications to the development consent if the Project is approved (see discussion below)	3.7.4; 3.7.5; 3.7.7; 3.7.8
	• plans showing the layout and design in plan-view and cross section	Figure 1-2 Attachment 2
Uses and activities	The description must include: • the land uses e.g. (residential, commercial, mixed use, mining, waste, warehouses, schools, hospitals, intensive agriculture) that characterise the project	3.7.1
	• the activities (e.g. demolition, cut and fill, resource extraction, processing, storage and handling of materials, waste disposal, parking) that will be carried out on site	3
	• the scale and intensity of these activities (e.g. extraction rates, rates of production, hours of operation)	3.6
	• the transport of materials and people to and from the Site (e.g. raw materials, equipment, products, waste, employees)	6.6
	• process flow diagrams of these uses and activities	N/A
Timing	**Stages** Describe each stage of the Project if the delivery of the Project is to be staged.	3.5
	Phases Describe each phase (e.g. demolition, construction, operation, decommissioning and rehabilitation) of the project. However, if the delivery of the Project is to be staged, then describe the phases of each stage.	
	Sequencing Describe the order in which the stages and phases of the Project will be carried out and identify snapshots of the Project at key points in time that will be used to assess the impacts of the Project (see discussion below). This description should be supported by a simple graphic showing the planned sequencing of the project, and concurrent delivery of the various stages and phases of the project.	

Section 3.4 of the draft modification guideline specifies that the statutory context section of the modification report must have regard to the guidance in DPIE (n.d.) *Preparing an environmental impact statement – State significant development guide (exhibition draft) (the draft EIS guideline*). Section 3.4 of the draft EIS guideline specifies the required content for the statutory context section, which is provided with section references in Table 4-7.

Table 4-7 Draft EIS guideline statutory requirements

EIS guideline requirement		Report section
Power to grant approval	Identify the legal pathway under which consent is sought, why the pathway applies, and who the consent authority is.	4.4.2
Permissibility	Identify the relevant provisions affecting the permissibility of the project, including any land use zones. If there are inconsistencies in these provisions, identify the inconsistencies and explain which provisions prevail to the extent of any inconsistency.	4.4.2.1 4.4.3

EIS guideline requirement		Report section
	If the Project is partly or wholly prohibited, identify any provisions or actions being taken that would allow the Project to be considered on its merits (e.g. making a concurrent amendment to the relevant environmental planning instrument). The rationale for allowing the Project to be carried out on this land should be discussed in more detail in the assessment and evaluation sections of the EIS.	
Other approvals	Identify any other approvals that are required to carry out the Project and why they are required. These approvals should be grouped into the following categories: • Consistent approvals: approvals that cannot be refused if the Project is approved and must be substantially consistent with the approval.	4.4.8
	• EPBC Act approval, and whether the bilateral agreement applies.	4.3.1
	• Other approvals: approvals that are not expressly integrated into the SSD assessment under the EP&A Act (e.g. water access licences under the *Water Management Act 2000*, leases under the *National Parks and Wildlife Act 1974*).	4.5
Pre-condition to exercising the power to grant approval	Identify any pre-conditions to exercising the power to grant approval for the project. These will include mandatory conditions that must be satisfied before the decision-maker may grant approval.	4.4.2.1, 4.4.7
Mandatory matters for consideration	Identify the matters that the decision-maker is required to consider in deciding whether to grant approval.	4.4.7

4.4.7 Section 4.15 matters for consideration

The consent authority is required to consider the matters in Section 4.15 of the EP&A Act when determining a modification application for SSD. Matters relating to the Project are considered in the following sections.

4.4.7.1 Environmental planning instruments

The environmental planning instruments requiring consideration under Section 4.15(1)(a) have been addressed as follows:

(i) Any environmental planning instrument – the LEP is addressed in Sections 4.4.2.1 and the Mining SEPP is addressed in Section 4.4.2.1. The Project will not be inconsistent with he aims of the zone objectives under the LEP and is permissible on the Site by the application of the Mining SEPP.

(ii) Proposed instruments – there are no known proposed instruments that will potentially apply to the Site.

(iii) Any development control plan – applicability of other EPIs are considered in Section 4.5.

(iv) Any planning agreement – there are no current or proposed planning agreements in connection with the Project.

(v) The regulations – requirements of the EP&A Regulation are considered in Section 4.3.6.

4.4.7.2 Likely impacts of the development

The technical assessments have assessed impacts to the natural and built environments, and social and economic impacts, which are in Appendix A to Appendix G and summarised in Section 6. The technical

assessments were prepared using the most recent and accurate scientific data relevant to the Project. The technical assessments adopted conservative assumptions so the upper limit (worst case) of likely impacts could be assessed.

The impact assessments determined the Project is unlikely to have significant residual impacts, that is, it is unlikely to exceed government standards and criteria. Some impacts have been identified in regards to traffic and biodiversity, and where redesign is unfeasible to avoid such impacts entirely these can be appropriately and effectively managed in the short to medium term as follows:

- Biodiversity –unavoidable impacts to PCT 849 and PCT 835 may occur, such impacts will be managed by offsetting under the BC Act. The BAM Calculator has determined that two ecosystem offset credits will be required for PCT 849. These ecosystem credits also cover the credit requirement for ecosystem credit species.
- Visual – vegetation will be planted to screen views to the Project. Depending on the maturity of the plantings, it is likely the properties will continue to be impacted in the short to medium term as the vegetation grows. Once the vegetation is mature there could still be glimpses of the Project through gaps in the foliage. However, the impact will be significantly reduced.

4.4.7.3 Suitability of the site

The Site is suitable for the proposed development as described in Section 1.4.5 and the Project is permissible on the Site as described in Section 4.4.3.

4.4.7.4 Submissions

This report will be placed on public exhibition by DPIE and submissions will be sought from council, government agencies and the community. Any submissions received by DPIE will be reviewed and forwarded to IMC for consideration in a Response To Submissions report (RTS).

DPIE will prepare its assessment report having regard to the matters raised in this report, all submissions received during the exhibition process and the RTS.

4.4.7.5 Public interest

This report includes an evaluation of project merits in Section 7, which considers the potential environment, social and economic impacts of the Project to assist the consent authority to determine if the Project is in the public interest. The report also considers the principles of ESD in Section 4.4.5.

4.4.7.6 Compliance with non-discretionary development standards

Compliance with the non-discretionary standards from the Wollondilly Development Control Plan 2016 (DCP) are addressed in Section 4.6.5. Compliance with non-discretionary standards from Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River are addressed in Section 4.6.3.

4.4.8 Legislation to be applied consistently with an approval

4.4.8.1 NSW Roads Act 1993

Consent is required from the relevant roads authority under Section 138 of the NSW *Roads Act 1993* (Roads Act) for any work in, on or over a public road. As described in Section 3.5, a site access intersection will be constructed off Menangle Road. These works will require a Section 138 approval under the Roads Act. Potential impacts on the existing road network are discussed in further detail in Section 6.6.

4.4.8.2 NSW Coal Mine Subsidence Compensation Act 2017

According to the ePlanning Spatial Viewer the Site is in a mine subsidence district. According to Section 22 of the NSW *Coal Mine Subsidence Compensation Act 2017* "an application for approval to alter or erect improvements, or to subdivide land, within a mine subsidence district is to be made in a form approved by the Chief Executive" of Subsidence Advisory NSW.

Subsidence Advisory NSW has been consulted as described in Section 5.3. An approval or exemption from approval for the proposed development has been sought in writing on 18 June 2021 from Subsidence Advisory NSW.

4.4.8.3 NSW Protection of the Environment Operations Act 1997

Under Section 48 of the *Protection of the Environment Operations Act 1997* (POEO Act), an EPL is required for premises-based scheduled activities listed in Schedule 1 of the POEO Act. Mining for coal is a scheduled activity under the Act and the Mine operates under Environment Protection Licence (EPL) 2504.

IMC will seek to vary EPL 2504 to address licensing requirements for the Site, including conditions for water quality monitoring and discharge from the proposed sediment basin to Foot Onslow Creek (as required) and the proposed irrigation spray field.

4.4.9 Exemptions from NSW authorisations

Under Section 4.41 of the EP&A Act, the following authorisations are not required for SSD that is authorised by a development consent:

- a permit under Section 201, 205 or 219 of the NSW Fisheries Management Act 1994;
- an approval under Part 4, or an excavation permit under Section 139 of the NSW Heritage Act 1977;
- an Aboriginal heritage impact permit under Section 90 of the NSW National Parks and Wildlife Act 1974 (NPW Act);
- a bushfire safety authority under Section 100B of the NSW Rural Fires Act 1997; and
- a water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the NSW Water Management Act 2000 (WM Act).

Notwithstanding the above, potential impacts on biodiversity (Section 6.8), historic heritage (Section 6.10), Aboriginal heritage (Section 6.9) and surface water (Section 6.7) have been assessed to provide an evaluation of the modified Project as a whole.

4.5 Other State legislation and regulations

In addition to the requirements under Part 4 of the EP&A Act, the Project may require additional approvals, licences and/or authorisation under various other pieces of NSW legislation and regulations, which are summarised in this section.

4.5.1 NSW Water Act 1912 and NSW Water Management Act 2000

The *NSW Water Act 1912* (Water Act) and WM Act regulate the management of water by granting licences and approvals for taking and using water, and trading groundwater and surface water. The WM Act applies to those areas where a water sharing plan has commenced. Alternatively, if a water sharing plan has not yet commenced, the Water Act applies. The WM Act is progressively replacing the Water Act as relevant water sharing plans are introduced across the State.

Water sharing plans have commenced for most of NSW.

The Site is located in the 'Mid Nepean River Catchment Management Zone' of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011. The Project will not involve the extraction of surface water (other than as described in Section 4.5.1.1).

The Site is in the 'Nepean Management Zone 2' management zone of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011. During construction and ongoing use of the ventilation shaft, the Project may involve the incidental 'take' or diversion of groundwater. Groundwater inflows would be minimsed by lining and grouting of the shafts during construction. IMC holds Water Access Licences (WAL) for Nepean Management Zone 2 for the Mine. The share allocation of licences held is sufficient to account for any incidental groundwater take at the Site.

The WM Act identifies a certain class of activities which can impact groundwater as 'aquifer interference activity' which are identified by the relevant management plan for a water management area. The WM Act establishes that such activities require an 'aquifer interference approval'. Given the current legislative regime established by the WM Act, the statutory requirement for an aquifer interference approval does not apply in respect of the Greater Metropolitan Region Water Sources plan, and as such, an aquifer interference approval for the Project is not sought.

4.5.1.1 Water Access Licence 30145

In 2011, Endeavour Coal was issued a Water Licence (10SL057070) under the *Water Act 1912* (NSW). Following commencement of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011 (NSW), the Water Licence was transitioned into the new licensing and approval framework under the *Water Management Act 2000* (NSW) (WM Act) and on 23 May 2012 converted into a:

- water access licence (30145) (WAL) (Section 63 of the WM Act); and
- water supply works approval (10WA117285) (Works Approval) (Section 90 of the WM Act).

The WAL and Works Approval together establish the licensing and approval framework for water supply at the VS6 site under the WM Act. The VS6 operations involve water being pumped out of the Nepean River by the 50mm Submersible Pumps located in the Nepean River and transferred via pipeline to the VS6 site. The water is stored in tanks at the VS6 site before being used for the operation of the VS6 (cooling of equipment etc.).

It is proposed that water will be sourced from the existing tanks at VS6 and transported to the Site via water cart, up to the maximum share component of 53 ML per year. Minor upgrade or augmentation to the existing tanks, pipeline and standpipe (and associated infrastructure) may be required to provide adequate water supply.

The Project will rely on the provisions of Section 4.41(1)(g) of the EP&A Act in respect of works approvals under the WM Act

Alternative water supplies for the Project include an authorised Sydney Water supplier (a potable water fill point) or surplus raw water from the Appin Mine Water Treatment Plant (WTP). The Appin West WTP produces surplus raw water suitable for construction use, in variable volumes.

4.5.2 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) replaced the NSW *Threatened Species Conservation Act 1995*, NSW *Native Vegetation Act 2003* and the flora and fauna provisions of the NSW *National Parks and Wildlife Act 1979* (NPW Act).

The BC Act protects threatened flora and fauna species and ecological communities and their habitats in NSW. Section 7.9 of this Act requires that a development application for SSD be accompanied by a Biodiversity Development Assessment Report (BDAR) unless the determining authority and DPIE Environment, Energy and Science (EES) determine the Project is not likely to significantly impact biodiversity.

As the Project is SSD, it is required to consider biodiversity impacts in accordance with the Biodiversity Offset Scheme of the BC Act. The offset scheme requires impacts to first be avoided and then mitigated before being offset in accordance with the scheme.

A BDAR has been prepared for the Project, which is in Appendix E and summarised in Section 6.8. An updated biodiversity offset strategy will be prepared in accordance with the requirements of the Biodiversity Assessment Method (2017) (BAM). IMC proposes to offset the Project through one of the following methods:

- Payment into the Biodiversity Conservation Fund (BCF), in which IMC would pay the equivalent credit costs into the BCF.
- Purchase the requisite number and type of Ecosystem Credits from the market of potential offset credit suppliers and retire the credits in accordance with the BC Act.
- Retire the requisite number and type of Ecosystem Credits already owned by IMC in accordance with the BC Act.

Given the above, it is evident the Project can be appropriately managed to reduce biodiversity impacts, with the minor residual impacts able to be offset using the NSW Biodiversity Offsetting Scheme.

4.5.3 NSW Contaminated Land Management Act 1997

An objective of the NSW *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and remediating land that the EPA declares is significantly contaminated.

No orders, notices or audit statements are available on the EPA's contaminated land record for the Site. The management measures in Section 6.7 will be implemented if suspected contamination is encountered during construction.

4.5.4 NSW Waste Avoidance and Resource Recovery Act 2001

The purpose of the NSW *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) is to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecological sustainable development. This Act provides for the making of policies and strategies to achieve these ends.

This Act promotes a hierarchy of avoidance of unnecessary resource consumption; resource recovery (including reuse, reprocessing recycling and energy recovery), and disposal (as a last resort). As described in Section 6.12, the construction and operation of the Project will assist in achieving the actions and goals for the management of waste in accordance with this Act.

4.5.5 NSW Mining Act 1992

The Mine operates in accordance with leases granted under Part 6 of the *Mining Act 1992* including the terms and conditions of Consolidated Coal Lease CCL 767.

4.6 Environmental planning instruments

4.6.1 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) requires the consent authority to consider whether a development proposal is a potentially hazardous industry or a potentially offensive industry.

As described in Section 6.11, the Project is not potentially hazardous or offensive and, therefore, a preliminary hazard analysis has not been prepared.

4.6.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The application of the Mining SEPP to the Project is addressed at Section 4.4.2.1.

4.6.3 Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River

According to the ePlanning Spatial Viewer the Site is in the land application area of Sydney Regional Environmental Plan 20 – Hawkesbury Nepean River (SREP 20). SREP 20 contains general planning considerations in clause 5 and specific planning policies and recommended strategies in clause 6.

Additional development controls apply to development defined in clause 11 of SREP 20, with part of the Project constituting 'filling' under clause 11(7). The additional control under this clause is that the development requires consent, which is being sought under Section 4.55 of the EP&A Act.

Clause 11(17) *Sewerage systems or works* is also applicable as sewage is proposed to be treated at the Project (refer to Section 3.7.9). In summary, sewage will be treated onsite to class A quality then used for irrigation under license or trucked for offsite disposal at a licensed waste facility. The additional control under this clause is that the development requires consent, which is being sought under Section 4.55 of the EP&A Act

Clause 4(1) of the plan specifies 'The general planning considerations set out in clause 5, and the specific planning policies and related recommended strategies set out in clause 6 which are applicable to the proposed development, must be taken into consideration:

a) by a consent authority determining an application for consent to the carrying out of development on land to which this plan applies, and

b) by a person, company, public authority or a company State owned corporation proposing to carry out development which does not require development consent.

Clause 4(2) of the plan specifies:

> *Those considerations, policies and strategies should be taken into consideration in the preparation of each environmental planning instrument and development control plan that applies to land to which this plan applies.*

The general planning considerations in clause 5 of the plan have been considered in Table 4-8 to assist the consent authority in assessing the Project. As described above, the considerations, policies and strategies in the plan should be reflected in the LEP and DCP. Therefore, clause 6 of the plan, which describes the considerations, policies and strategies, has not been considered in this section as the LEP and DCP have been considered in regard to the Project in sections 4.6.4 and 4.6.5.

Table 4-8 Sydney Regional Environmental Plan 20

Clause	Description	Comment
5	The general planning considerations relevant for this Part are:	
(a)	The aim of this plan – *The aim of this plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.*	As described in Section 1, the Project will not significantly impact the environment. The Project has been assessed in respect to the LEP and DCP in sections 4.6.4 and 4.6.5 – the LEP and DCP set controls to ensure land uses are considered in a regional context.
(b)	The strategies listed in the *Action Plan of the Hawkesbury-Nepean Environmental Planning Strategy.*	There are two principal publicly available documents concerning management of the Hawkesbury Nepean River – Hawkesbury-Nepean Catchment Management Authority (2008) *Hawkesbury-Nepean Catchment Action Plan 2007-2016* and Hawkesbury-Nepean Catchment Management Authority (2007) *Hawkesbury-Nepean River Health Strategy*. The plan sets targets for river health, biodiversity, land and soil. The strategy directs management activity to the achievement of the river health targets in the plan. The objectives for management in the strategy are considered further in Section 4.6.3.
(c)	Whether there are any feasible alternatives to the development or other proposal concerned.	Refer to Section 1.4.6.
(d)	The relationship between the different impacts of the development or other proposal and the environment, and how those impacts will be addressed and monitored.	As described in Section 1, the Project will not significantly impact the environment. Existing environmental controls in the BSO Environmental Management Strategy (EMS), and the additional controls identified in this Modification Report will be implemented to manage potential air quality and noise impacts on sensitive receivers, and traffic impacts on nearby roads. A water management system is proposed, which as described in sections 3.7.2.5 and 6.7.2, will treat surface water during construction and operations to the required water quality standard prior to release to Foot Onslow Creek.

Management objectives in the River Health Strategy are:

- Maintain the condition of reaches in natural or near natural condition.
- Maintain and improve reaches in good condition.
- Improve the environmental condition in the remaining reaches.
- Achieve the highest environmental and community gain for the resources.

Foot Onslow Creek is the primary water body near the Site and meanders in and out of the eastern boundary, flowing in a northerly direction to its confluence with the Nepean River approximately 3 km north of the Site. Foot Onslow Creek is an intermittent 3rd order stream with several farm dams upstream. This creek contained stagnant pools of water when inspected in August 2020 and January 2021 and was not flowing.

The Foot Onslow Creek channel is reasonably well vegetated by mostly exotic trees and a mixed native/exotic groundcover, with the riparian vegetation being in good health. While it is likely to provide some aquatic habitat (including some macrophytes) for tolerant aquatic fauna it is unlikely to support sensitive species protected under State and Federal legislation. Additionally, Foot Onslow Creek is not mapped as being key fish habitat.

Foot Onslow Creek is not in natural, near natural or good condition. However, the Project can prevent the deterioration of the creek and improve the environmental condition of the creek by:

- Setting the Project back from the creek to maintain a 40 m buffer (where possible).

- The proposed construction water quality management system (refer sections 3.7.2.5 and 3.7.3.6) will prevent sediment laden water entering the creek.
- The proposed operational water quality management system (refer sections 3.7.2.5 and 3.7.3.6) will treat surface water during to the required water quality standard prior to release to Foot Onslow Creek.
- Improved weed management and rehabilitation/revegetation along the creek.

4.6.4 Wollondilly Local Environmental Plan 2011

Wollondilly *Local Environmental Plan 2011* (LEP) applies to the site. The Site is zoned RU2 Rural Landscape under the LEP.

The project's consistency with the zone objectives is described below:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base – the Project will conflict with this objective for a period as it will result in the removal of 25.65 hectares of land from primary industry use. Notwithstanding, project structures will be removed and the land rehabilitated. The final landuse will be determined in accordance with the process described in Section 3.5.13.
- As outlined in Section 6.2, the Site is currently not being used for agricultural purposes, therefore the Project would not result in the immediate removal of any land from agriculture (primary industry production). The location for the Project was chosen to minimise potential impact to the environment and community stakeholders, including local agricultural operations. The Site is not located within (or within 2 km of) any areas of mapped potential Biophysical Strategic Agricultural Land (BSAL); nor is the Site located on any high capability land (Land and Soil Capability classes 1 – 3).
- To maintain the rural landscape character of the land – the Project will be consistent with this objective as it is part of a mining use, with mining uses common in rural areas of NSW, with several mines and quarries located within 10 kms of the Site. Furthermore, as described in Section 6.13, the Project will not be significantly visible to surrounding viewpoints and will not significantly contrast with the rural character of the area.
- To provide for a range of compatible land uses, including extensive agriculture – As mining activities are common in the area including surface support infrastructure for underground mines, and the Project is unlikely to result in any significant impacts, the Project is considered to be compatible with other land uses in the local area. Although the Project will not provide extensive agriculture, it won't remove existing agriculture from the Site as the Site does not support any agricultural activities. Even if the Project was not proposed on the Site, it is unlikely the Site would have been used for agricultural for the reasons outlined above and in Section 6.2. The Project will also not impact on any existing nearby agricultural operations.
- To provide areas where the density of development is limited in order to maintain a separation between urban areas – the Project will not be inconsistent with this objective as it will not be a dense development (structures will be scattered across the Site) and is not an urban land use.

4.6.5 Wollondilly Development Control Plan 2016

The Wollondilly Development Control Plan 2016 (DCP) sets controls for development within the LGA. Although the Project is not bound to comply with the requirements of this DCP due to it being SSD, this section reviews the Project against relevant DCP objectives/controls to identify any inconsistencies.

Volume 1 of the Wollondilly Development Control Plan 2016 (DCP) identifies general requirements for all development in the LGA. Relevant sections of Volume 1 are considered in Table 4-9. Only objectives are listed in instances where the DCP section is determined not to apply to the Project and controls are listed in instances where the section does apply.

The DCP does not include specific controls for mining or mining related infrastructure. Volume 7 relates to industrial development and Volume 8 relates to primary agricultural and rural uses. Neither of these are considered relevant to the proposed development.

Table 4-9 DCP – Volume 1

DCP section	Objectives or controls	Project comments
2. General considerations for all development		
2.2 – 1	**Controls** The consent authority shall consider the following safety and human health risks in assessing a development application under this volume: (a) Road and traffic hazards; (b) Bushfire threat; (c) Flood risk; (d) Noise, vibration, pollution, odour, radiation or waste from surrounding land uses; (e) Exposure to electricity transmission systems; (f) Exposure to radiation from telecommunications infrastructure; (g) Potential exposure to children of material (including signage) from any nearby restricted premises and/or sex services premises; (h) Hazards from vehicles within car parking areas; and (i) Hazard from potential contamination of the land.	(a) The traffic assessment determined the Project will not result in any significant traffic impacts on local intersections and roads (Section 6.6) (b) Structures associated with the Project will not be on land mapped as bushfire prone (Figure 3-6). (c) Structures associated with the Project will not be on land mapped as flood prone (Figure 3-6). (d) Surrounding land use is rural (Section 2). (e) The project anticipates interaction with electricity supply infrastructure (Section 3.7.7). (f) There is no telecommunications infrastructure that can emit radiation on the site. (g) No. (h) Carpark design will conform to relevant standards. (i) The Site is not anticipated to contain contaminated soil or water and any potentially hazardous products such as fuels, oils, lubricants, grease and other chemicals required for the project will be contained within appropriately bunded areas (Section 6.11)
2.2 – 2	**Controls** The consent authority shall consider the suitability of the road network in the vicinity in assessing a development application under this volume.	The traffic assessment determined the Project will not result in additional traffic impacts on local intersections and roads (Section 6.6)
2.2 – 3	**Controls** The consent authority must not grant consent to a development application for development within a proclaimed mine subsidence area without the concurrence of the Mine Subsidence Board.	Subsidence Advisory NSW has been consulted as described in Section 5.3. An approval or exemption from approval for the proposed development has been sought in writing on 18 June 2021 from Subsidence Advisory NSW.
2.2 – 4	**Controls** The consent authority must not grant consent to a development application for development subject to this volume on land unless it has considered the impact of the development on any system for the management of wastewater present on that land.	IMC will seek to vary EPL 2504 to address licensing requirements for the Site, including conditions for water quality monitoring and discharge from the proposed sediment basin to Foot Onslow Creek (as required) and the proposed irrigation spray field.
2.2 – 5	**Controls** The consent authority must not consent to the carrying out of development within a drinking water catchment area unless it is	The Project is not in any drinking water catchment mapped on the ePlanning Spatial Viewer.

DCP section	Objectives or controls	Project comments
	satisfied that the proposal will have a neutral or beneficial effect on water quality.	
5. Colonial heritage		
5.1	**Objectives** (a) To establish good design principles to guide development to and around heritage items, (b) To ensure development is sympathetic to the overall heritage values and characteristics of the area, (c) To identify local heritage character and heritage elements of the built environment, and (d) To ensure the retention and management of heritage values identified for each conservation area and specific precinct.	As described in Section 6.10, the Project will not impact any heritage items.
7. Aboriginal heritage		
7.1	**Objectives** (a) To achieve appropriate means of conservation, management and protection for archaeological sites, Aboriginal objects and Aboriginal places of heritage significance. (b) To achieve compliance with the requirements of the National Parks and Wildlife Act, 1974 and associated Regulations and guidelines with respect to Aboriginal objects and Aboriginal places of heritage significance. (c) To consider and manage Aboriginal objects and Aboriginal places of heritage significance at the earliest practical stages in the land development process.	A detailed Aboriginal Cultural Heritage Assessment and test excavation has been undertaken for the Project as described in Section 6.9.
8. Flooding		
8.1	**Objectives** To reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible.	The Site is located outside the Nepean River 1 in 100 year flood zone mapping, provided by Wollondilly Shire Council (Figure 3-6).
10. Tree removal		
10.1	**Objectives**	A single native tree will be removed from the Site and has been assessed as part of a detailed Biodiversity Development Assessment Report (Section 6.8)

DCP section	Objectives or controls	Project comments
	1. Identify trees and other native vegetation for the purpose of clause 5.9(3) of Wollondilly Local Environmental Plan 2011 which states the following: *"(3) A person must not ringbark, cut down, top, lop, remove, injure or wilfully destroy any tree or other vegetation to which any such development control plan applies without the authority conferred by:* *(a) development consent; or* *(b) a permit granted by the Council"* 2. Identify trees and other native vegetation that: • may be removed without a permit or development consent • may be removed with a permit • may be removed only with development consent	
11. Landscaping		
11.1	**Objectives** 1. To encourage the planting of endemic species in landscaping. 2. To reduce the impact of landscaping on the environment, infrastructure and human safety. 3. To create a landscape character that is defined by native vegetation and not introduced species.	IMC anticipates planting native vegetation as screening trees on the Site and will be mindful of the species listed in Section 11.1 of the DCP (see Section 3.7.2.1)

4.6.5.1 Other plans and policies

Wollondilly Shire Council's Create *Wollondilly – community strategic plan 2033* describes council's long-term intentions for the development of the LGA. The plan commits to the development of the Wilton New Town in the Wilton Growth Area, which could house as many as 50,000 people. The Project is not near this growth area. The plan commits to not supporting any other growth areas and, therefore, the Project is consistent with Council's intentions regarding land use/zoning from rural to residential.

The Department of Planning and Environment's (2018) *A plan for the Wilton Growth Area and Greater Macarthur 2040 – an interim plan for the Greater Macarthur Growth Area* applies to land near, but not in, the Project area. Therefore, the Project is consistent with State government intentions regarding land use/zoning from rural to residential.

4.7 Summary of approval requirements

Licences, approvals and permits that are likely to be required for the Project are summarised in Table 4-10.

Table 4-10 Summary of approval requirements

Legislation	Authorisation	Consent of approving authority
EP&A Act	Development consent (as modified from time to time)	Minister
POEO Act	Variation to EPL	EPA
Roads Act	Section 138 permit for road connection as the Project requires works on public roads	Council
WM Act	Relevant allocations for anticipated water take already held by IMC	NRAR
NSW Explosives Act and Explosives Regulation	The party/s responsible for transporting and using explosives at the Site will hold the appropriate licences	Safe Work NSW

5 COMMUNITY ENGAGEMENT

5.1 Introduction

A detailed Communication and Stakeholder Engagement Strategy (CSES) has been developed for the Project, which profiles the area surrounding the Site, identifies key stakeholders, outlines key messages, and describes consultation processes and engagement mechanisms. Most of the engagement processes and mechanisms are pre-existing and support the Mine operations under the Mine Approval.

Community engagement commenced in September 2020 in line with the CSES and is ongoing through to the lodgement of the modification application, determination process and, if the Project is approved, through the construction and operational phase of the Project.

Engagement during the time to lodgement of the modification application was relatively positive. The majority of the community members consulted understood why the Project was required and were keen to work with IMC to achieve the best result for the community and Company. Community views related to:

- Strategic context.
- The design of the Project.
- Economic, environmental and social impacts of the Project.
- Issues that are beyond the scope of the Project.

Should the Project be approved, implementation of the CSES will continue. This includes the continuation of consultation and engagement mechanisms, in particular the Menangle Advisory Panel (MAP), which enables effective engagement through open and transparent conversations to ensure participation is meaningful.

5.1.1 Engagement strategy

The IMC Corporate Affairs Team has been engaged on the Project since concept planning, enabling potential community views to be identified and addressed in conceptual designs and considered in the early decision-making process. This is considered best practice. Early internal engagement allowed for adequate time to develop a detailed CSES, which profiles the area surrounding the Site, identifies key stakeholders, identifies potential community views, outlines key messages, and describes consultation processes and engagement mechanisms for the different stages of the Project (the stages being conceptual, approval, construction and operational).

Given the existing Mine operations in the area, the majority of key stakeholders identified are well-known and have an existing relationship with IMC. The key stakeholders and the relationship status with those stakeholders is outlined in Table 5-1. Where the stakeholder relationship is described as ‘new’ it is considered that IMC does not have a strong relationship with the stakeholder but the stakeholder may be aware of IMC and its activities.

Table 5-1 Key stakeholders and relationship status

Key stakeholders	Relationship status
Illawarra Metallurgical Coal Community Consultative Committee (CCC)	Existing
Douglas Park Advisory Panel (DPAP)	Existing
Menangle Advisory Panel (MAP)	New

Key stakeholders	Relationship status
Wollondilly Shire Council	Existing
Wollondilly Shire Council Mayor and Councillors	Existing
Local business	Existing and new
Nearby residents	Existing and new
Durham Green Retirement Village	New
Douglas Park village residents	Existing
Menangle village residents	New
Menangle Community Association	New
Macarthur Agricultural Institute	Existing

Key stakeholder engagement commenced in September 2020, prior to lodging the formal preliminary application to DPIE. The level of engagement and delivery method used varied based on the level of interest from or potential impact on the stakeholder. The engagement level varied from inform (providing the stakeholder with balanced and objective information to assist with understanding) to consult (where feedback is actively sought). This is outlined in Table 5-2.

The following information was provided to the key stakeholders:

- Location.
- Environmental and engineering assessments.
- On-ground activities.
- Government approvals process.
- Construction techniques.
- Mitigation (noise, dust, visual amenity, etc.).
- Public road upgrades.
- Supporting infrastructure (water and electricity).

The delivery methods of this information were:

- Face to face meetings.
- Door knocks.
- Phone calls.
- Briefings.
- Community forums.
- Printed materials such as fact sheets, Project Updates and community information kits. Project Updates provided to the wider community during the consultation are included in Attachment 3.
- Website specific for the Project.

A timeline of when and how this information was shared with the key stakeholders is provided in Table 5-3.

The Menangle Advisory Panel (MAP) was established in March 2021 following a period seeking expressions of interest from the broader community. The MAP is the key stakeholder group for consultation with the local community on the Project. It was created specifically for the Project as best practice for engagement, and is comprised of six to eight community representatives selected by an independent chairperson, two IMC representatives and the independent chairperson. It is governed by a terms of reference which allows for open and transparent discussion with the community, from concept

through to the operation if approval is granted. The MAP meets regularly, as agreed by the members, and meeting minutes can be found on the South32 Project website[16].

Feedback received from all stakeholders is shared with the Project team via a register. Feedback is investigated and then a response is provided to the stakeholders with regards to the outcome or further actions being undertaken, where appropriate.

Table 5-2 Level and mechanism of engagement by stakeholder

Key stakeholder	Level of engagement	Engagement method
Illawarra Metallurgical Coal Community Consultative Committee (CCC)	Primarily inform Consult	Regular bi-monthly meetings, commencing September 2020 Community forum
Douglas Park Advisory Panel (DPAP)	Inform	Regular bi-monthly meetings, commencing September 2020 Community forum
Menangle Advisory Panel (MAP)	Consult	Varied meetings as information is available, commencing March 2021 Community forum
Wollondilly Shire Council General Manager	Inform	Soft copy of community Project Updates Project briefings offered
Wollondilly Shire Council Mayor and Councillors	Inform	Soft copy of community Project Updates Project briefings offered Community forum
Local business	Primarily inform Consult	Mailed community Project updates One-on-one discussions
Nearby residents	Consult	Mailed community Project updates One-on-one discussions / door-knocks Community forum
Durham Green Retirement Village	Inform	Mailed community Project updates Soft copy of community Project Updates Community forum
Douglas Park village residents	Inform	Mailed community Project updates Community forum
Menangle village residents	Inform	Mailed community Project updates Community forum
Menangle Community Association	Inform	Mailed community Project updates One-on-one discussions (local community investment opportunities)

[16] https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/appin-mine-ventilation-and-access-project

Elizabeth Macarthur Agricultural Institute	Inform	Mailed community Project updates Project briefings offered and One-on-one discussions

Table 5-3 Engagement timeline

Date	Stakeholder/s	Information shared on the Project	Delivery method
September 2020 – January 2021	DPAP, CCC	Proposed concept layout and location, visual bunding, tree screening, government approvals process, environment and engineering assessments, MAP formation, expected community engagement from IMC	Regular meetings, printed materials, emailed materials
	Nearby residents	Proposed concept layout and location, visual bunding, tree screening, government approvals process, environment and engineering assessments, MAP formation, expected community engagement from IMC, visual amenity	Door-knock, Community Information pack including various printed materials, ongoing discussions/meetings
	Douglas Park village, Menangle village	Proposed concept layout and location, visual bunding, tree screening, government approvals process, environment and engineering assessments, MAP formation, expected community engagement from IMC	Printed materials delivered to residents, displayed on noticeboards and in shop windows, follow up phone calls
	Local Government, State Government	Proposed concept layout and location, visual bunding, tree screening, government approvals process, environment and engineering assessments, MAP formation, expected community engagement from IMC	Emailed materials, briefings (offered/held)
	Local business	Proposed concept layout and location, visual bunding, tree screening, government approvals process, environment and engineering assessments, MAP formation, expected community engagement from IMC	Door-knock, printed materials
February – April 2021	DPAP, CCC	Update on assessment activities completed to date, EOI to join MAP, approvals process, tree screening	Regular meetings, printed materials, emailed materials
	MAP	Update on assessment activities completed to date, approvals process and timeline, tree screening, construction methods, detailed visuals, engineering detail available	Meetings, printed materials, emailed materials
	Nearby residents	Update on assessment activities completed to date, EOI to join MAP, approvals process, tree screening	Meetings, printed materials, emailed materials
	Douglas Park village, Menangle village	Update on assessment activities completed to date, EOI to join MAP, approvals process, tree screening	Printed materials, phone calls
	Local Government, State Government	Update on assessment activities completed to date, EOI to join MAP, approvals process, tree screening	Emailed materials, briefings (offered/held)
	Local business	Update on assessment activities completed to date, EOI to join MAP, approvals process, tree screening	Door-knock, printed materials
May – June 2021	DPAP, CCC	Update on assessment activities completed, approval process, shaft sinking method, road upgrades, detailed visuals	Regular meetings, printed materials, emailed materials, community information sessions

	MAP	Update on approval process, shaft sinking method, road upgrades, detailed visuals. Summary of the assessment reports	Meetings, printed materials, emailed materials, community information sessions
	Nearby residents	Update on approval process, shaft sinking method, road upgrades, detailed visuals.	Meetings, printed materials, emailed materials, community information sessions
	Douglas Park village, Menangle village	Update on assessment activities completed, approval process, shaft sinking method, detailed visuals	Printed materials, community information sessions
	Local Government, State Government	Update on assessment activities completed, approvals process, shaft sinking method, detailed visuals	Emailed materials, briefings (offered/held), community information sessions.
	Local business	Update on assessment activities completed, approvals process, shaft sinking method	Door-knock, printed materials, community information sessions.

5.2 Community consultation outcomes

There has been local and regional community interest on the Project, where local is within 5 km of the Site, and regional is within 100 km.

The local community generally provided feedback in line with economic, environmental and social impacts of the Project, such as potential noise, air quality, visual amenity, water and light impacts. The strategic context was also raised given the proximity of nearby residents. Frequent engagement was completed with nearby residents to ensure their feedback was received and able to be considered.

Mitigative actions for potential impacts have proactively been included in the Project design, such as bunding and tree screening for visual amenity, or included in the environmental assessments, such as consideration of noise sheds in the noise assessment for construction.

The regional interest generally provided the same feedback as local, as well as issues related to the design of the Project and issues that are beyond the scope of the Project. The predominant issues included the location of the Project and its visual nature, and the future mine plan for the Menangle area.

As mentioned, a detailed CSES was developed for the Project and executed accordingly. Table 5-4 summarises the key aspects raised during community engagement and where these aspects have been addressed in the Modification Report.

Table 5-4 Key aspects raised during community engagement

Category	Sub-category	Description	Report Section
Strategic context	Neighbouring residents	N/A	2.1.1 and 2.1.4
Design of the Project and consideration of alternatives	Location	N/A	2.1.1
	Height of property/infrastructure	N/A	3.7.4.2
Economic, environmental and social impacts of the Project	Noise	Construction noise	6.3.2.1
		Construction and operational traffic noise	6.3.2.4

Category	Sub-category	Description	Report Section
		Operation noise	6.3.2.3
	Light	Construction and operational light spill	6.13.5.1
	Visual	Construction and operational amenity	6.13.3
	Water	Private water tank contamination	6.4.2
		Construction water run off management	6.7.3
		Operation water run off management	6.7.3
	Air quality	Ambient air quality impacts	6.4.2
	Public safety	Road users	6.6.2.5
	Vibration	Construction blasting	6.3.2.2
		Ventilation fan operation	6.3.2.3
The evaluation of the Project as a whole	Consistency of project with Government plans	OSO1	1.4.6; 5.3; 6.15.2
Issues that are beyond the scope of the Project or not relevant to the Project	Mine planning	Mine subsidence	Information on mine planning and mine subsidence is provided via established channels by the IMC Community Affairs Team.

5.3 Key stakeholder consultation

In addition to executing the CSES, IMC has also engaged with DPIE (as the consent authority) and other key stakeholders during the Modification Application preparation process. Table 5-5 summarises stakeholder engagement undertaken to date, aspects discussed and where these aspects have been addressed in the Modification Report.

Table 5-5 Key stakeholder consultation

Agency	Date	Method	Aspects	Report section
DPIE	Ongoing	Correspondence, telephone	General operation of the Mine, including assessment of previous modifications	N/A
	8/10/2020	Letter/form (outgoing)	Preliminary modification request lodged for the Project (the Bulli Seam Operations - Modification 3)	N/A
	21/10/2020	Scoping meeting	• Nature and scale of the modification • Assessment pathway • Engagement Approach • Level of assessment required • Status of engagement with Transport for NSW	3 4.4.2 5.1.1 6.1 5.3.1
	29/10/2020	Letter (received by IMC)	Confirming that the appropriate approval pathway for the modification application would be section 4.55(2) of the Environmental Planning and Assessment Act 1979 (EP&A Act) and identifying additional matters to be addressed in	4.4.2

Agency	Date	Method	Aspects	Report section
			the Modification Report in addition to the matters proposed	
NSW Resources Regulator	18/03/2021	Meeting	The scope of the meeting included an introduction to the Project, shaft sinking experience of the Project team and the requirements for notification of high-risk activities	N/A
Endeavour Energy	June 2020	Letter (outgoing)	Providing an overview of the Project and description of relevant Endeavour Energy assets, as well as an offer for a meeting	N/A
	July 2020	Application	An application for technical review was submitted including the proposed relocation and removal of existing overhead powerlines within the Site and the proposed connections of an 11kV construction power supply and a 66kV permanent operational power supply.	N/A
	October 2020	Meeting and Application	Discussion regarding the applications submitted to Endeavour Energy and the submission of two Applications for connection and one application for relocation	3.7.7
	December 2020	Correspondence (received by IMC)	Responses to the application submissions were received	3.7.7
Sydney Water	September 2020	Correspondence (outgoing)	An overview of the Project and an application for potable supply for the project	3.7.8
Wollondilly Shire Council	Ongoing	Correspondence, phone calls, meetings	Consultation with the Wollondilly Shire Council continues to be undertaken regularly in relation to the current operation of the Mine	N/A
	12/05/2021	Meeting	The key topics of discussion were the company's employment and economic contribution to the local region through the operation of its mines situated within the LGA, the community engagement undertaken, the construction methodology, the proposed road upgrades and other infrastructure upgrades	Table 6-35 5 3.7.3 3.7.2.3
	June 2021	Correspondence, phone calls	Discussions with engineering team regarding proposed road upgrades and other infrastructure upgrades	3.7.2.3
Subsidence Advisory NSW	Ongoing	Correspondence, phone calls, meetings	Consultation with SA NSW continues to be undertaken regularly in relation to the current operation of the Mine	N/A
	10/06/2021	Meeting	An overview of the Project and discussion regarding approvals pathway for the Project	4.4.8.2
	18/06/2021	Letter (outgoing)	Letter regarding approvals pathway for the Project	4.4.8.2
Landholders	November 2020 – June 2021	Engagement activities	Landholders with an interest in developing their property within two kilometres of the Site were informed of the Project	N/A

5.3.1 Transport for NSW

The NSW Government is planning for the long term transport needs of Western Sydney by identifying and protecting corridors of land for future transport infrastructure. Transport for NSW consulted on a recommended corridor of land for the Outer Sydney Orbital Stage 1 (OSO1) for a possible future motorway and freight rail line in 2018. The 2018 OSO1 corridor passed over the southernmost portion of the property, outside of the proposed project operational footprint.

Following the period of consultation, the recommended corridor alignment was altered, and IMC understands that the current location of the recommended corridor being investigated by Transport for NSW is as presented in the consultation materials for the Draft Cumberland Plain Conservation Plan (DPIE 2020) [See Figure 5-1]. The recommended corridor intersects a portion of the Site.

The Draft Cumberland Plain Conservation Plan (DPIE 2020) included assessment of major infrastructure corridors (including the OSO1). It stated that the design and the exact staging of delivery are not yet determined and are subject to the legislated approvals process and funding, however noted that the OSO1 (specifically the OSO1 between Box Hill and the Hume Motorway near Menangle) is an initiative for investigation over the next 10-20 years.

Given the revised recommended location of the corridor, and the indicative timing of the infrastructure, IMC undertook preliminary consultation with Transport for NSW in the development of this application in accordance with their Meeting Protocols for Landowners with Transport for NSW and probity arrangements. Key considerations arising from the preliminary consultation were:

- Conceptual design development of the Project.
- Potential impacts to infrastructure and public safety due to the coexistence of the Project and the OSO1 on the Site (Section 6.15.2).
- IMC's consideration of design requirements in the development of the Project to enable co-existence of the two developments in future (Section 6.15.2).

5.4 Ongoing engagement

Should the Project be approved, implementation of the CSES will continue.

5.4.1 Construction

The key stakeholders identified in the early engagement will continue to be engaged during the construction phase of the Project.

During the construction phase, engagement will be targeted toward those impacted by the Project (i.e. nearby residents) and the MAP. This engagement, with the MAP in particular, will seek to work with the community to proactively understand the impacts and implement further mitigations, such as providing input into the traffic management plan pre-construction.

It is expected there will be concerns raised from other stakeholders in the area, such as Menangle Road users. It is proposed the IMC Community Complaints and Enquiries Procedure will be implemented to manage these concerns.

IMC has a free Community Call Line (1800 102 210) which is available 24 hours a day, 7 days a week and email address (illawarracommunity@south32.net) dedicated to enquiries and concerns. These details will be included on signage strategically placed at the Site. The IMC Community Complaints and Enquiries Procedure requires staff to respond to all enquiries and concerns within a 24-hour period and provide follow up detail as required from investigations. All contact is logged and published on the South32 (www.south32.net) website monthly.

5.4.2 Operations

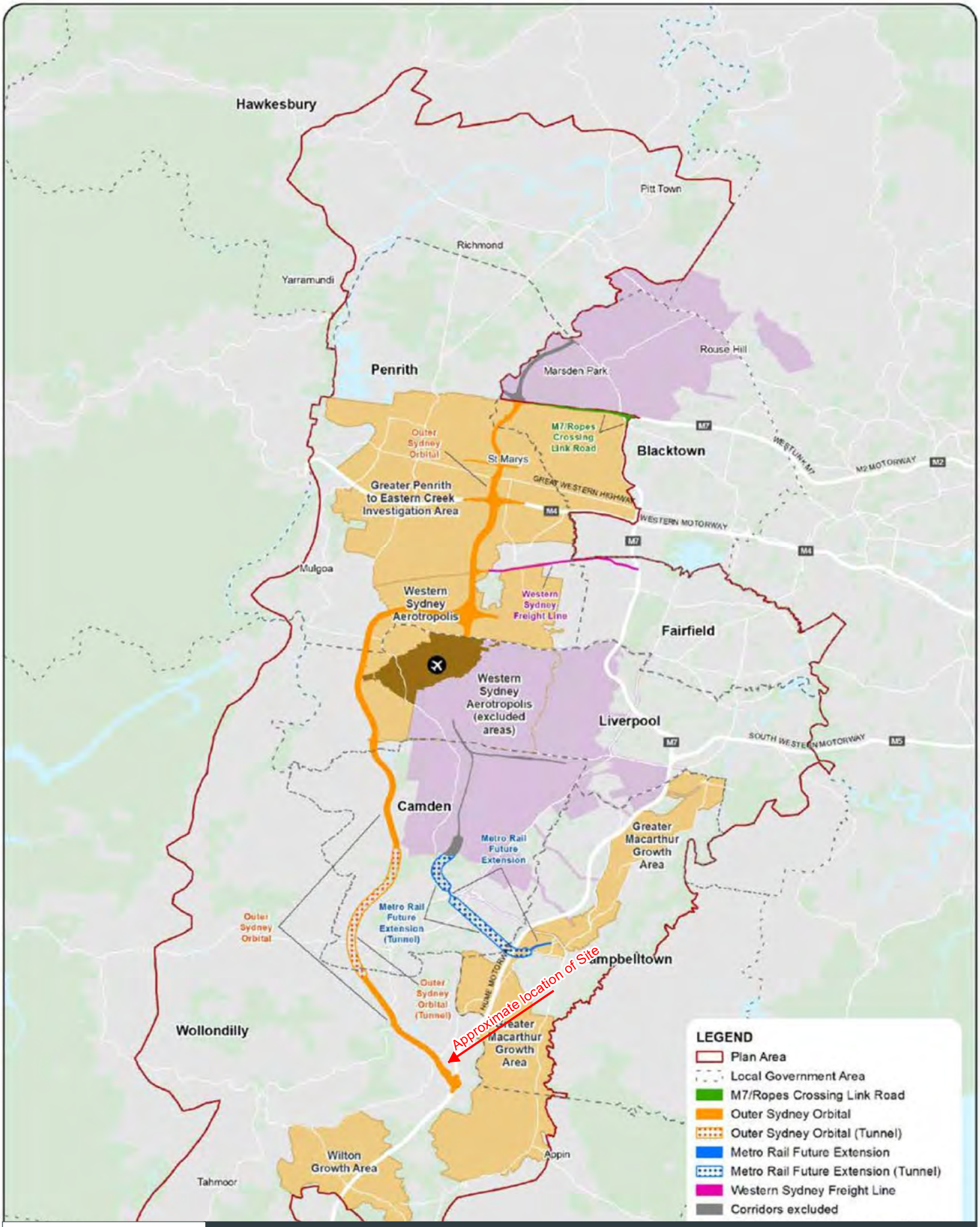
When the construction phases are complete, the Site will be considered operational and Project specific engagement will be incorporated into existing Mine CSES communication mechanisms. These mechanisms include the BSO Community Newsletter and CCC meetings.

It is intended that the MAP will close at this time, as it will have served its purpose of providing open and transparent communication with the local community during the design, approval and construction phase

of the Project. Members of the MAP would be invited to join the CCC, to continue community participation throughout the operational phase. Membership of the CCC is reviewed every three years, which will allow opportunities for change in membership.

IMC undertakes a community perception survey every three years to receive feedback, assess performance and identify areas for improvement in a number of areas, including community engagement. This survey encompasses all communities/residents within the current Mine footprint (such as Douglas Park village) and will be extended to include Menangle village to capture feedback from the Project area.

The community will be encouraged to contact IMC with complaints or enquiries through the Community Call Line. The Community Call Line details will be included in regular communication via the community newsletter and on signage at the entry to the Site. The IMC Community Complaints and Enquiries procedure (including updates) will continue to be followed for the life of the operation.



Drawn by: LL File: T:\spatial\projects\a5900\a5948_Appin_MineVentilation_NSW\Maps\report\Mod_Application\5948_Figure_5-1_OSO.mxd Last updated: 28-Jun-21 3:52:53 PM

SOUTH32

FIGURE 5-1

OSO1 Location Plan
(Draft Cumberland Plain Conservation Plan (DPIE 2020))

Appin Mine Ventilation and Access Project

N

v2.0

6 ENVIRONMENTAL ASSESSMENT

6.1 Environmental assessment approach

Correspondence was sent to DPIE on 8 October 2020 informing it of the proposed modification and the key aspects that will be addressed in the report accompanying the modification application. These aspects were noise and blasting, air quality and greenhouse gas, biodiversity, Aboriginal heritage, surface water, traffic and visual amenity. In DPIE's reply dated 29 October 2020 it was requested that agricultural and cumulative impacts of the Project be assessed also.

The above matters are addressed in the following sections and appended technical assessment reports.

6.2 Agricultural impact

6.2.1 Introduction

This section summarises the agricultural impact statement (AIS), which is included as Appendix A. It describes potential impacts from the Project within an agricultural context and details mitigation measures where impacts are unavoidable. The AIS was prepared with reference to other assessments completed for the Project including the Noise and Vibration Assessment (Section 6.3), Air Quality and Greenhouse Gas assessment (Section 6.4 and Section 6.5), Traffic and Transport (Section 6.6), Surface Water and Soils (Section 6.7) and Biodiversity (Section 6.8).

6.2.1.1 Summary of assessment methods

The AIS was assessed using the methodology set out below:

- Review of available Project information.
- Field visit and inspection.
- Description of the biophysical environment for the Site and surrounding locality.
- Review of technical assessments prepared for the Project.
- Assessment of potential impacts on agricultural resources and industry, including mitigation measures for any identified impacts.
- Review of IMC's demonstrated capacity for rehabilitation.

6.2.2 Potential impacts

Land resources

The Project would result in the temporary removal of 0.0028 ha of Class 4 land, 12.2 ha of Class 5 land, and 9.25 ha of Class 6 land from potential agricultural use (total of 21.45 ha). Given that the Site is currently not being used for agricultural purposes, the Project would not result in the immediate removal of any land from agricultural activities.

Local agricultural operations

A desktop search of nearby agricultural operations was conducted; results are presented in Table 6-1. A total of four, relatively small, agricultural operations were identified within the general proximity of the Site.

A fifth enterprise of note is the Elizabeth Macarthur Agricultural Institute (EMAI). The EMAI is owned and operated by the NSW Department of Primary Industries as a biosecurity facility that enhances food and fibre production and helps protect the environment. The site is a sprawling facility that is bound by

Woodbridge Road in the south (approximately 2.3 km from the Site) and stretches to the north where it is bounded by the Nepean River (approximately 7.7 km from the Site).

Potential noise and vibration impacts to local agricultural operations are likely to be negligible based on the assessment summarised in Section 6.3. Potential air quality and emissions impacts to local agricultural operations are likely to be negligible based on the assessment summarised in Section 6.4.

Table 6-1 Agricultural enterprises in proximity to the Site.

Name	Type/description	Distance to Site
Coromandel Spelling and Agistment	Equine Agistment	1.2 km
Razorback Ridge Wines	Viticulture	2.4 km
Red Lea Poultry Breeding	Poultry	2.7 km
Jersey Farm	Dairy	3.1 km
Elizabeth Macarthur Agricultural Institute (EMAI)	Agricultural Research Facility	2.3 km

Impact on biophysical strategic agricultural land

The Site is not located near (or within 2 km of)any mapped BSAL. The closest mapped BSAL is located 2.1 km to the north of the Site. Appropriate drainage and water discharge measures will be implemented on the Site to prevent and mitigate potential downstream impacts via Foot Onslow Creek to mapped BSAL.

Water resources

There is a total of 20 WAL's in the Menangle Weir Management Zone; of these, two are registered for domestic and stock watering purposes. The Project would utilise IMC's existing water access licence (WAL 30145), under the WM Act, issued for Ventilation Shaft 6 (VS6). The Project would not require additional water licenses for the construction and operational phases than those already held by the Mine. Therefore, it is considered that the Project would not significantly impact water resources for agricultural production.

Potential impacts to groundwater from the Mine have been assessed as part of the EA. It is unlikely that the Project would cause impacts to groundwater aquifers greater than those already predicted in the EA. Registered groundwater boreholes would not be impacted by the Project.

Weed management and agricultural biosecurity

There is the potential for invasive weed species to become established at the Site due to ground disturbance during the construction phase. Vehicles entering and leaving the Site have the potential to act as weed vectors.

According to the Wollondilly Shire website, there are 92 noxious weed species recorded within the Wollondilly LGA. Potential weed species of concern identified from the original BSO Terrestrial Flora Assessment, are relevant to the Project (Table 6-2).

During additional field surveys, conducted by Niche, 14 weed species were recorded at the Site (Table 6-2). Of these, four are listed as Weeds of National Significance: African Boxthorn, Blackberry, Fireweed and Lantana.

Table 6-2 Noxious weeds identified from the BSO terrestrial flora assessment and the BDAR for the Project.

Scientific Name	Common name	Weeds of national significance	Wollondilly Shire Council Weed class[1]	Recorded during BSO terrestrial flora assessment	Recorded during BDAR for the Project
Lycium ferocissimum	African Boxthorn	Yes	4	Yes	Yes
Olea europaea subsp. cuspidata	African Olive	-	NA	-	Yes
Rubus fruticosus agg. Sp.	Blackberry	Yes	4	Yes	-
Asparagus asparagoides	Bridal Creeper	Yes	4, 5	Yes	-
Stenotaphrum secundatum	Buffalo Grass	-	NA	-	Yes
Axonopus fissifolius	Carpet Grass	-	NA	-	Yes
Briza subaristata	Chilean Quaking Grass	-	NA	-	Yes
Senecio madagascariensis	Fireweed	Yes	5	-	Yes
Lantana camara	Lantana	Yes	4, 5	Yes	Yes
Oxalis purpurea	Large-flowered Wood-sorrell	-	5	Yes	-
Ligustrum lucidum	Large-leaf Privet	-	4	Yes	-
Ehrharta erecta	Panic Veldtgrass	-	NA	-	Yes
Paspalum dilatatum	Paspalum	-	NA	-	Yes
Opuntia stricta, O. elatior	Prickly Pear	Yes	4	Yes	-
Polygala virgata	Purple Broom	-	NA	-	Yes
Chloris gayana	Rhodes Grass	-	NA	-	Yes
Carthamus lanatus	Saffron Thistle	-	NA	-	Yes
Ligustrum sinense	Small-leaf Privet	-	4	Yes	-
Hypericum perforatum	St. John's Wort	-	NA	-	Yes
Cyperus eragrostis	Umbrella Sedge	-	NA	-	Yes

6.2.3 Management measures

General

The location for the Site was chosen to minimise potential impact to the environment and community stakeholders, including local agricultural operations. The Site is not located within (or within 2 km of) any areas of mapped potential BSAL; nor is the Site located on any high capability land (LSC classes 1 – 3).

Whilst there is the potential for sediment and erosion impacts to occur during the construction phase, mitigation and management measures will be implemented in accordance with Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004). These mitigation measures will be incorporated into the relevant construction phase environmental management plan/s. The plan/s will also detail management practices to avoid and mitigate potential weed impacts.

Noxious Weeds

Mitigation measures to reduce the risk of noxious weed establishment during the construction phase at the Site include:

- Vehicles will enter and leave the Site via defined entry points and use constructed roads to minimise on Site damage and the potential for weed spread.
- A wash down bay will be established on Site for vehicles and machinery entering the Site for the first time (or those that require periodic cleaning); the wash down bay will be maintained during site establishment (clearing and grubbing) to prevent the further spread of noxious and environmental weeds.
- Personnel, vehicle and equipment hygiene procedures would be implemented to minimise the spread and/or introduction of noxious and environmental weeds into the construction area.
- If required, imported topsoil and bedding material will be certified free of weeds (where practicable).
- Disturbed areas will be re-sown as soon as practicable to minimise the area of exposed soil for weed establishment and spread.

Noxious weed species will be controlled by a suitably qualified and licensed contractor.

Rehabilitation

Excavated material will be stockpiled, incorporated into the design of the Site and ultimately used during rehabilitation. During rehabilitation, any contaminated soil will be removed from the Site and disposed of appropriately. The proposed rehabilitation of the Site is detailed in Section 3.7.12.

Based on existing approval for the Mine, the operational phase of the Project is expected to continue until 2041, followed by the rehabilitation phase which is expected to occur over five years. Site rehabilitation would be undertaken in accordance with the existing Mine MOP, which outlines the general closure and rehabilitation strategies to be used. The Site would be incorporated into the MOP following approval.

6.2.4 Residual impacts

As the Site is not currently used for agricultural purposes and is on low capability land (predominantly Class 5 and 6), the surface disturbance associated with the Project would likely have a negligible impact on potential agricultural enterprises and related industries.

The Project is likely to have a negligible impact on surface water and groundwater resources relied on by agriculture. Potential surface water impacts will be managed by the Project environmental management plans, existing environmental controls in the BSO EMS, and relevant licence and approvals conditions.

Given the mitigation measures that would be implemented, it is considered the Project is unlikely to represent a risk to agricultural resources and enterprises within the local area.

6.3 Noise and vibration

6.3.1 Introduction

This section summarises the noise impact assessment report, provided in Appendix B. It describes the noise and vibration assessment criteria which apply to the Project, potential noise sources and vibration, modelling method and results, potential impacts and mitigation measures where impacts are unavoidable.

6.3.1.1 Summary of assessment methods

Noise and vibration impacts from the Project have been assessed in accordance with the following guidelines:

- DECC (2009) Interim construction noise guideline (ICNG).

- EPA (2017) Noise policy for industry (NPI).
- DECCW (2011) Road noise policy (RNP).
- DEC (2006) Assessing Vibration: A technical guideline.

Construction noise

The CadnaA noise prediction software and CONCAWE noise prediction algorithm were used to predict construction noise at the receivers based on the activities and sound power levels for the plant and equipment listed in Table 24 of Appendix B operating during the various construction phases.

The ICNG recommended standard construction hours are:

- 7am to 6pm Monday to Friday.
- 8am to 1pm Saturday.
- No work on Sunday or public holidays.

It is proposed that some construction activities associated with shaft sinking would be conducted outside of standard construction hours and that, if these works are approved, acoustic sheds will be constructed over the VS7 and VS8 shaft construction areas to mitigate noise emissions associated with shaft sinking during out of hours (OOH) work.

Table 24 of Appendix B also shows the construction activities which will outside the standard construction hours.

Predicted noise levels were assessed against the ICNG noise criteria. The ICNG recommends noise management levels (NMLs) to reduce the likelihood of noise impacts arising from construction activities. The Project construction NMLs based on the ICNG for residential receivers are in Table 6-3.

Table 6-3 Project specific construction NML ($LA_{eq,\ 15min}$ - dB(A))

Receiver	Standard construction hours[1]		Out of hours (OOH)		
	Noise-affected level	Highly noise-affected Level	Day[2]	Evening[3]	Night[4]
All residences	48	75	43	43	39

[1] 7am – 6pm Monday to Friday; 8am – 1pm Saturday
[2] 1pm – 6pm Saturday; 8am – 6pm Sunday and Public Holidays
[3] 6pm – 10pm All days
[4] 10pm – 7am Monday to Friday; 10pm – 8am Saturday, Sunday and Public Holidays.

Blasting

Construction of the shafts will include controlled blasting, where small diameter holes will be pre-drilled into the rock face, loaded with small explosive charges and electronically detonated. The main advantages of controlled blasting are that it can reduce the duration of ground borne noise and vibration impacts for local communities as well as reduce the overall construction time in comparison to alternative shaft sinking methods.

The assessment took a conservative worst-case approach assuming concurrent shaft construction.

Blasting impacts were assessed to determine compliance with the following criteria:

- Day (9.00am – 5.00pm, Monday to Saturday) *Assessing Vibration: a technical guideline* (EPA 2006):
    - Maximum overpressure due to blasting should not exceed 115 dBL for more than 5% of blasts in any year and should not exceed 120 dBL for any blast.
    - Maximum peak particle velocity (PPV) should not exceed 5 mm/s for more than 5% of blasts in any year and should not exceed 10 mm/s for any blast.
- Out of hours:

- Vibration – British Standard BS 6472:2008-2 Guide to evaluation of human exposure to vibration in buildings – Part 2: Blast induced vibration (residential):
  - Day (8.00 am – 6.00 pm Monday – Friday & 8.00 am – 1.00 pm Saturday) – 6.00 mm/s peak particle velocity (PPV).
  - Night (11.00 pm – 7.00 am) – 2.00 mm/s PPV (proposed to be applied from 10.00 pm).
  - Other times – 4.5 mm/s PPV.
- Overpressure – ANZECC Guideline – 115 dBL.
- Sleep disturbance – RNP – external 75 dBA (LAmax).

Operational noise

The CadnaA noise prediction software and CONCAWE noise prediction algorithm were used to predict operational noise at the receivers based on the sound power levels for the operational plant and equipment listed in Table 8 of Appendix B operating simultaneously during the following scenarios:

- Ventilation fans and substation.
- Ventilation fans and substation plus mine access comprising forklift/truck/car movements and water treatment plant.

Heavy vehicle movements during the second scenario will mostly occur during the day, however, the model run included heavy vehicles during the evening also. The night model run did not include heavy vehicles as there will be less activity during this period.

Noise emissions can be significantly influenced by prevailing weather conditions. Light stable winds (<3 metres per second (m/s)) and temperature inversions have the potential to increase noise at a receiver (noise enhancing conditions).

The assessment used the following noise enhancing meteorological conditions from Table D1 of the NPI:

- Stability category D with 3.0 m/s source-to-receiver winds during the daytime and evening.
- Stability category F with 2.0 m/s source-to-receiver winds during the night time.

The software allows a 'worst-case wind direction' scenario to produce the highest noise level for each receiver due to noise-enhancing winds and this has been used in the modelling.

The predicted noise levels were assessed against the project noise trigger levels (PNTL) determined in accordance with the NPI. In determining the PNTLs, a comparison has been made between the amenity and intrusiveness noise levels, and the lowest noise level was selected for each period (day, evening and night). Table 6-4 shows the adopted PNTLs in bold text.

Table 6-4 Project noise trigger levels

Receiver	Time of day a	project intrusiveness noise levels ($L_{Aeq,15min}$)	Project amenity noise level ($L_{Aeq,15min}$)
All nearby residences	**Day**	**43**	**53**
	Evening	**43**	**48**
	Night	**39**	**43**

Note: day = 7am-6pm Monday to Saturday or 8am-6pm on Sundays and public holidays; evening = 6-10pm; Night = remaining periods.

Residual noise is the predicted noise level minus the PNTL. The NPI acknowledges the potential for residual noise impacts after reasonable and feasible mitigation has been applied and provides guidance as to the significance of these impacts as outlined in Table 6-5.

Table 6-5 Significance of residual noise

Predicted noise level minus trigger level	Cumulative industrial noise level	Significance of residual noise level
<= 2 dBA	Not applicable	Negligible
>=3 but <=5 dBA	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1dB	Marginal
>=3 but <=5 dBA	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1dB	Moderate
>5 dBA	=< recommended amenity noise level	Moderate
>5 dBA	> recommended amenity noise level	Significant

The NPI also gives examples of noise mitigation measures or noise treatments that can be applied to address residual noise impacts. The NPI states that where the significance of the residual noise level is 'negligible', the exceedance would not be discernible by the average listener and therefore would not warrant receiver-based treatment or controls.

The maximum noise trigger levels in Table 6-6 are based on night-time RBLs and trigger levels as per Section 2.5 of the NPI. The trigger levels will be applied to transient noise events that have the potential to cause sleep disturbance.

Table 6-6 Maximum noise assessment trigger levels

Receiver	RBL	RBL + 15 dBA	Maximum Noise Trigger Level dBA (L_{Amax})
All nearby residences	39	54	54

Road traffic noise

The RNP sets out criteria for assessment of noise from vehicles on public roads. The applicable criteria for local roads are set in Table 6-7.

Table 6-7 Road traffic noise criteria

Road	Category	Criteria (dB(A)	
		Day (7am-10pm) $L_{Aeq, 15hour}$	Night (10pm-7am) $L_{Aeq(9hr)}$
Menangle Road	Arterial	60	55

The RNP also states that where predicted noise levels exceed the traffic noise criteria, an assessment of all feasible and reasonable mitigation options should be considered. The RNP states that an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person.

Any significant increase in traffic noise at receivers must be considered in addition to meeting the assessment criteria. Receivers experiencing increases in traffic noise levels above those in Table 6-8 due to the addition of vehicles along the haulage route should be considered for mitigation.

Table 6-8 Road traffic noise increase criteria

Road category	Land use	Criteria (dB(A)	
		Day (7am-10pm) $L_{Aeq, 15hour}$	Night (10pm-7am) $L_{Aeq(9hr)}$
Freeway/arterial/sub-arterial road	Existing residences affected by additional traffic on existing freeways/sub-arterial/roads generated by land use developments	Existing traffic + 12 (external)	Existing traffic + 12 (external)

Noise levels were calculated using procedures based on the CoRTN (Calculation of Road Traffic Noise) (UK Department of Transport, 1988) prediction algorithms. The assessment was based on the background and proposed volumes of vehicles summarised in Section 6.6.

6.3.2 Potential impacts

6.3.2.1 Construction noise

Standard hours

Noise from the construction activities and plant/equipment during standard construction hours is compared to the NML in Table 25 of Appendix B.

Noise levels associated with construction activities during standard hours are predicted to comply with the NML at sensitive receivers during all proposed activities except for the civil works, shaft sinking without acoustic sheds, and intersection works under the following circumstances:

- During the proposed civil works, noise levels are predicted to exceed the NML at R2 and R3 by 5 dBA and 1 dBA, respectively;
- During shaft sinking without an acoustic shed, noise levels are predicted to exceed the NML at R2 and R3 by up to 5 dBA and 1 dBA, respectively, and,
- During the proposed intersection works, noise levels at R2 are predicted to exceed the NML by up to 4 dBA.

Noise generated by construction during standard construction hours is predicted to comply with the NML at all other receivers.

Outside standard hours

Shaft sinking is proposed to occur 24 hours a day, 7 days a week. Predicted noise levels from individual construction activities are summarised in Table 26 and Table 27 of Appendix B, for calm and noise enhancing meteorological conditions, respectively. Predicted noise level at receivers from the worst-case scenario of concurrent construction activities that are likely to occur on the Site are also shown.

Predicted noise levels have been assessed against the ICNG's out of hours (OOH) NML. For clarity, OOH works are any works conducted during the evening (6pm – 10pm), night (10pm – 7am), Saturday (1pm - 8am), or on Sundays or public holidays. Predicted noise levels have also been assessed against calm and noise-enhancing meteorological conditions during the night-time period.

The results indicate that:

- Predicted noise levels associated with the proposed OOH construction activities comply with the NML under calm meteorological conditions at all receivers, and for all activities, except shaft sinking without the use of acoustic sheds;

- Without the use of acoustic sheds, predicted noise levels associated with OOH construction activities under calm meteorological conditions exceed the NML at five sensitive receivers, with the maximum predicted exceedance being 17 dBA at R2.
- The use of acoustic sheds with 25 dBA noise reduction results in predicted levels complying with the OOH NML under calm meteorological conditions.
- Predicted noise levels associated with the proposed OOH construction activities comply with the NML under noise enhancing meteorological conditions at all receivers during deliveries;
- Without the use of acoustic sheds, predicted noise levels associated with OOH construction activities under noise enhancing meteorological conditions exceed the NML at 13 sensitive receivers, with the maximum predicted exceedance being 22 dBA at R2.
- The use of acoustic sheds with 25 dBA noise reduction results in predicted levels complying with the OOH NML under noise enhancing meteorological conditions.

The predicted OOH construction noise levels show that acoustic sheds would be required to achieve compliance with the NML at all sensitive receivers. Section 6.3.3 describes the Project's noise mitigation measures in more detail, including the potential use of acoustic sheds.

6.3.2.2 Blasting

Blast overpressure

Predicted overpressure levels at sensitive receivers due to blasts occurring at the VS7 and VS8 shafts are presented in Table 32 of Appendix B.

The predicted overpressure levels exceed the criterion at several receivers by up to 8 dBL. Overpressure levels are very difficult to model accurately. Due to the vertical orientation of the vent shafts, which is not accounted for in the predictions, overpressure levels at sensitive receivers are anticipated to be significantly lower than the predictions.

Mitigation measures including blast mats and water curtains will be implemented, which typically provide 5-10 dB reduction in overpressure levels. Additionally, acoustics sheds, which may be constructed if OOH shaft sinking activities are permitted, will be used for much of the shaft construction and are likely to reduce overpressure levels by 10 dB or more.

Mitigation measures will be finalised following the development of a site law and the detailed blast design(s).

Blast vibration

Predicted vibration levels at sensitive receivers due to blasts occurring at VS7 and VS8 are presented in Table 33 of Appendix B.

The predicted vibration values are well below the criterion at all sensitive receivers. This indicates that the blast design is likely to be limited by overpressure, not vibration.

6.3.2.3 Operational noise

Ventilation fans only

The predicted $L_{Aeq,15min}$ noise levels at sensitive receivers from the operation of the ventilation fans (and substation) are summarised in Table 9 of Appendix B. Noise generated by operations is predicted to comply with the PNTLs.

Ventilation fans and mine access

The predicted $L_{Aeq,15min}$ noise levels at sensitive receivers from the operation of the ventilation fans (and substation) are summarised in Table 10 of Appendix B. Noise generated by operations is predicted to comply with the PNTLs.

Low frequency noise

The NPI recommends modifying factors be applied to account for increased annoyance from low frequency noise when the difference between the C-weighted and A-weighted $L_{Aeq,15min}$ noise levels exceed 15 dB, and sufficient acoustic energy from the source is identified in third octave bands between 10Hz and 160Hz. The third octave band threshold levels are in Table 6-9.

Table 6-9 Low frequency noise thresholds

Hz/dBZ	One-third octave $L_{Zeq,15minute}$ threshold												
f (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dBZ	92	89	86	77	69	61	54	50	50	48	48	46	44

If the one-third octave band noise levels at receivers exceed any of the thresholds by up to 5 dB, a 2 dB adjustment should be added to the measured $L_{Aeq,15min}$ noise levels during the evening and night time periods.

If the one-third octave band noise levels at receivers exceed any of the thresholds by more than 5 dB, a 2 dB adjustment should be added to the measured $L_{Aeq,15min}$ noise levels during the daytime and a 5 dB adjustment should be added to the measured $L_{Aeq,15min}$ noise levels during the evening and night time periods.

The applicability of low frequency noise penalties per the NPI can only be confirmed through compliance measurements. However, the EPA typically requires some assessment of potential low frequency noise impacts in the approvals process.

Predicted noise levels at R2 under noise enhancing meteorological conditions during the operation of the ventilation fans and the mine access have been analysed for potential low frequency noise penalties. This receiver has been chosen for this analysis since it is the only location where the addition of a penalty for low frequency noise could affect the predicted compliance with the PNTL.

The results in Table 6-10 indicate the potential for a low frequency noise penalty of 2 dB to be applied at R2. If such a penalty were to be applied at R2, then the predicted night time $L_{Aeq,15min}$ operational noise level of 37 dBA under noise enhancing meteorological conditions would be increased to 39 dBA. This noise level would still comply with the night time PNTL of 39 dBA at R2[17].

Table 6-10 Low frequency penalty – R2

Frequency (Hz)	One-third octave band noise levels (dBZ)													Penalty
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	
NPI Trigger Level	92	89	86	77	69	61	54	50	50	48	48	46	44	
R2 Predicted Level (NE)	65	65	65	65	65	60	**55**	**54**	50	46	40	37	34	**2 dB**

[17] This receiver has been chosen for this analysis since, considering the predicted noise levels in Table 10 of Appendix B, this is the only location where the addition of a penalty for low frequency noise could affect the predicted compliance with the project noise trigger levels.

Sleep disturbance

The most likely potential source of maximum noise levels during site operations would be the audible alarm that sounds prior to the operation of the winder/cage. The L_{Amax} sound power level of audible alarms of this type is typically 105 dBA.

The predicted L_{Amax} noise levels at sensitive receivers due to the operation of the winder/cage alarm are summarised in Table 13 of Appendix B. The predicted L_{Amax} noise levels comply with the maximum noise trigger levels at all receivers.

6.3.2.4 Road traffic noise

Operations

Road noise levels at the most potentially affected sensitive receivers along Menangle Road have been predicted for the 'no-build' and 'build' scenarios, and are shown in Table 6-11.

Predicted road noise levels at the façade of the most potentially affected receivers along Menangle Road comply with the RNP impact assessment criteria.

Table 6-11 Predicted $L_{Aeq,period}$ road noise levels

Road	Difference	
	Day (7.00 am – 10.00 pm)	Night (10.00 pm – 7.00 am)
Menangle Road South of Finns Road	0.3	0.6

6.3.3 Management measures

6.3.3.1 Construction

Noise levels from construction activities during standard hours are predicted to exceed the NMLs of the ICNG at receivers R2 and R3 by 1 to 5 dBA. Therefore, in accordance with the ICNG, all reasonable and feasible measures should be applied to manage construction noise emissions from the site. Accordingly detailed environmental management plans containing construction noise management measures will be prepared for the Project.

Further, the measures in Table 6-12 should be applied to manage construction noise emissions from the site.

Table 6-12 Construction noise mitigation measures

Mitigation measure	Predicted noise reduction (dBA)
Operate during approved hours	N/A
Regularly monitor noise to determine the impact of operating plant on sensitive receivers	N/A
Appropriate training of onsite staff	N/A
Noise performance incorporated into contractor performance requirements.	N/A
Consult the community and respond to complaints in accordance with established project procedures	N/A
Turning off machinery when not in use	0-5

Mitigation measure	Predicted noise reduction (dBA)
Respite periods for pile drivers and rock breakers	N/A
Undertake noisier activities during standard construction hours	N/A
Portable temporary screens	5-10
Screen or enclosure for stationary equipment	10-15
Maximising the offset distance between noisy plant items and sensitive receivers	3-6
Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers	2-3
Orienting equipment away from sensitive receivers	3-5
Carrying out loading and unloading away from sensitive receivers	3-5
Using dampened tips on rock breakers	3-6
Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks	5-10
Selecting site access points and roads as far as reasonably practicable away from sensitive receivers	3-6
Using spotters, closed circuit television monitors, “smart” reversing alarms, or ‘squawker’ type reversing alarms in place of traditional reversing alarms	2-5
Employ non noise-generating structures such as site offices, storage sheds, stockpiles and tanks as noise barriers	5-10

Acoustic Sheds

The required noise reduction of the proposed acoustic sheds to mitigate OOH noise associated with shaft sinking would be confirmed during detailed design. If quieter construction methods are able to be used, the acoustic performance of the sheds could be lowered, potentially reducing cost and complexity. Additionally, the required acoustic performance of the sheds could be lowered further by entering into negotiated noise agreements with some of the most potentially affected receivers.

6.3.3.2 Blast management strategy

As described in detail in Section 3.7.3.4, a Blast Management Strategy will be prepared prior to blasting. It will be prepared in consultation with relevant stakeholders and reviewed by a suitably qualified person.

Blasting will be monitored in accordance with AS 2187.2–2006. An automatic monitoring system is proposed, where data will be instantly uploaded to a central server.

Blast cycle and timing

Shaft sinking using controlled blasting is a cyclical process which relies on a repetitive sequence of activities and can take between 24 and 32 hours to complete. Blasts should be regular in accordance with this sequence wherever possible. In order to reduce the length of the construction phase of the Project, shaft construction is proposed to occur 24 hours per day, up to seven days per week.

A two phased blasting approach is proposed given the construction program, blasting cycle and the need to minimise impacts. In both phases, typically up to one construction blast per shaft, per day is anticipated.

During Phase One of the blasting program, blasting will be restricted to standard construction hours. During this phase, blasts will be closely monitored and feedback from potentially affected receivers will

be sought. The data and feedback collected during Phase One would be used to review and revise the Blast Management Strategy prior to Phase Two.

During Phase Two, blasting would occur 24 hours a day, 7 days a week. Due to the length of the shaft sinking cycle, there will not be blasting every night nor at the same time each day.

Adaptive management

Blast parameters are subject to change pending the results of the trial blast and development of the blast design. Additional site investigations (trial blasts) may be conducted prior to construction˙ blasting to refine blast designs to comply with project blasting noise, overpressure and vibration criteria.

Flyrock and overpressure

Measures will be prepared during detailed design to control flyrock and overpressure but may include the use of controls such as the selection of stemming material, water curtains, acoustic sheds and blast mats.

6.3.4 Residual impacts

Noise generated during construction of the Project will exceed NMLs at a limited number of nearby receivers. Management measures will be implemented to reduce construction noise impacts and minimize impact at receivers.

Overpressure and vibration results indicate that the blast design is likely to be limited by overpressure, not vibration. Trial blasts would be conducted to develop a site law and a detailed blast design to achieves compliance with the criteria.

A Blast Management Strategy has been outlined, including a range of blasting mitigation measures.

Noise generated during operations will not exceed PNTLs at nearby receivers. Therefore, the Project is not likely to generate the residual noise impacts summarised in Table 6-5 and noise treatments will not be required at receivers.

6.4 Air quality and greenhouse gas

6.4.1 Introduction

This section summarises the air quality impact assessment report, which is in Appendix C. It describes the air quality assessment criteria which apply to the Project, potential air emission sources, modelling method and results, potential impacts and mitigation measures where impacts are unavoidable.

6.4.1.1 Summary of assessment methods

Air quality impacts from the Project have been assessed in accordance with the following guidelines:

- NSW EPA (2017) Approved methods for the modelling and assessment of air pollutants in New South Wales (approved methods).
- NSW EPA (2006) Assessment and measurement of odour from stationary sources in NSW.

The purpose of mine ventilation is to provide a safe working environment for mine employees underground. MVA will typically contain dust/particulate matter and gaseous pollutants. The combustion of diesel in mining equipment results in the emission of particulates mostly in the $PM_{2.5}$ fraction, as well as gases such as oxides of nitrogen (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), carbon dioxide

(CO_2) and Volatile Organic Compounds (VOCs). Particulates may also contain trace elements such as metals.

Construction of the Project will generate particulates from material handling and ground disturbance; particulates and gasses from combustion of fuel in equipment; and NO_x and odour from blasting.

The CALPUFF model, an advanced 'puff' model that accounts for impact of complex local terrain on dispersion meteorology, was used to estimate the dispersion of air pollutants from the Project and resulting impacts on nearby sensitive receivers (Figure 2-3).

The CALMET meteorological model was used to provide the meteorological conditions for the dispersion model based on January 2018 to December 2018 data from two weather stations near the site. CALMET predicted wind is predominantly from the south-west, with smaller influences from the south and north-east.

Scenarios

A construction and an operational scenario was assessed.

Construction will comprise site establishment sinking and lining of two shafts, with emissions likely to be generated by surface disturbance/ excavation/ stockpiling/material handling and drilling/ blasting/ excavation/ material handling at the shafts.

Under the operational scenario, there is potential for pollutants to be generated during operation of the fans at VS8, which will have a volumetric airflow requirement of 315 m^3/s from November 2025 to August 2033, and a requirement of 440 m^3/s thereafter. The assessment focused on emissions of TSP, PM_{10}, $PM_{2.5}$, NO_x and odour.

Emissions estimates

The following construction dust mitigation measures have been incorporated into the emission inventory based on emission reduction factors reported by the National Pollution Inventory (NPI) and Katestone:

- Emissions from hauling are controlled by 75%, based on level 2 watering (application rate >2 litres of water per m^2 per hour).
- Activities occurring within acoustic shed for shaft sinking are controlled by 70% for enclosure.
- Emissions from unloading trucks are controlled by 30%, based on keeping drop heights to a minimum.

Dust generation during construction of the Project was estimated using Australian and United States EPA emissions factors (Table 6-13).

Table 6-13 Predicted annual emissions – construction

Emission source	Annual emission (kg/annum)		
	TSP	PM_{10}	$PM_{2.5}$
Bulk earthworks	16,559.5	5,720.6	1,383.2
Vent Shaft 7 + Vent Shaft 8 sink	16,385.9	5,283.7	1,685.7

Mass emission rates (g/s) during operation of VS8 were derived by multiplying the measured concentrations (mg/m^3) of Appin MVA by the volumetric air flow (m^3/s) and are summarised in Table 6-14.

Table 6-14 Predicted Vent Shaft 8 emission rates

Scenario	Emission rates				
	NO_x (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	Odour ($OU.m^3/s$)	H_2S (g/s)
2025	0.31	0.15	0.04	18,900	2.64
2033	0.43	0.21	0.05	26,400	3.68

Gases generated by diesel combustion in construction projects do not generally result in significant off-site concentrations and would not compromise ambient air quality goals at the closest assessment locations. Accordingly, with the exception of PM, diesel combustion emissions have not been quantitatively assessed.

A Blast Management Strategy will be developed for the Project, which would include blast fume prevention measures, developed in accordance with the *Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting* (AEISG 2011). Given that it has been demonstrated within the industry that adoption of measures outlined in the Code of Practice effectively controls blast fume, blast fumes have not been assessed.

Criteria

The air quality goals for key pollutants in the approved methods applicable to the Project are in Table 6-15. These relate to the total pollutant in the air, not only pollutants from the Project (i.e. cumulative).

Table 6-15 NSW EPA air quality impact assessment criteria

Pollutant	Averaging period	Criterion
TSP	Annual	90 $\mu g/m^3$
PM_{10}	Annual	25 $\mu g/m^3$
	24 hour	50 $\mu g/m^3$
$PM_{2.5}$	Annual	8 $\mu g/m^3$
	24 hour	25 $\mu g/m^3$
Deposited dust	Annual	2 g/m^2/month
		4 g/m2/month
SO2	10-minute	712 $\mu g/m^3$
	1-hour	570 $\mu g/m^3$
	24-hour	228 $\mu g/m^3$
	Annual	60 $\mu g/m^3$
NO_2	1-hour	246 $\mu g/m^3$
	Annual	62 $\mu g/m^3$
CO	15-minute	100 mg/m^3
	1-hour	30 mg/m^3
	8-hour	10 mg/m^3
Lead	Annual	0.5 $\mu g/m^3$

There are no impact assessment criteria for total VOCs, however impact assessment criteria are prescribed for various individual toxic and odorous VOCs, and a few of the more commonly assessed substances are presented in Table 6-16.

Table 6-16 Principal and individual toxic air pollutant criteria

Pollutant	Averaging period	Impact assessment criteria
Trace elements		
Antinomy	1-hour (99.9th percentile)	9 µg/m^3
Arsenic	1-hour (99.9th percentile)	0.09 µg/m^3
Beryllium	1-hour (99.9th percentile)	0.004 µg/m^3
Cadmium	1-hour (99.9th percentile)	0.018 µg/m^3
Chromium III	1-hour (99.9th percentile)	9.0 µg/m^3
Chromium VI	1-hour (99.9th percentile)	0.09 µg/m^3
Manganese	1-hour (99.9th percentile)	18 µg/m^3
Mercury inorganic	1-hour (99.9th percentile)	1.8 µg/m^3
Nickel	1-hour (99.9th percentile)	0.18 µg/m^3
Individual VOCs		
Benzene	1-hour (99.9th percentile)	29 µg/m^3
Formaldehyde	1-hour (99.9th percentile)	20 µg/m^3
Toluene	1-hour (99.9th percentile)	360 µg/m^3
Xylene	1-hour (99.9th percentile)	190 µg/m^3

Odour

Odour concentrations are used and are defined in odour units (OU). The number of odour units represents the number of times that the odour would need to be diluted to reach a level that is just detectable to the human nose. Therefore, odour less than one odour unit (1 OU) would not be detectable to most people.

Air dispersion modelling is used to calculate the level of dilution of odours emitted from the source at the point to where odour reaches surrounding receivers. This approach allows the air dispersion model to produce results in terms of odour units.

The NSW criteria for acceptable levels of odour range from 2 to 7 OU, with the more stringent 2 OU criteria applicable to densely populated urban areas and the 7 OU criteria applicable to sparsely populated rural areas.

The odour criteria in the approved methods are summarised in Table 6-17.

Table 6-17 Impact assessment criteria for complex mixtures of odorous air pollutants

Population of affected community	Impact assessment criteria for complex mixtures of odorous air pollutants (OU)
Urban (≥~2000) and/or schools and hospitals	2.0
~500	3.0

Population of affected community	Impact assessment criteria for complex mixtures of odorous air pollutants (OU)
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤~2)	7.0

6.4.2 Potential impacts

6.4.2.1 Construction

PM_{10} and $PM_{2.5}$

Predicted incremental ground level PM_{10} and $PM_{2.5}$ concentrations from construction are summarised in Table 8.1 of Appendix C. Cumulative results were calculated by adding the modelled increment to the adopted background concentrations.

The incremental and annual average PM_{10} and $PM_{2.5}$ criteria are not predicted to be exceeded at any of the sensitive receivers during construction.

Total suspended particulates and deposited dust

Predicted increment ground level TSP concentrations and dust deposition from construction are summarised in Table 8.2 of Appendix C. Cumulative TSP results were calculated by adding the modelled increment to the adopted background concentrations. There is no local monitoring data available for dust deposition, therefore modelling results are assessed against the incremental impact assessment criterion only. However, given the minor incremental increase from the Project, no exceedances of the cumulative impact assessment criterion would be expected.

The incremental and annual average TSP and deposited dust criteria are not predicted to be exceeded at any of the sensitive receivers during construction.

6.4.2.2 Operations

PM_{10}

Predicted incremental ground level PM_{10} concentrations from the operation of both ventilation shaft airflow scenarios are summarised in Table 8.3 of Appendix C. Cumulative results were calculated by adding the modelled increment to the adopted background concentrations.

The incremental and annual average PM_{10} criteria are not predicted to be exceeded at any of the sensitive receivers for either airflow scenario during operations.

$PM_{2.5}$

Predicted incremental ground level $PM_{2.5}$ concentrations from the operation of both ventilation shaft airflow scenarios are summarised in Table 8.4 of Appendix C. Cumulative results were calculated by adding the modelled increment to the adopted background concentrations.

The incremental and annual average $PM_{2.5}$ criteria are not predicted to be exceeded at any of the sensitive receivers for either airflow scenario during operations.

Total suspended particulates and deposited dust

Predicted increment ground level TSP concentrations and dust deposition from the operation of both ventilation shaft airflow scenarios are summarised in Table 8.7 of Appendix C. Cumulative TSP results were calculated by adding the modelled increment to the adopted background concentrations. There is no local monitoring data available for dust deposition, therefore modelling results are assessed against the incremental impact assessment criterion only. However, given the minor incremental increase from the Project, no exceedances of the cumulative impact assessment criterion would be expected.

The incremental and annual average TSP and deposited dust criteria are not predicted to be exceeded at any of the sensitive receivers for either airflow scenario during operations.

The predicted deposited dust levels are less than 5% of the relevant criterion for nuisance dust at all assessment locations. Previous studies have shown that dust fallout at levels higher than this do not constitute a risk to locally collected drinking water.

NO_2

Emissions from the ventilation shafts are modelled as NO_x while the impact assessment criteria are applied to NO_2. Therefore, it is necessary to account for the atmospheric conversion of NO_x to NO_2. The ozone limiting method was applied, which assumes that all the available ozone (O_3) in the atmosphere will react with NO in the plume until either all the O_3 or all the NO is used up.

Predicted incremental NO_2 concentrations from the operation of both ventilation shaft airflow scenarios are summarised in Table 8.5 of Appendix C. Cumulative results were calculated by adding the modelled increment NO_2 to the adopted background concentrations.

The incremental and annual average NO_2 criteria are not predicted to be exceeded at any of the sensitive receivers for either airflow scenario during operations.

Odour

Potential odour impacts are evaluated in two ways, as a complex mixture of odour, using emission rates derived from the measured odour concentration and as hydrogen sulphide (H_2S), using emission rates derived from the measured sulphur compounds in the underground return air.

The instantaneous perception of odours by the human nose occurs over very short timescales (~ 1 second), but dispersion model predictions are typically made for a one hour averaging period. To estimate the effects of plume meandering and concentration fluctuations perceived by the human nose, it is possible to multiply dispersion model predictions by a correction factor called a 'peak-to-mean ratio'. The peak-to-mean ratio (P/M60) is defined as the ratio of peak 1-second concentrations to mean 1-hour average concentrations.

CALPUFF has been modelled at hourly time-steps. To estimate peak 1-second concentrations from hourly averaged odour concentrations, a peak-to-mean ratio (P/M60) of 2.3 has been applied in accordance with Table 6.1 of the Approved Methods for Modelling.

Predicted incremental ground level odour and H_2S concentrations from the operation of both ventilation shaft airflow scenarios are summarised in Table 8.6 of Appendix C. Results are presented as the 99th percentile, 1-second average. All assessment locations are below the most stringent odour and H_2S impact assessment criteria for both flow scenarios.

6.4.3 Management measures

Relevant environmental management plans will be prepared and implemented, which will contain the following air quality measures:

- Reporting and record keeping:
    - Implement CSES to notify the potentially impacted residences of the Project (duration, types of works, etc.), relevant contact details for environmental complaints reporting.
    - Implement IMC procedure Handling Community Complaints Enquiries and Disputes during construction for any complaints related to dust. Where a dust complaint is received, the details of the response actions to the complaint should be recorded.
    - Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation.
    - Carry out regular site inspections, record inspection results, and make the records available for review as requested.

- Dust generation – general:
    - Erect screens or barriers to site fences around potentially dusty activities and material stockpiles where practicable.
    - Provide an adequate water supply on the construction site for effective dust/particulate matter suppression/mitigation.
    - Avoid site runoff of dirty water or mud.
    - Temporary cessation of non-essential dust generating activities during high winds.
    - Schedule activities to avoid adverse weather conditions by reviewing weather forecasts.

- Materials handling:
    - Prevention of truck overloading to reduce spillage during loading/unloading and hauling.
    - Minimise drop heights from loading, unloading or handling equipment

- Soil stripping: soil stripping will be limited to areas required for construction.

- Exposed areas:

    - Minimise the disturbance area.
    - Exposed areas will be stabilised as soon as practicable.
    - Long-term soil stockpiles will be revegetated.

- Dust generation from vehicles moving on paved and unpaved roads:
    - Watering of main haulage routes or applying dust suppressants, as required.
    - Routes to be clearly marked and speed limits enforced.
    - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
    - Installation of a wheel wash or shaker grid or hose down area to prevent dirt track out.

- Vehicle fuel combustion emissions:

    - Undertake maintenance of equipment.
    - Switch off vehicles when stationary.

- Regular visual inspections:

    - Inspect and report on excessive dust being generated at source (wheel generated dust, excavators, wind erosion).
    - Inspect and report on water cart activity and effectiveness.
    - Inspect and report on any dust leaving the Site and moving towards sensitive receptors.

Blast management practices and blast fume prevention measures may include but not be limited to:

- Best practice blast design and drill and blast practice in accordance with *Australian Standard 2187.2-2006: Explosives – Storage and use, Part 2: Use of explosives (AS 2187.2-2006).*
- Training of all drill and blast crew.
- Require the manufacturer and supplier of explosives to have appropriate quality control systems to ensure formulation specifications are met, in particular, explosive type and optimum fuel content for any damp/wet holes.
- Review geological conditions in the formulation of blast design.
- Review ground conditions (e.g. presence of clay or loose/broken ground).
- Minimise the time between drilling and loading, and loading and firing the shot (i.e. ignition of the blast).
- Ensuring shot sleep times (i.e. duration explosives remain within the holes prior to blasting) are within the technical guidelines of the bulk explosive.
- Prior to each blast, a pre-blast assessment would be undertaken to ensure meteorological conditions are suitable and to determine/review the blast exclusion zone and fume management zone.

6.4.4 Residual impacts

Dust, other pollutants and odour generated during construction and operation of the Project will not exceed criteria at residential receivers. Management measures will be implemented to further reduce the potential for air quality impacts during construction and operation of the Project.

6.5 Greenhouse Gas

6.5.1 Introduction

This section summarises the greenhouse gas (GHG) assessment, which is in Section 11 of Appendix C. It describes the GHG emission sources and factors, predicted emissions, potential impacts and mitigation measures.

6.5.2 Summary of assessment methods

GHGs generated by the Project have been predicted with reference to the Department of the Environment and Energy (DEE) National Greenhouse Gas Inventory for 2018.

GHGs include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulphur hexafluoride, a hydrofluorocarbon, a perfluorocarbon, or a prescribed gas. These atmospheric gases contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface.

GHG sources are described in three scopes:

1. Direct GHG emissions – direct emissions that occur from on-site sources such as combustion of fuels in equipment.

2. Electricity indirect GHG emissions – emissions from the generation of purchased electricity consumed on-site. Scope 2 emissions are indirect as they are generated off-site.

3. Other indirect GHG emissions – an optional reporting category for all other indirect emissions activities not under the proponent's control. These have not been considered further.

The GHGs likely generated by the Project were estimated by:

- Determining the quantities of fuels used by project related equipment to estimate scope 1 emissions and electricity used by the Project for scope 2 emissions.

- Using emissions factors in DEE (2019c) to convert GHG emissions (CO2, CH4 and N2O) from the fuel and electricity use in terms of carbon dioxide equivalent (CO2-e), which is the reporting standard for GHGs.

Emissions associated with MVA (Scope 1) are associated with continuing underground mining activities assessed as part of the Mine Approval. As such, they have been addressed within the scope of the Mine Approval assessment for the Project.

The predicted GHG emissions were compared to NSW and Commonwealth annual emissions to determine the Project's contribution.

6.5.3 Potential impacts

6.5.3.1 GHG sources

Construction

Scope 1 and 2 GHG emissions will be generated during construction by the on-site combustion of diesel, stripping of vegetation, electricity use and use of explosives. Construction emissions are summarised in Table 6-18.

Table 6-18 Summary of GHG emissions – construction (t CO_2-e)

Source	Scope 1	Scope 2
Onsite fuel consumption	1,436	
Explosives	35.7	
Vegetation stripping	2,358	
Electricity use		7,683
Total	**3,830**	**7,683**

Operations

Scope 2 GHG emissions will be generated during operations by electricity generation for the fans and pit top infrastructure. Operations emissions will be approximately 45,538 t CO2-e.

Operation of the proposed surface fans will remove the dependency on two existing underground booster fans. Furthermore, without the operation of VS7 and VS8, additional underground booster fans are likely to be required to maintain a business-as-usual scenario. Due to lower frictional resistance of surface fans when compared to booster fans, the proposed surface fans at Ventilation Shaft 8 will reduce overall electricity consumption for the Mine.

6.5.4 Contribution of GHG

The most recent estimated Australian GHG emissions were 537.4 Mt CO2-e. The annual project construction scope 1 and 2 contribution compared to NSW emissions is approximately 0.007%. The most recent estimated NSW greenhouse emissions were 131.7 Mt CO2 e. The annual project construction contribution scope 1 and 2 emissions compared to Australian emissions is approximately 0.002%.

The annual project operations scope 2 emissions contribution compared to Australian emissions is approximately 0.008%. The annual project operations scope 2 emissions contribution compared to NSW emissions is approximately 0.03%.

6.5.5 Management measures

The following mitigation measures will be implemented during construction of the Project to reduce GHG emissions:

- Efficient scheduling and planning (e.g. minimising rehandling and haulage of materials) to minimise fuel consumption.
- Reduce idling and turn off equipment when not in use.
- Use of 10% blended ethanol for select petrol-powered light vehicles, where practicable.
- Maintenance of plant and equipment to optimise fuel consumption.
- Sourcing materials (aggregates etc.) from local sources where possible.
- Reuse of the removed vegetation through mulching or composting and avoiding disposal to landfill or burning.

The most significant source of GHG emissions for the Project is associated with electricity consumption during operations. However, as described above, the proposed surface fans at VS8 will reduce the need for underground booster fans and therefore reduce the overall electricity consumption for the Mine (compared to what would otherwise be required under a business-as-usual scenario without the Project).

The Mine continues to identify and implement measures to minimise the release of GHG and to support the South32 Climate Change Strategy, directed towards reducing methane emissions which make up the majority of GHG emissions from the Mine. Measures to minimise the release of GHG and to support the South32 Climate Change Strategy at the Mine continue to be implemented and reported in the Annual Review.

6.5.6 Residual impacts

Project related GHG emissions will not be significant in the State and Commonwealth contexts. Notwithstanding, management measures will be implemented to reduce the Project's GHG emissions.

6.6 Traffic and transport

6.6.1 Introduction

This section summarises the traffic impact assessment report, which is in Appendix D. It describes the existing traffic conditions on the nearby road network, describes potential impacts of project related construction and operational traffic on this network and provides measures to minimise and manage these impacts.

6.6.1.1 Summary of assessment methods

Traffic impacts from project related construction and operational vehicles were assessed with consideration of RMS (2002) *Guide to traffic generating development* and:

- Austroads Guide to Road Design and RMS supplements.
- Austroads Guide to Traffic Management and RMS supplements.
- Austroads Guide to Traffic Management Part 12. Traffic Impacts of Developments.

Existing roads and their alignments/widths, speed limits, intersections and bus routes were described. The road network is shown on Figure 1-1.

Traffic was counted at several points along Menangle, Finns and Woodbridge roads between 2 and 8 December 2019, 20 and 26 October 2020 and 19 and 25 November 2020. Intersection traffic was counted between 6.30 and 9.30 AM and 3.00 and 6.30 PM on 3 December 2019 and 20 October 2020.

The Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) program was used to predict the impact of project related traffic on performance of the following intersections for existing plus project traffic:

- Menangle Road/Woodbridge Road/Station Street.
- Menangle Road/Finns Road.
- Menangle Road/site entrance.

The AM and PM peak hours were modelled for 2020 (existing conditions) and a 2025 traffic scenario to account for background traffic growth (10% between 2020 and 2025) and the start of operations.

The SIDRA results are expressed as level of service (LoS), degree of saturation (DS) and average vehicle delay (AVD). The *Guide to traffic generating development* intersection criteria is summarised in Table 6-3. A LoS D or better is the desirable design criteria for intersections.

Table 6-19 LoS criteria for intersections

LoS	AVD (seconds per vehicle)	Traffic signals, roundabout	Give way and stop signs
A	<14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory, but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode.	At capacity, requires other control mode.
F	>70	Intersection is oversaturated.	Oversaturated, requires other control method.

6.6.2 Potential impacts

6.6.2.1 Existing conditions

Traffic

Two-way traffic along the surveyed roads was averaged over five days to give week day volumes and over seven days to give daily traffic, which is summarised in Table 6-20. The proportion of traffic comprising heavy vehicles was also calculated.

Two way weekday volumes on Menangle Road closest the Site are 3,081 vehicles per day (vpd).

Table 6-20 Week day and daily traffic including heavy vehicles

Location	Average weekday (5 Day)		Average day (7 Day)	
	Volume (vpd)	% of heavy vehicles*	Volume (vpd)	% of heavy vehicles*
Menangle Road 850 metres north of Woodbridge Road	7304	12.5%	6612	11.7%
Menangle Road between Woodbridge Road and St James Avenue	3622	-	3341	-
Menangle Road approx. 700m north of Finns Road	3081	11.2%	2899	9.9%
Menangle Road approx. 600m south of Finns Road	5760	7.4%	5527	6.5%
Menangle Road south of Camden Road**	3940	13.8%	3729	11.7%

Location	Average weekday (5 Day)		Average day (7 Day)	
	Volume (vpd)	% of heavy vehicles*	Volume (vpd)	% of heavy vehicles*
Finns Road between Carols Road and Menangle Road	3532	7.8%	3422	7.0%
Finns Road between Remembrance Highway (Old Hume Highway) and Woodbridge Road	7579	11.2%	6862	11.0%
Woodbridge Road between Finns Road and Menangle Road	4092	10.4%	3644	9.9%
Camden Road east of Menangle Road**	3061	13.7%	2858	12.7%

*Heavy vehicles are classified as Austroad Class 3-12 vehicles and include small, medium and articulated trucks and buses. Source: Traffic Counts 20 -26 October and 19-25 November 2020 ** Traffic Counts 2-8 December 2019

Intersections

The AM and PM peak hours at intersections generally occurred between 7.45 and 8.45 AM and 4.45 and 5.45 PM. Traffic modelling determined that all intersections operate with a good (LoS A) and low vehicle delays, during the weekday AM and PM peaks.

Pedestrians, bicycles and buses

Pedestrian and bicycle activity was very low during the surveys.

Bus routes in the area are:

- 889 bus service between Menangle to Campbelltown via Menangle Park which uses the section of Menangle Road north of Durham Green as well as Station Street.
- 49 bus service between Camden and Menangle with Razorback Loop, which uses Menangle Road, Finns Road and Woodbridge Road.

6.6.2.2 Project traffic generation

Operational traffic

The Project will generate the most traffic on weekdays, and particularly on the Site maintenance day, due to the workforce's private vehicles, site visitors and maintenance vehicles. On a maintenance day, it is estimated there will be 564 two-way (282 in and 282 out) light vehicle trips based on a conservative estimate of 1.1 people per employee vehicle. Visitors could generate an additional 10 two-way (five in and five out) light vehicle trips per day.

There will be approximately 24 two-way (12 in and 12 out) heavy vehicle trips per day.

The current Mine shift times are spilt into three shifts on weekdays (Monday to Thursday) and two shifts on weekends (Friday to Sunday). Only one shift changeover period (Shift 3 departs) partially coincides with a traffic peak hour (AM Peak 7.45 to 8.45 am). Traffic volumes on weekday maintenance days are shown in Table 6-21.

Table 6-21 Weekday traffic generation (maintenance day)

Time	Total vehicles			Vehicle Movements In	Vehicle Movements Out
	Employee	Heavy	Total		
7.00 – 8.00 AM (Shift 3 departs)	82	1	83	1	83
3.00 – 4.00 PM (Shift 1 departs)	116	1	118	1	117

Construction traffic

The majority of the workforce for the surface construction will typically arrive between 6.00am and 7.00am and depart between 6.00pm and 7.00pm.

Based on a vehicle occupancy of 1.0 person per vehicle for construction worker trips, the maximum hourly traffic generation during construction is estimated to be;

- 76 inbound workforce trips between 6.00am and 7.00am.
- 76 outbound workforce trips between 6.00pm and 7.00pm.

The construction workforce trips will not coincide with the commuter AM and PM peak hours on the road network adjacent the Site and the impacts on the roads and intersections will be less than during the operational phase of the Mine.

6.6.2.3 Impacts on the road network

Road network

The majority of the workforce (93%) will likely arrive from and depart to the south along Menangle Road and the remainder (7%) will arrive from and depart to the north via Menangle Road.

Weekday traffic volumes will increase as follows:

- 43 two way vehicle trips per day on Menangle Road north of the Site entrance (including 2 heavy vehicle trip), resulting in a 1.2% increase in traffic.
- 555 two way vehicle trips per day on Menangle Road south of the Site entrance (including 22 heavy vehicle trips), resulting in a 9.6% increase in traffic.

Intersections

The intersections listed in Section 6.6.1.1 were assessed, with the most significant change in performance at the Menangle/Woodbridge Road/Station Street intersection (Table 6-22). LoS is predicted to change from A in 2020 to B at this intersection in 2025, which is “good with acceptable delays and spare capacity”.

Right turn volumes into the Site will be very small during the AM and PM Site peak hours as these times do not coincide with a shift arrival period for the workforce.

The Site entrance has been additionally modelled to determine sensitivity to increased right turn volumes. The results under “Menangle Road/Site entrance and increased right turn into Site” in Table 6-22 show LoS will remain A at these volumes.

As part of the sensitivity testing of the Site entrance intersection, additional modelling has been undertaken for the AM and PM Site Peaks. During both the AM and PM Site Peak Hours the right turn volumes into the Site will be very small, as these times do not coincide with a shift arrival period for the workforce.

Figure 6-1 Intersection traffic – AM peak

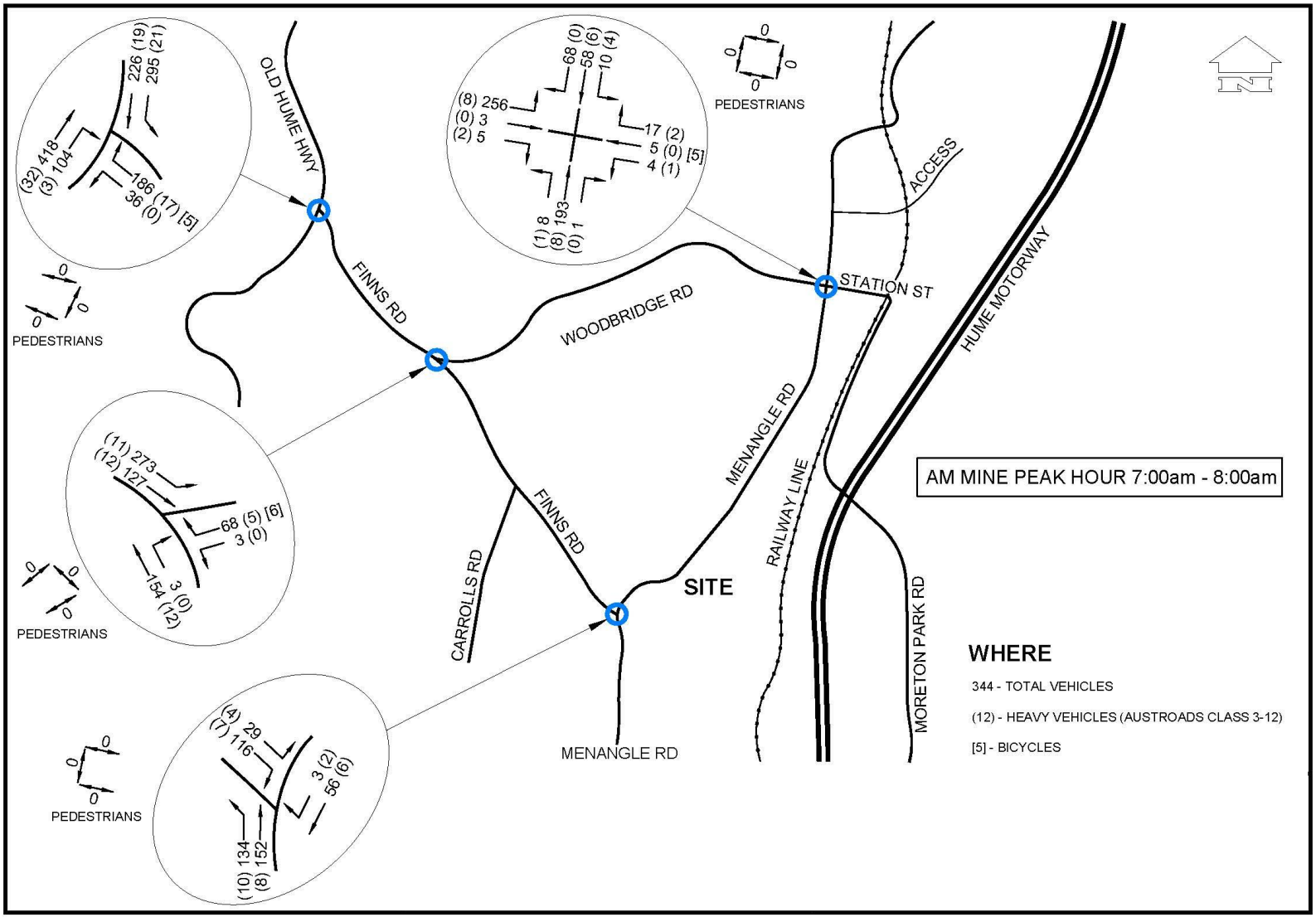
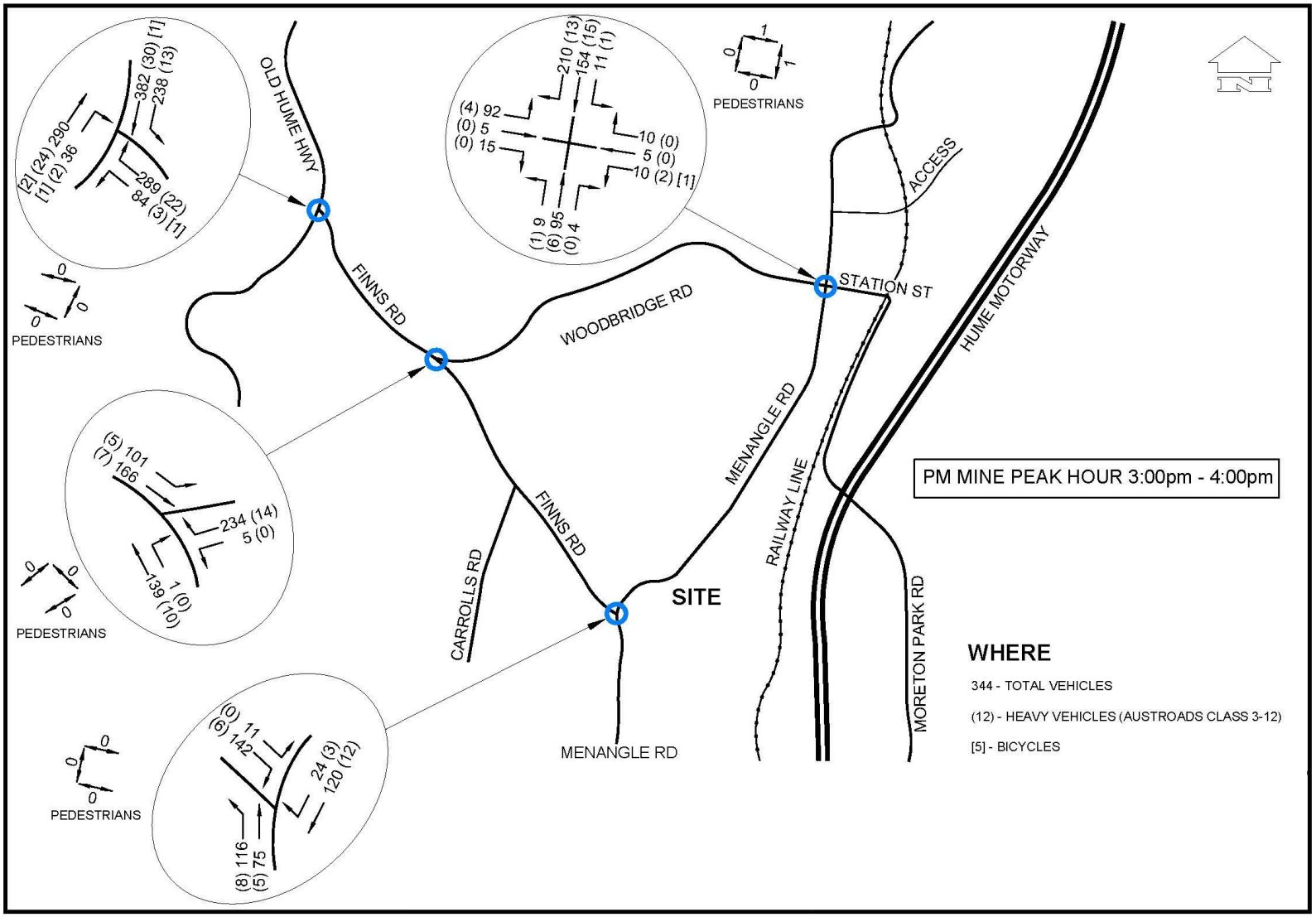


Figure 6-2 Intersection traffic – PM peak



Even though the AM and PM Site Peak Hours do not coincide with a shift arrival period of the workforce, to demonstrate that the intersection will have sufficient capacity including the length of the right turn bay, sensitivity analysis has been undertaken at the Site Entrance Intersection. This sensitivity analysis assumes that a workforce arrival period occurs during the AM and PM Site Peak Hours and is representative of shift times overlapping and/or a change in shift times in the future. Based on the arrival volumes of Shift 1 on a maintenance weekday, some 118 vehicles per hour (117 light vehicle trips and 1 heavy vehicle trip) would arrive at the Site. The right and left turn volumes into the Site would be 109vph and 8vph.

These volumes have been overlaid onto the AM and PM Site Peak volumes that will use the intersection and additional SIDRA modelling has been undertaken. The results of this modelling is shown in Table 6-22 and indicates that the Site Entrance intersection will retain a Level of Service A operation with low vehicle delays in both peak hours, with the additional right turn volumes. This indicates that the intersection will have sufficient spare capacity.

Table 6-22 Current and predicted intersection performance – 2025

Year	Peak	Criteria			
		LoS	DS	AVD (s)	HMD(s)
Menangle/Woodbridge road/Station Street intersection					
2020	AM	A	0.233	4.9	13.3
	PM	A	0.217	4.0	14.1
2025	AM	B	0.267	5.0	15.0
	PM	B	0.242	4.1	16.3
Menangle/Finns road intersection					
2020	AM	A	0.144	4.4	10.0
	PM	A	0.097	3.8	8.4
2025	AM	A	0.173	4.0	10.7
	PM	A	0.139	3.1	9.2
Menangle Road/Site entrance					
2025	AM	A	0.103	1.2	9.3
	PM	A	0.097	1.7	10.2
Menangle Road/Site entrance and increased right turn into site					
2025	AM	A	0.104	2.7	7.2
	PM	A	0.097	3.1	7.7

LoS	Level of Service
DS	Degree of Saturation
AVD	Average Vehicle Delay (in seconds)
HMD	Highest Movement Delay (in seconds)

Cumulative impacts

A large proportion of those workers that will access the Mine via the Site in 2025 (estimated as 308 people per day on a maintenance weekday) would currently access the Mine via Appin West, Appin East or Appin North. There may be a small increase in the workforce associated with the operation of the additional mine access and ventilation shaft infrastructure constructed as part of the Project.

Similarly, a proportion of those heavy vehicles that will service the Mine via the Site in 2025 (estimated at 12 vehicles per day) are already servicing the Mine via Appin West, Appin East or Appin North. A small increase in heavy vehicle trips will occur due to the ventilation shaft operation and the Mine access. The majority of modelled vehicles already access the Mine at other access points. Therefore, the majority of the vehicle trips associated with the Project are already using the road network, albeit not the section of Menangle Road adjacent the Site.

Notwithstanding this, a conservative approach to the cumulative impacts has been adopted to assess the impact on the intersections based on a 20% increase in background traffic growth for the 10 year period between 2025 and 2035 (i.e. 2% base increase per year for 10 years).

The intersections listed in Section 6.6.1.1 were assessed, with the most significant change in performance at the Menangle/Woodbridge Road/Station Street intersection (Table 6-23). LoS is predicted to change from A in 2020 to B at this intersection in 2035, which is “good with acceptable delays and spare capacity”.

Table 6-23 Predicted intersection performance – 2035

Peak	Criteria			
	LoS	DS	AVD (s)	HMD(s)
Menangle/Woodbridge road/Station Street intersection				
AM	B	0.340	5.3	18.0
PM	B	0.295	4.4	19.8
Menangle/Finns road intersection				
AM	A	0.225	4.2	11.1
PM	A	0.166	3.3	9.9
Menangle Road/Site entrance				
AM	A	0.124	1.1	9.4
PM	A	0.110	1.6	10.6
Menangle Road/Site entrance and increased right turn into site				
AM	A	0.125	2.5	7.9
PM	A	0.110	2.9	7.9

LoS Level of Service
DS Degree of Saturation
AVD Average Vehicle Delay (in seconds)
HMD Highest Movement Delay (in seconds)

6.6.2.4 Construction traffic impacts

The construction workforce trips will not coincide with the commuter AM and PM peak hours on nearby roads and the impacts on the roads and intersections will be less than during the operational phase of the Project.

6.6.2.5 Impacts on road users and safety

Pedestrian crossing activity and the number of cyclists using the road are relatively small and the Project is not expected to have any negative impacts on pedestrians, cyclists and buses that use nearby roads.

The Project is not expected to have any negative impacts on road safety. A channelised site entrance intersection will be constructed on Menangle Road. This intersection, as well as the adjacent intersections will all have adequate capacity to cater for the traffic generated by the Project.

With the Project in place, the intersections are expected to operate at a good level of service (i.e. Level of Service A or B operation) with low vehicle delays.

6.6.2.6 Parking and internal roads

Car parking for 212 cars, including two accessible parking spaces, as well as provision for future additional parking will be provided on Site. This provision will be adequate for employee numbers (including at shift change over times) as well as visitors to the Site.

Truck parking and loading areas will also be provided on site.

The internal roads, the truck parking and loading areas, as well as the car parking areas will be designed to AS2890.1, AS2890.2 and AS2890.6 standards as appropriate.

6.6.3 Management measures

IMC will update the BSO Project Traffic Management Plan and prepare relevant Construction Environmental Management Plans to manage the impacts of the construction of site infrastructure, including the construction of the Site access intersection.

6.6.4 Residual impacts

The Project will not impact traffic provided the implementation of the Traffic Management Plan during construction and use of the proposed left turn auxiliary lane and a right turn bay (CHR treatment) during operations.

6.7 Surface water and soils

6.7.1 Introduction

This section summarises the surface water quality impact assessment, which was part of the aquatic ecology assessment prepared by Niche (Appendix E). This section also incorporates initial assessments (including a catchment assessment) undertaken as part of the pre-feasibility study (PFS) for the Project.

6.7.1.1 Summary of assessment methods

Potential surface water quality impacts were assessed with consideration to the Landcom (2004) Managing Urban Stormwater: Soils and construction – Volume 1 – 4th Edition (Blue Book) gudelines.

6.7.2 Potential impacts

There is a potential for surface water and soil quality impacts to occur, particularly during the construction phase of the Project. There is a risk of erosion and sedimentation impacts occurring as a result of surface disturbance and excavation activities. The uncontrolled release of sediment-laden waters may cause impacts to water quality by changing water quality parameters such as turbidity, pH, dissolved oxygen (DO) and electrical conductivity (EC).

Given the existing and previous land use of the Site, potential sources of hydrocarbons would likely be limited to leaking engine sumps or accidental fuel spills/leaks. Storage of fuels (diesel and petrol) will be

in bunded areas with concrete aprons to relevant Australian Standards and will prevent any hydrocarbons entering the stormwater system.

The use of explosive charges would result in blasting residue (ammonium nitrate), which may dissolve and transmit to the downstream environment (namely Foot Onslow Creek) if not managed appropriately. Ammonium nitrate is of low toxicity to aquatic life; however, concentrated volumes of nitrates may cause algal blooms in static waters (CSBP Limited 2017).

During the operational phase, potential impacts to water quality could occur due to erosion and runoff from the irrigation spray field, particularly if the spray field is not properly vegetated or irrigation rates are unsustainably high.

6.7.3 Management measures

The Site has been designed to mitigate potential impacts to surface water and soil during both the construction and operational phases of the Project. These design considerations and features include:

- The bulk earthworks pad has been designed so that it would be free-draining and direct all sediment-laden water to the sediment pond. The pad has also been designed so that it is offset from Foot Onslow Creek.
- The Site has been designed so that external (clean water) drainage would be diverted around the Site, reducing internal Site drainage and sediment pond requirements.
- The sediment pond has been designed to be positioned downstream of the bulk earthworks (and offset from the waterfront land of Foot Onslow Creek) to capture all of the internal Site drainage runoff.
- Potential surface water and soil impacts during the operation phase will be managed in accordance with the existing Appin Mine Surface Water Management Plan, which will be updated to include the Site. Furthermore, relevant environmental management plans will be developed to address potential impacts specific to the construction phase of the Project.
- For erosion and sediment control, a silt fence adjacent to the fill embankment will capture any sediment-laden run-off during construction and runoff to be directed to construction dams as required. The total length of the fence would be approximately 400 m.
- Water discharged from the Site will be subject to an EPL as required, and management of the discharge water quality will adhere to any EPL conditions.
- Hydrocarbon spill kits will be located around the Site to address any incidental hydrocarbon spills.
- Diesel will be stored in accordance with *Australian Standard 1940-2017: Storage and Handling of flammable and combustible liquids. (AS 1940-2017).*
- Sewerage wastewater would be processed in the STP. Effluent would then be spray irrigated onto a field at the Site. The spray field would have similar specifications to the existing Appin West irrigation field. The irrigation spray field will be designed in accordance with conditions set out in the EPL, which will be amended.
- The spray irrigation field would be located away from Foot Onslow Creek and appropriately vegetated (i.e. vegetation that is suited to the application of effluent).
- Irrigation rates for the spray field would be at appropriate levels for the soil type; this will be assessed during the detailed design phase of the Project.

Activities during the construction phase of the Project will be undertaken in accordance with therelevant environmental management plans.

During the operational phase, potential surface water and soil impacts at the Site will be managed in accordance with the existing Appin Mine Water Management Plan, which will be updated to incorporate any site-specific mitigation measures. Furthermore, discharge from the Site will be conducted in accordance with conditions set in the EPL, which will be amended as part of the Project.

6.7.4 Residual impacts

The Project is not likely to cause significant impacts to surface water and soils. Potential impacts have been mitigated through careful design of the Site, including the chosen location.

6.8 Biodiversity

6.8.1 Introduction

This section summarises the Biodiversity Development Assessment Report (BDAR), which is in Appendix E. It describes the study methods, flora and fauna discovered during surveys, potential impacts and mitigation measures where impacts are unavoidable.

6.8.1.1 Summary of assessment methods

Biodiversity impacts were assessed in accordance with OEH's (Office of Environment and Heritage, now NSW Environment, Energy and Science), Biodiversity Assessment Method (BAM) using the BAM Calculator, which comprises two stages:

- Stage 1 – biodiversity assessment, involving assessment of:
    - landscape features;
    - native vegetation; and
    - threatened species and populations.
- Stage 2 – impact assessment, involving consideration of:
    - how to avoid and minimise impacts on biodiversity values;
    - impact and offset thresholds; and
    - offset requirements.

Landscape assessment

The habitat value of the landscape is determined by comparing the current state of the landscape with the state of the landscape should the Project proceed, and considers:

- native vegetation cover
- rivers, streams and estuaries
- areas of geological significance
- habitat connectivity.

Native vegetation and flora

Previous records of threatened flora within a 10 km radius of the Site were retrieved from the NSW Bionet Atlas and the EPBC Act Protected Matters Search Tool (PMST).

The PCT mapping in DPIE's Vegetation Information System was used to determine potential biodiversity constraints on the Project. The PCTs were validated with fieldwork on 18 August 2020, 13 January 2021 and 23 January 2021 using the BAM. The assessment involved observing vegetation attributes in the Site using BAM plots and targeted surveys to identify flora species and confirm the PCTs and their condition (Figure 2-2). High threat and priority weeds were also recorded during the fieldwork.

The validated PCTs were mapped and it was determined if any TEC were present.

The BAM Calculator was used to predict the presence of threatened flora, which were targeted during the fieldwork. The list of potential threatened flora was refined after the fieldwork based on previous records within the search radius, observed PCTs, their condition and habitat features. Then a determination was made on the likelihood of threatened flora occurring.

Native fauna and habitat

The NSW Bionet Atlas and EPBC Act PMST were also searched for records of threatened fauna within a 10 km radius of the Site. The results were considered during fieldwork planning and the likelihood of occurrence analysis.

The habitat assessment recorded:

- Type, condition and diversity of vegetation communities present.
- Presence of roosting/breeding/shelter resources such as:
    - large stick nests suitable for raptors
    - hollow-bearing trees and stags
    - rock ledges, shelters, caves, outcrops, gibber plains
    - logs and leaf litter.
- Permanent and ephemeral aquatic habitat.

Aquatic habitat and species

Site aquatic habitat and species were surveyed on 13 January 2021 consistent with the Australian River Assessment System (AUSRIVAS) assessment technique. Habitat was assessed in terms of:

- Geomorphology
- Channel diversity
- Bank stability
- Riparian vegetation and adjacent land use
- Macrophytes
- Local impacts and land use practices.

Impacts

Direct, indirect and cumulative impacts to native vegetation and habitat were assessed. Serious and irreversible impacts were assessed in accordance with the BAM, which provides criteria to determine if a project will have serious and irreversible impacts on biodiversity. Biodiversity which will be impacted by a project require offsetting in accordance with BAM Calculator to calculate ecosystem and species offset credits. The credits are retired by establishing a biodiversity stewardship site or payment into the Biodiversity Conservation Trust Fund.

6.8.2 Potential impacts

6.8.2.1 Survey results

Terrestrial biodiversity

The survey confirmed the presence of the TECs summarised in Section 2.2.5.1. PCT 849 aligns with *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*, a critically endangered TEC under the EPBC Act. However, PCT 849 on the Site would not satisfy the condition thresholds provided to make it eligible for Commonwealth listing. The thresholds require the patch to comprise native trees with a minimum projected foliage cover of 10% and be at least 0.5 ha in size.

PCT 835 aligns with *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (RFEF) TEC, listed as endangered under the BC Act and critically endangered under the EPBC Act. However, as no native tree layer is present, PCT 835 on the Site would not meet the NSW Scientific Committee and Commonwealth definition for RFEF.

Two threatened plant species, the Spiked Rice-flower (*Pimelea spicata*) and Downy Wattle (*Acacia pubescens*), were targeted during the survey. No individuals were recorded or considered likely to occur on the Site.

As summarised in Table 2-5, no threatened fauna species with potential to occur on the Site required survey as there was insufficient breeding and/or foraging habitat on the Site, or the Site was determined to be outside the range of some species.

Aquatic biodiversity

The Foot Onslow Creek channel was reasonably well vegetated by mostly exotic trees and a mixed native/exotic groundcover, with the riparian vegetation being in good health. Native emergent macrophyte, Cumbungi (*Typha orientalis*) was also present.

Foot Onslow Creek is an intermittent 3rd order stream with several farm dams upstream. While it is likely to provide some aquatic habitat (including some macrophytes) for tolerant aquatic fauna it is unlikely to support sensitive species protected under State and Federal legislation. Additionally, Foot Onslow Creek is not mapped as being key fish habitat.

Database searches indicated the threatened Macquarie Perch (*Macquaria australasica*) and Australian Grayling (*Prototroctes maraena*) have potential habitat within 10 km of the Site. Neither the Macquarie Perch, Australian Grayling nor any other threatened aquatic species are expected to occur in Foot Onslow Creek given a lack of suitable habitat.

6.8.2.2 Direct and indirect impacts

Impact avoidance

In accordance with the BAM, proponents must demonstrate the measures employed to avoid, mitigate and offset impacts of a project on biodiversity values. The footprint of the Project was adjusted to avoid better quality stands of vegetation on the Site and to avoid hollow bearing trees.

Impacts

The direct and indirect impacts summarised in Table 6-24 cannot be further avoided.

Table 6-24 Direct and indirect impacts

Impact	Extent of impact as a result of the Project
Direct impacts	
Removal or modification of highly modified native vegetation	Known: approximately 0.44 ha of PCT 835 and 18.34 ha of PCT 849[18] vegetation would be removed.
Loss of individuals of a threatened species	None: no threatened flora or fauna habitat was identified in the area of direct impact. No threatened species are likely to be harmed by the Project.

18 Note: All of PCT 849 on the Site is highly modified. Of the 18.34 ha of PCT 849 to be disturbed by the Project, 18.21 ha is devoid of trees and shrubs (grass land only), 0.1 ha is devoid of trees (scattered shrubs and grassland) and 0.03 ha is considered to be woodland, represented by a single tree.

Impact	Extent of impact as a result of the Project
Removal or modification of threatened species habitat other than native vegetation (micro-habitat features)	None: no threatened species habitat (excluding native vegetation) was identified.
Death through trampling or vehicle strike	Low: the Project is unlikely to cause death through trampling or vehicle strike.
Death through poisoning	Low: no poisons are proposed to be used as part of the Project. Harmful substances used in construction would all be controlled as per required Australian standards.
Fragmentation	Low: approximately 18.78 ha of highly modified vegetation would be permanently removed. Given the majority of this is grassland and a small portion isolated shrubland, it will not contribute to fragmentation of remnant native vegetation in the locality.
Indirect impacts	
Predation by domestic and/or feral animals	Low: the Project is not likely to increase the presence of domestic or feral animals in the local area.
Loss of shade/shelter	Known: the removal of vegetation would result in a loss of shade and shelter for local ground-dwelling fauna. This impact will be low in magnitude as the area to be removed is dominated by grassland with a very small, isolated patch of shrubland and an isolated tree (the area to be impacted) is small and in poor condition, providing minimal habitat.
Loss of individuals through starvation	Low: removal of the habitat will not cause loss of individuals through starvation. It is likely to be used seasonally as a foraging resource by insectivorous, frugivorous and nectivorous species occupying a much larger territory and relying on other resources throughout the rest of the year.
Loss of individuals through exposure	Low: habitat to be removed is dominated by grassland with a very small, isolated patch of shrubland and an isolated tree. Therefore, the Project will not cause a loss of individuals through exposure.
Edge effects (noise, light, traffic)	Low: A single hollow-bearing tree immediately adjacent to the south of the construction footprint has the potential to be used by threatened hollow-dependent bats. These species can be sensitive to noise and light. The Site is impacted by noise and light from traffic on Menangle Road. No works will take place immediately adjacent to this tree. The Project is not considered likely to adversely affect any threatened microbats through noise or light.
Traffic impacts	Low: increased traffic in the Site and Menangle Road could impact locally occurring fauna that may be traversing the locality. However, traffic on site will be confined to new internal roads and hardstand areas with very low speed restrictions and threatened species are unlikely to be subject to this impact.
Deleterious hydrological changes	Low: the Project will alter runoff across the Site. Any impacts beyond the Site during or after construction will be marginal and would be managed by standard sediment and erosion controls during construction and the incorporation of stormwater drainage into the Project design.
Contamination of groundwater, surface water and Foot Onslow Creek	None: runoff and wastewater from site processes would be retained within the Project's sedimentation ponds and discharged into Foot Onslow Creek. The discharge will be in accordance with water quality standards prescribed by the EPA. No transport of contaminants into the wider hydrological system of the area is likely.
Weed invasion	Low: area is already highly weed-infested. Active management of the Site will likely reduce weed loads on the Site.
Increased human activity within or directly adjacent to sensitive habitat areas	High: The CPW present beyond the construction footprint is a sensitive habitat area. Site management activities including containing activities to Subject Area will avoid the CPW.

Prescribed impacts

The following prescribed impacts identified in Section 6 of the BAM are relevant to the Project:

- Hydrological process sustaining/interacting with rivers, streams or wetlands.
- Vehicle strikes on threatened species.

Prescribed impacts will be managed and mitigated via the measures in Section 6.8.3.

Serious and irreversible impacts

The BC Act and the NSW *Local Land Services Act 2013* impose obligations on decision-makers in relation to impacts on biodiversity values that are at risk of serious and irreversible impacts (SAII). These obligations generally require a decision-maker to determine whether the residual impacts of a proposed development on biodiversity values (that is, the impacts that would remain after any proposed avoid or mitigate measures have been taken) are serious and irreversible.

Cumberland Plain Woodland is on the list of threatened entities for which the potential for SAII must be considered. No threatened species at risk of SAII are known or considered likely to occur at the Site.

The following matters were considered during the assessment of SAII on CPW:

- The Project has been designed to avoid the better quality stands of treed CPW that are present in the south (this stand also contains a hollow-bearing tree), south-east and north-east of the property. Those areas of the property that are to be impacted are of poor quality.
- The Project is expected to impact 18.34 ha of CPW (consisting predominantly of a grassland zone with very small areas of the shrubland zone and woodland zone). This is approximately 0.2% of the identified CPW in NSW[19].
- The area of CPW to be impacted is predominantly grassland with a high proportion of weeds present throughout. It has little to no structural integrity, has low floristic diversity and its ecological processes have been substantially disrupted such that the community's functioning is dramatically reduced.
- The grassland, shrubland and woodland zones have a vegetation integrity score of 5.9, 16.5 and 26.3, respectively.
- Patches of intact (containing all structural layers) CPW in the surrounding locality are scarce, with those small, isolated stands present being of low quality and impacted by weeds. No good quality CPW remnants are present within a 500 m buffer of the subject land.

The Project is unlikely to cause SAII to CPW.

6.8.3 Management measures

The following management measures to be implemented during construction and operation of the Project will be included in the biodiversity and construction environmental management plans:

- Pre-construction:
    - Establishment of fencing around woodland areas adjacent to the subject land, with fencing maintained throughout the construction phase of the Project – the Site boundary is to be clearly demarcated.
    - Review of the Appin Mine Biodiversity Management Plan (BMP) (IMC 2019).
- Construction:

19 It is noted that this 0.2% estimate includes a grassland variant of CPW within the Site but compares it to a vegetation mapping project that does not generally include such variants. As such, a true comparison to the vegetation mapping undertaken would take in only the wooded variants of CPW present on the subject land, and thus result in an even smaller reduction of CPW in NSW.

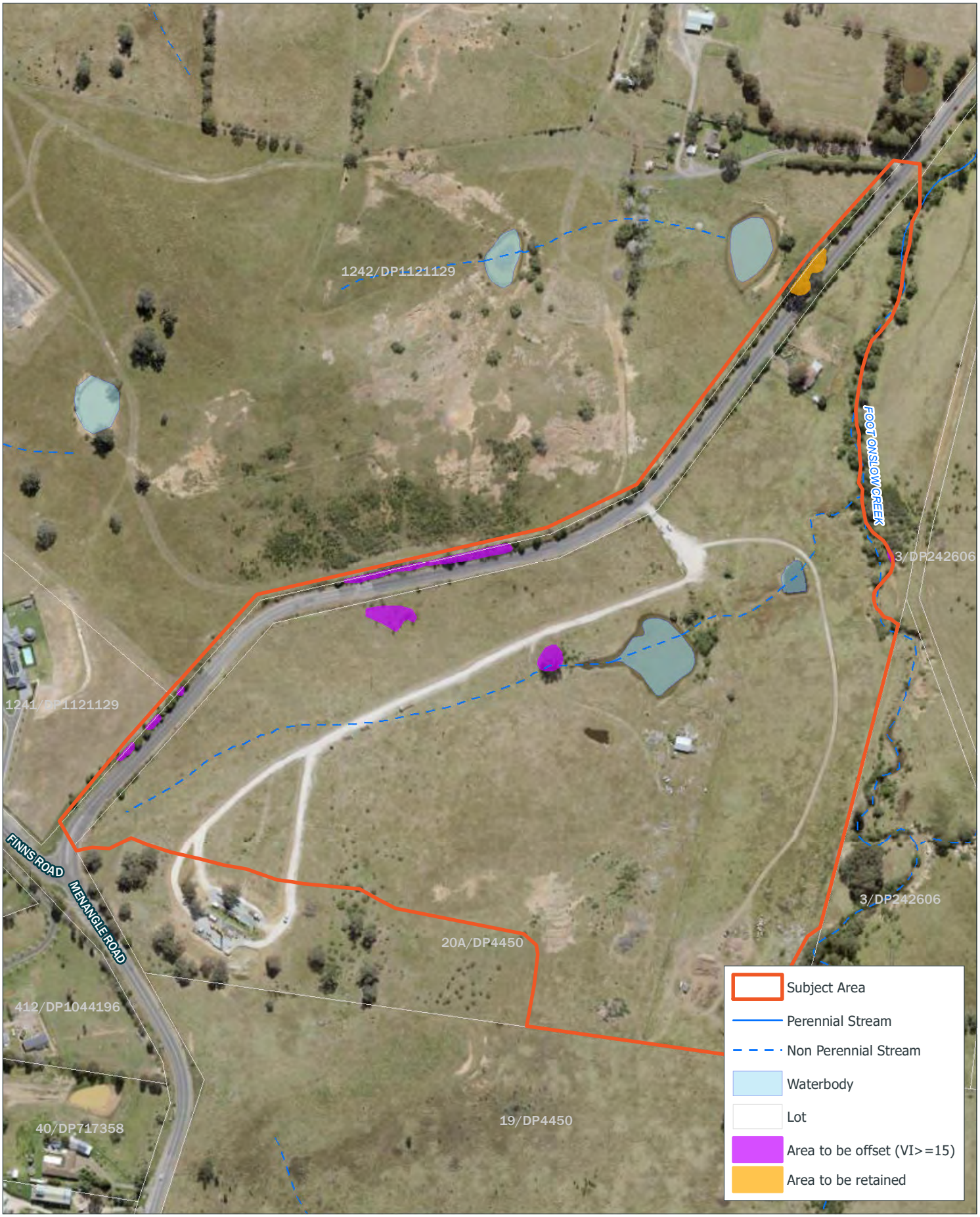
    - Implementation of erosion and sediment controls for the duration of construction works. Regular maintenance of erosion and sediment controls during construction and until excavated areas are vegetated. This will be detailed in a relevant management plan and is noted in Section 3.7.3.6.
    - Implementation of the revised BMP.
    - Pest and weed prevention measures for construction activities and management of any priority pests or weeds within the Site.
- Post construction:
    - Landscape planting focusing on naturally occurring endemic tree and shrub species.
    - Management and removal of all waste from the subject land (see Section 6.11).
- Operations:
    - Monitoring of water quality within the Sediment Pond and treating the water to ensure the quality of the discharged water meets Site EPL requirements.
    - Monitoring and maintenance of all erosion and sedimentation controls.

The BMP includes measures to protect and manage important biodiversity values. The BMP would be updated to include the Project prior to the commencement of construction.

6.8.4 Residual impacts

As described in Section 6.8.2.2, there will be unavoidable impacts to PCT 849 and PCT 835. These impacts will require offsetting under the BC Act, for the area shown in Figure 6-3. The BAM Calculator has determined that two ecosystem offset credits will be required for PCT 849. These ecosystem credits also cover the credit requirement for ecosystem credit species.

As no threatened biodiversity listed under the EPBC Act were recorded or considered likely to occur in the subject land, no assessment/s of significance under the EPBC Act were required. As such, there is no requirement for an EPBC Act Referral regarding Commonwealth threatened species, communities or populations.



SOUTH32

FIGURE 6-3

Area to be offset

Appin Mine Ventilation and Access Project

N

0 50 100

m

GDA 1994 MGA Zone 56

6.9 Aboriginal heritage

6.9.1 Introduction

This section summarises the Aboriginal cultural heritage assessment (ACHA) report, which is in Appendix F. It describes the cultural context of the Site, consultation with the Aboriginal community, study methods, items discovered during surveys, the significance of the items, potential impacts and mitigation measures where impacts are unavoidable.

6.9.1.1 Summary of assessment methods

The following guidelines were referenced during the assessment:

- Former Department of Environment and Conservation (2005) Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.
- Former Department of Environment, Climate Change and Water (2010) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.
- Department of Environment, Climate Change and Water (2010) Aboriginal Cultural Heritage Consultation Requirements for Proponents.
- Former Office of Environment and Heritage (2011) Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.
- Australia ICOMOS (2013) The Burra Charter.

The following assessment methods were used during the ACHA.

Desktop study

Environmental features which could influence historic Aboriginal use of the area were characterised, for example landscape, drainage, geology, soils, vegetation, fauna and climate.

Literature such as previous heritage assessments of the region and local area were reviewed to understand historical Aboriginal use of the area and customs.

The AHIMS database was also searched as described in Section 2.4.1.

Information gathered from the desktop study is used to develop a predictive model of what types of Aboriginal sites are likely to occur in the Site.

Aboriginal consultation

Aboriginal parties were consulted in accordance with the former Department of Environment, Climate Change and Water's (2010) Aboriginal Cultural Heritage Consultation Requirements for Proponents as detailed in Chapter 4 of Appendix F. Twenty-one Aboriginal groups registered their interest in the Project and contributed cultural knowledge and archaeological expertise to the Aboriginal heritage assessment process.

Archaeological survey

The Site was surveyed on 7 December 2020 by archaeologists and representatives of the registered Aboriginal parties (RAPs). All of the Site including the land along the eastern bank of Foot Onslow Creek was surveyed. Areas of greater visibility and higher potential (exposures, ridgelines, terraced flats etc.) were targeted during the survey.

Test excavation

The area associated with a known registered Aboriginal site (AHIMS ID# 52-2-3687) (Figure 6-4) was test excavated to:

- Test the area surrounding the registered Aboriginal cultural heritage site.
- Increase ground surface visibility in the Site.
- Provide further information on the nature, significance and extent of any sub-surface archaeological deposit within the Site.
- Test the nature, significance and extent of any sub-surface archaeological deposit in relation to archaeologically sensitive landforms within the Site (i.e. with distance from water).

Fifty-two test pits were excavated using the method presented to the RAPs. The 46 pits were aligned along three transects following the contours of Foot Onslow Creek. The additional six test pits were in the central portion of the Site to assist in determining the extent of subsurface archaeological deposits.

6.9.2 Potential impacts

6.9.2.1 Predictive model

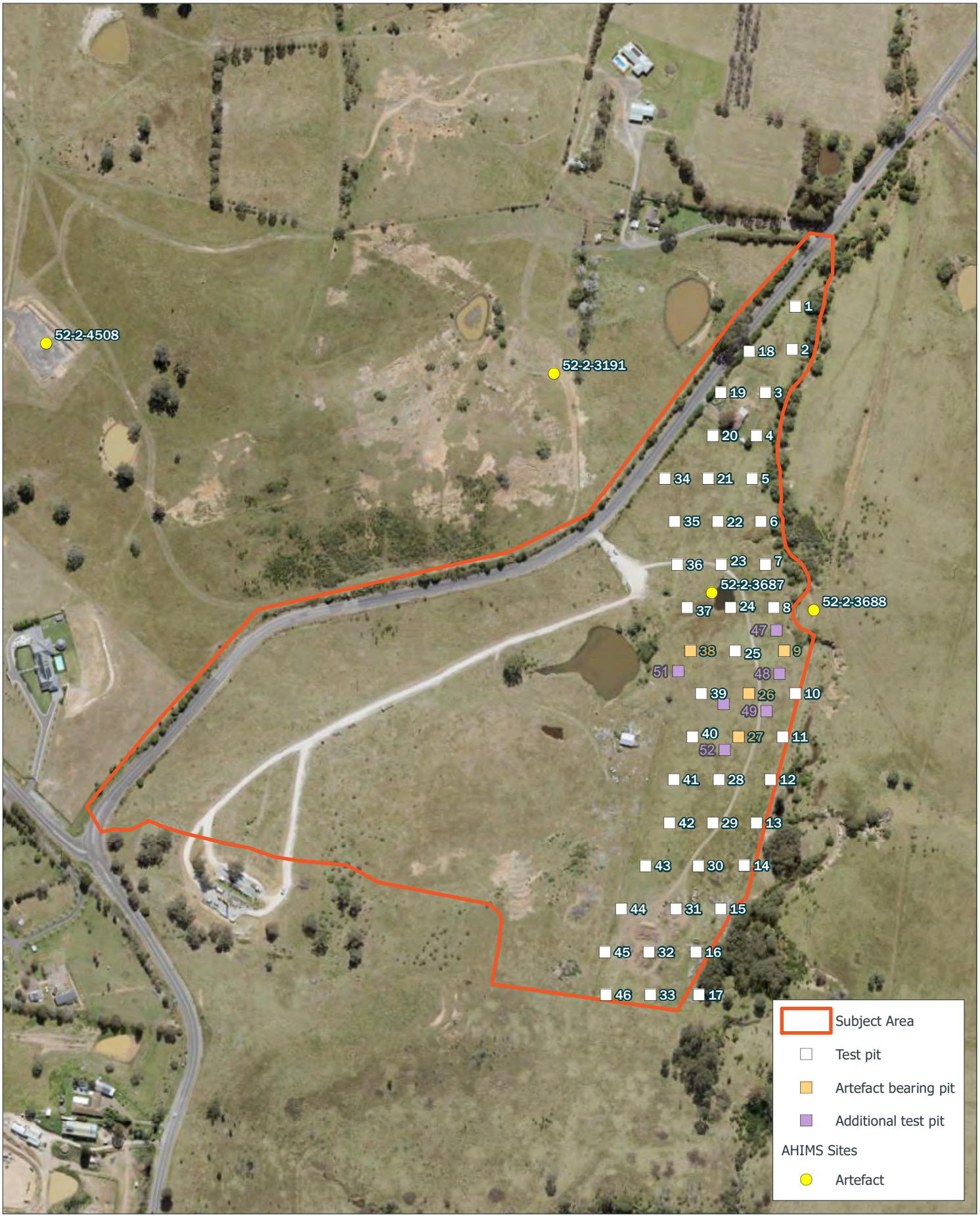
The distribution of stone artefacts across the Rouse Hill Development Area were analysed in 2010, which was the first such peer reviewed and published analysis and predictive model. Several landscape variables were analysed against the results of sub-surface and concluded that the stream order (the size of a drainage line) and landform were the most important factors in determining artefact density and distribution. In summary it was concluded that factors influencing artefact density on the Cumberland Plain are:

1. Stream order, with higher order streams tending to have higher artefact densities and more continuous distributions than lower order streams.
2. Landform, with higher densities on terraces and lower slopes, and with sparse discontinuous scatters on upper slopes.
3. Aspect on lower slopes associated with larger streams, with higher artefact densities on landscapes facing north and northeast.
4. Distance from water, with higher artefact densities 51–100 m from 4th order streams, and within 50 m of 2nd order streams.

Although the Menangle area has greater relief than Rouse Hill, the observation about the importance of landform describes the known distribution of stone artefact sites in the Menangle area. A study of Indigenous heritage values at Menangle Park, just north of the Site, identified three high value landscapes with the potential to contain sub-surface Aboriginal objects, including creek terraces like Foot Onslow Creek.

The Site is on mostly cleared flats and low to steep hills of the Blacktown Soil Landscape as well as the floodplain and terraces of Theresa Park Soil landscape. There are no landforms which will produce rock shelters. The Site contains no previously documented or known evidence of use by the Aboriginal community in the times since European contact.

Open stone artefact sites were considered the most likely type of Aboriginal archaeological items to occur on the Site. The Blacktown Soil Landscape has the potential to preserve traces of past Aboriginal land use. The Theresa Park Soil Landscape also has the potential to contain Aboriginal objects and/or features due to its moderately deep soil profile, increasing the likelihood to preserve artefacts at depth.



SOUTH32

FIGURE 6-4

Excavated test pits

Appin Mine Ventilation and Access Project

N

0 50 100

m

GDA 1994 MGA Zone 56

Considering the characteristics of the Cumberland Plain in general, and the specific results of previous investigations in the Site and the surrounding Menangle area the following predictive statements can be made:

- Open Camp Sites (consisting of surface artefact scatters and/or isolated artefacts) are the most likely Aboriginal site types to occur, being commonly found in water-related landforms and gentle slopes <200 m from waterways. This includes flats, lower slopes and hill crests. High density artefact sites are usually located within 50-100 m proximity to upper reaches of larger drainage lines.
- PADs are likely to occur where intact soil profiles are present in association with well drained flats and lower slopes. The occurrence of sub-surface material does not necessarily correlate with Aboriginal objects found upon the surface.
- Modified trees (scarred or carved) are unlikely to occur due to historic clearing of vegetation and the practice of using wood and bark from trees by Aboriginal people decreased after European contact.
- There will not be rock shelters, art (pigment and engraved), middens, quarries, stone arrangements and axe grinding grooves in the Site due to the absence of suitable food water resources (shells and molluscs) and/or suitable geology (i.e. sandstone formations and outcrops).
- Aboriginal burials are unlikely to be present due to the shallow soil profile. These sites tend to occur within deep, sandy and/or soft soil contexts within sand dune formations, often in association with midden materials.
- Aboriginal places are places of cultural significance to Aboriginal people. No Aboriginal places have been declared in the Site (November 2020) or listed on AHIMS.

The predictive statements are limited to the open stone artefact and scarred tree site types, as these are the only site types with a predictable likelihood to occur at the Site.

6.9.2.2 Survey results

The Site comprises, dense grass cover, with scattered low regrowth vegetation. Visibility is generally poor and exposures are scattered, comprising vehicle tracks, erosion and dam banks.

As described in Section 2.4.1, two Aboriginal items (AHIMS ID #52-2-3687 and AHIMS ID #52-2-3688) were discovered during previous surveys of the Site (Figure 2-4).

Item AHIMS ID #52-2-3687 was not found during the December 2020 survey. However, a red silcrete flake was found on a dam wall during a later survey, which is unlikely to be in-situ given the dam wall was constructed and would have disturbed the surface. This item is Bulli Site 7 (AHIMS ID #52-2-3687).

Item AHIMS ID #52-2-3688 was found and extends approximately 100 m along a fence on the eastern side of Foot Onslow Creek. This site is not in the Site boundary and will not be impacted by the Project.

6.9.2.3 Test excavation results

Five Aboriginal objects were found in four of the test pits from a range of depths (Table 6-25). The frequency and distribution of objects are representative of transient land-use resulting in low-density occupation.

Table 6-25 Recorded Aboriginal objects

Test pit	Landform	No. objects
TP09	Creek terrace	1
TP26	Creek terrace	2
TP27	Creek terrace	1
TP38	Creek terrace	1

Two of the objects were silcrete and the others were one each of siltstone, indurated mudstone and milky quartz. Two of the objects were complete retouched flakes and the others were one each of a complete flake, marginal flake and distal flake.

Based on the results of the test excavation, the boundary of site AHIMS ID #52-2-3687 has been revised to include all artefact bearing pits and site AHIMS ID #52-2-3688.

Overall, the results demonstrate the Site was likely associated with a low intensity occupation and use by Aboriginal people. The broad association between artefact bearing test pits, the locations of sites AHIMS ID #52-2-3687 and AHIMS ID#52-2-3688 and the low number of subsurface artefacts suggest that Aboriginal objects resulted not from isolated behavioural events but from sporadic use of and/or movement through the Site over a long period.

6.9.2.4 Statement of significance

The *Burra Charter* defines cultural significance as being derived from the four values summarised in Table 6-26. Site AHIMS ID #52-2-3687 has low scientific (archaeological) significance. The Site is of high social significance to the Aboriginal community because it contains landscapes and resources that help define the communities' identity.

Table 6-26 Definition of heritage values

Value	Description	Summary
Aesthetic	This value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.	The Site has low aesthetic values as much of the surrounding environment has been significantly modified. However, natural landforms still remain along with the presence of Foot Onslow Creek which adds to the strong sense of beauty and Aboriginal connectivity to the landscape.
Historic	This value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.	The Site contains no identified historic values relating to Aboriginal heritage.
Scientific	The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information.	The Site contains an Aboriginal open camp site (52-2-3687), which is of low scientific (archaeological) value. The site could yield information that would contribute to a further understanding of the cultural history of the local area and region. In particular, the nature of past Aboriginal land-use of the Cumberland Plain, and the relationship between past Aboriginal land use and the use of available resources including the Nepean River.
Social	This value embraces the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a majority or minority group.	The Site is of high social significance to the Aboriginal community because it contains landscapes and resources that help define the communities' identity.

Value	Description	Summary
		Kadibulla Kahn of KYWH expressed that high cultural and social value exists within the wider cultural landscape. *A long time ago before the Europeans arrived, the land would have been very different from today. The flora and fauna would have been thriving, there would have been many water ways flowing, today they have been used for drainage. Aboriginal people would have used their environment to their advantage, utilising what they needed and never wasting or taking too much. This was a part of our lore looking after mother nature as she provides for us Aboriginal people and we give back to her.* The Aboriginal objects associated with the AHIMS registered site are valued for providing a tangible link to the past.

6.9.3 Management measures

The following management measures will be implemented to reduce impacts to site 52-2-3687 and prevent impacts to any previously undiscovered Aboriginal objects in the disturbance area:

- An Aboriginal Cultural Heritage Management Plan (AHMP) will be prepared to detail and schedule (for the life of the Project) the mitigation and management measures in Appendix F. The AHMP will be developed in consultation with the RAPs and relevant regulatory authorities and in compliance with the requirements of the BSO HMP 2017. The AHMP will comprise:
    - Protocols for the involvement of the RAPs in cultural heritage works under the AHMP. This protocol should focus on members of the RAPs identified during this ACHA's consultation process.
    - A communications protocol that describes clear methods of communication, including expectations of suitable notification and response time, between the proponent and the RAPs.
    - A protocol for the discovery and management of unexpected finds, including stop work provisions and notification protocols.
    - A protocol for the discovery and management of human remains, including stop work provisions and notification protocols.
    - Procedures for the management and reporting of previously unknown Aboriginal heritage sites that may be identified during the life of the Project.
    - Protocols for heritage awareness training to be incorporated into the Site inductions for both employees and sub-contractors who may be conducting works that have the potential to impact on any Aboriginal heritage sites. Consideration should be given to involving the RAPs in the development and presentation of the cultural awareness training.
    - A regular review process for the AHMP (every three years).
    - AHIMS site impact forms to be submitted for any sites subject to impact.
    - Copies of the final AHMP should be made available to each RAP, DPIE and Heritage NSW.
- The isolated surface artefact at site AHIMS ID #52-2-3687 will be collected in consultation with the RAPs under the above AHMP.
- A care and control agreement will be prepared and implemented for the long-term management of recovered artefacts.
- The five artefacts recovered during the test excavation and the surface artefact to be collected as per the above will be reburied on the Site outside of the area of impact in accordance with the AHMP.

- All site personnel will be inducted into the Site so they are made aware of their obligations under the NPWS Act as to their responsibilities in the conservation of Aboriginal heritage.
- Site card information for site AHIMS ID #52-2-3687 will be updated in the AHIMS database with revised site descriptions (i.e. Aboriginal site impact form).
- In the unlikely event that suspected human remains are encountered during construction, all work in the area that may cause further impact, must cease immediately and:
    - The location, including a 20 m curtilage, should be secured using barrier fencing to avoid further harm.
    - The remains must be left in place and protected from harm or damage.
    - The NSW Police and Coroner's Office must be contacted immediately.
    - No further action is to be undertaken until the NSW Police confirm the origin of the remains as non-human and provide a case number for South32's records.
    - If the skeletal remains are identified as Aboriginal, South32 or their agent must contact:
        - the Heritage NSW's Enviroline on 131 555; and representatives of the RAPs.
        - No works are to continue until the Heritage NSW provides written notification to the Proponent or their Agent.

6.9.4 Residual impacts

The Project would partially impact a single Aboriginal cultural heritage site (AHIMS ID 52-2-3687) registered on Aboriginal Heritage Management System (AHIMS).

6.10 Historical heritage

6.10.1 Introduction

This section summarises the historical heritage assessment and statement of heritage impact report, which is in Appendix G. It describes the non-Aboriginal cultural context of the Site, items discovered during surveys, the significance of the items, potential impacts and mitigation measures where impacts are unavoidable.

6.10.1.1 Summary of assessment methods

The following guidelines were referenced during the assessment:

- *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (2013).*
- *Assessing Heritage Significance (Heritage Office, 2001).*
- *Assessing Significance for Historical Archaeological Sites and 'Relics' (Heritage Council, 2009).*

The desktop assessment component of the Project comprised a search of the public databases described in Section 2.4.2. There was a further literature review to determine and describe the historical 'phases' of the Project area and the region.

The Site was inspected on 7 December 2020 and between 1-12 February 2021, which comprised a systematic meander with areas of potential for disturbance closely inspected and recorded. Aerial photographs from between 1961 and 1975 were observed to determine historic site disturbance.

The criteria in Table 6-27 and Table 6-28 from Assessing Heritage Significance were used to assess the heritage significance of the Site. The Site was compared to 'Dairy No 4', comprising 'a cottage, feed sheds and soils' (database #3040025), which is approximately 3 km north of the Site. Dairy No 4 occurs within a farming landscape associated with the greater Camden Estate and is a local example of the evolution of small farms from the mid-19th century through to the mid-20th century.

Table 6-27 Heritage assessment criteria

Criteria	Value	Description
Criterion A)	Historical Significance	An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural of natural history of the local area).
Criterion B)	Associative significance	An item has strong or special association with the life or works of a person or group of persons, of important in NSW's cultural or natural history (or the cultural of natural history of the local area).
Criterion C)	Aesthetic significance	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).
Criterion D)	Social significance	An item has strong or special association with a particular community or cultural group in NSW (or the local area). for social, cultural or spiritual reasons.
Criterion E)	Research potential	An item has the potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area).
Criterion F)	Rarity	An item possesses uncommon, rare or endangered aspects of the area's cultural or natural history (or the cultural or natural history of the local area).
Criterion G)	Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places, or cultural or natural environments. (or a class of the local area's cultural or natural places, or cultural or natural environments.)

Table 6-28 Grading of significance

Grading	Justification	Status
Exceptional	Rare or outstanding element directly contributing to an item's local or State listing.	Fulfils criteria for local and/or State significance.
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local and/or State significance.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local and/or State significance.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Damaging	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing.

6.10.2 Potential impacts

6.10.2.1 Context

Historical context

The following historical phases of development have been identified for the Site. These phases are:

- Phase 1 – the Pre-European Aboriginal landscape.
- Phase 2 – 'Cowpastures' and the contact landscape.
- Phase 3 – South Camden Estate.
- Phase 4 – 20th Century farming.

The Menangle area is the traditional country of the Tharawal people, with boundaries from the south side of Botany Bay to north of the Shoalhaven River, and inland to the Campbelltown and Camden area. The

Appin and Douglas Park area is ‘Gundungurra and Tharawal tribal country’ as the area is a transitional boundary between the Tharawal and their westerly neighbours, the Gundungara.

The first Europeans arrived in the Appin region in the last decade of the 18th century. They discovered a large herd of cattle that had developed from animals that had escaped from the early Sydney settlement. This led to the area becoming known as ‘Cowpastures’.

Two European settlers, John Macarthur and Walter Davidson, were the first landowners of the area. there was sporadic then large scale conflict between the Europeans and the Tharawal which led to the Appin Massacre of 17 April 1816. By May of 1816, Governor Macquarie had changed tact and had established a campaign of ‘banishment’ which was more effective than military campaigns.

Walter Davidson, an early European settler in the area, named his land grant "Manangle". The Manangle property was later incorporated into the larger Macarthur Estate, as granted to John Macarthur in 1805. The 10,000 acre land grant within the Cowpastures region included the Upper Camden and South Camden Estates and was initially used to develop the Macarthur wool venture.

The Camden Estate continued to produce high quality wool throughout the mid-19th century, with John Macarthur’s son James creating the Australian Agricultural Company to facilitate the production of wool. The township of Menangle was created by the Macarthur family as a private village, and by the mid-19th century it had undergone significant growth with the development of a railway to the town.

In the 1850s, the Macarthur family mortgaged their estate and sold off some of the smaller allotments. The rapid growth of the wool industry had slowed, and the Macarthur family began a move into crop production. By the last years of the 19th century, the Macarthur family had formed the Camden Estate into a company. Some of the Estate was leased to tenant farmers during this time.

Flooding and drought in the 1870s put tenants and the company of the MacArthur owned Camden Estate under financial stress, and from 1876, many tenants were given notice to quit. In 1881 William Macarthur sold 5,100 acres including the flourishing north-west corner of the estate, Cobbitty Paddock and Cawdor together with all of the unsold allotments in the township of Camden.

The new lot arrangement was intended to provide both large and small farms not only for local residents, but also for farmers from all parts of the colony as well as potential homestead lots for gentlemen from. The first sale took place in March 1882 and again in 1887.

By the late 19th century, the land around the Menangle village had undergone significant change, with the focus of the Camden Estate changed to dairy farming and production. It is likely that the site, as part of the greater Camden Estate, would have been used for cattle grazing during this time.

By the early 20th century, the remaining estate had been cleared to provide additional grazing, cooperative dairy farms had been established including those at Camden and Menangle. Pig farming and bacon curing were in operation and the orchard and flower cultivation were in full production.

Physical evidence

The historical aerial photographs indicate that little to no development occurred on the Site for the latter half of the 20th century. The Site inspection indicates that it likely continued to house cattle to the current period.

Cultural landscape

The Site is an example of an evolved and continuing rural farming cultural landscape. The evolution of the Site though vegetation clearance, lot division, the construction of farming infrastructure, grazing and continued maintenance of internal and external boundaries are all contributory factors to the cultural landscape.

6.10.2.2 Assessment of significance

Comparative analysis

In comparison to Dairy No 4, the Site, while a good example of a rural cultural landscape and a dairy farming landscape associated with the greater Camden Estate, does not hold the level of significance or archaeological potential as other, more developed early farms in the area.

There is no historical evidence that the Site will contain evidence of occupation such as at the Dairy No 4 cottage, evidence of farming infrastructure such as feed sheds or silos, or archaeological resources that would contribute to the potential significance of the Site.

6.10.2.3 Statement of cultural significance

As there were no listed heritage items nor undiscovered heritage items, no items associated within the Site were assessed using the criteria outlined in Assessing Heritage Significance.

On the basis of this assessment, the Site does not meet the criteria for local or State heritage significance.

6.10.3 Management measures

Despite the assessment findings, an unexpected finds protocol will be implemented in the unlikely event that archaeological deposits are discovered.

6.10.4 Residual impacts

The Site is part of the regional cultural landscape associated with early 19th Century settlement and the development of large rural estates such as South Camden.

An analysis of historical resources has found that the Site has remained largely unchanged from first European settlement and farming of the area. Little to no development has occurred associated with the identified historical phases.

The Site does not contain heritage items and has a very low to low potential to contain archaeological resources associated with the identified historical phases. Implementation of the unexpected finds protocol will appropriately manage any undiscovered heritage items (if any).

6.11 Hazardous and offensive development

6.11.1 Introduction

This section summarises potential hazards and risks associated with the Project and management measures which, when implemented, would reduce these hazards and risks to acceptable levels.

Additionally, this section summarises the handling, transport, storage and use of dangerous goods at the Project, and the implications of these dangerous goods with respect to State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33).

6.11.1.1 Application of SEPP 33

Department of Planning (2011) *Applying SEPP 33* (the guideline) states that this report needs to determine if the Project will constitute a ‘potentially hazardous industry’. If the Project is a potentially

hazardous industry, then the SEPP applies and the guideline states that a preliminary hazard analysis (PHA) should be undertaken as part of the EIS.

A ‘hazardous industry’ under SEPP 33 is one which, when all locational, technical, operational and organisational safeguards are employed, continues to pose a significant risk. A proposal cannot be considered a hazardous industry unless it is first identified as potentially hazardous industry and subjected to the assessment requirements of SEPP 33.

The screening test for potentially hazardous industry relates to the type and quantity of hazardous materials or dangerous goods used and stored on-site, and the distance of the storage facility to the Site boundary. As outlined in the following section, the hazardous materials and dangerous goods proposed to be stored at the Project are below the screening thresholds in the guideline, and are transported, stored, handled and managed in accordance with relevant regulations and industry standards. As such, the Project does not constitute a potentially hazardous industry, and the assessment requirements of the SEPP, including requirement for a PHA, are not applicable to the report.

Despite the above, in accordance with the guideline, the Project may constitute a ‘potentially offensive industry’, where in the absence of safeguards and controls, the Project could ‘emit a polluting discharge that could cause a significant level of offence’. Examples of this may include depositional dust, or operational noise impacts on adjacent residents or land uses.

The guideline states that where a project requires pollution licencing from the EPA, that the development could be considered as potentially offensive. The guideline suggests that if the regulatory authority were to issue a licence for the pollution, then this would suggest that the pollution would not be significant and can be controlled via mitigation and management measures. As such, the potentially offensive industry would not be proved to be defined as ‘offensive industry’.

As summarised in this report, the Project may emit pollutants, which in the absence of safeguards could cause offense. However, management measures will be implemented to control and minimise these emissions or pollutants to a non-significant level.

Additionally, IMC holds an EPL (No. 2504), previously issued by the NSW EPA for the operation of the Mine. This EPL could require variation following consultation with the EPA following approval of the Project. However, the EPL would continue to be held for the life of the Project. Therefore, it is likely the historical provision of an EPL by the NSW EPA is sufficient to suggest that existing levels of emissions and pollutants are acceptable to the regulatory authority and that the Project is not offensive industry.

Potential environmental impacts associated with the Project have been considered in this report. Emissions and potential sources of pollution associated with the Project (including air quality, noise and surface water impacts) have been assessed by technical specialists, and these specialists have concluded that providing the implementation of management and monitoring measures, these impacts would not significantly impact the surrounding environment or community.

6.11.2 Potential impacts

6.11.2.1 Hazardous materials

A variety of hazardous substances and dangerous goods are used for mine operations. These include fuels, oils, greases, compressed gas, chemicals and explosives.

Dangerous goods and other hazardous substances are legislated under the NSW *Work Health and Safety Act 2011* (WHS Act) and NSW *Workplace Health and Safety (Mines) Act 2013*.

IMC currently holds all necessary approvals under these Acts and maintains a system for managing dangerous goods and hazardous substances that satisfies the requirements of the legislation and relevant SafeWork NSW codes of practice.

The main hazardous substances and dangerous goods required for the Project include hydrocarbons, explosives and chemicals. These materials are summarised in Table 6-29 and compared to the potentially hazardous development screening thresholds in the guideline.

It is demonstrated in Table 6-29 that the storage and handling of dangerous goods at the Project will not exceed guideline thresholds and, therefore, the Project is not a potentially hazardous industry and a PHA is not required.

Table 6-29 Hazardous materials

Material and dangerous goods classification under Australian Dangerous Goods Code	Storage quantity	Mode of storage	Storage location	Approximate distance to Site boundary	Estimated annual or peak weekly transport movements	Screening threshold	Threshold exceeded?
Diesel Fuel (3PGIII) [Vent fan back-up generator fuel tanks]	40,000 L, 34 t	2 * 20,000 L permanent above ground tanks	Near ventilation fans	170 m	1/month	[1]7 m	N/A
Hydrocarbons (Oil) (3PGIII) [For UG use / minor surface use]	5,000 L, ~4 t	Self-bunded IBCs	Warehouse	140 m	1/week	[2]4 m	No
Hydrocarbons (Oil) (3PGIII) [For lubrication of equipment and materials]	5,000 L, ~4 t	20 L drums	Bunded area of warehouse	140 m	1/week		
Grease, degreaser and kerosene (3PGIII)	5,000 L, ~4 t	20 L drums	Bunded area of warehouse	140 m	1/week		
Explosive: (1.1D) [For use during construction]	3,000 kg	Offsite magazine	Offsite	N/A	5/week	These materials will only be brought to Site prior to use during construction (i.e. short term) so only regulations and Australian Standards have been considered.	N/A
Detonators / primers (1.1B) [Electric for Blasting]	2,000 units	Offsite magazine	Offsite	N/A	1/week		

Material and dangerous goods classification under Australian Dangerous Goods Code	Storage quantity	Mode of storage	Storage location	Approximate distance to Site boundary	Estimated annual or peak weekly transport movements	Screening threshold	Threshold exceeded?
Hypochlorite (8PGII)	2,000 kg	Self-bunded IBCs	Adjacent to sewage treatment plant	80 m	1/week	25 t	No
Aerosols (2.1) (lubrication, paints, cleaning)	<500 kg	Steel cage	Warehouse	140 m	1/week	25 m	No
Flammable liquid including paints and similar (assume 3PGI)	<500 kg	AS1940:2004 compliant cabinet	Warehouse	140 m	1/week	No potential hazard for less the 2 t	No

[1] Diesel is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) Code Edition 7.7 but is included as it is classified as a combustible liquid by *Australian Standard 1940-2017: Storage and Handling of flammable and combustible liquids. (AS 1940-2017)* (Class C1) for the purpose of storage and handling .[2] These materials will be stored in proximity to each other so their quantities have been combined.

Diesel

Diesel is classified as a combustible liquid by *Australian Standard 1940:2004 The Storage and Handling of Flammable and Combustible Liquids* (AS 1940:2004) (Class C1) for the purpose of storage and handling, but is not classified as a dangerous good by the criteria of the ADG code.

The risks associated with the Project include diesel storage and usage. Diesel storage will comprise two 20,000 L above ground tanks inside a concrete bund in accordance with AS 1940: *The Storage and Handling of Flammable and Combustible Liquids*. Any spills in the collection areas will be contained, managed in accordance with emergency response procedures, and classified and disposed in accordance with relevant waste legislation.

Diesel would not be stored within the same bund as other flammable liquids, and as such would not be subject to the Applying SEPP 33 screening thresholds. As a result, the storage of diesel is not potentially hazardous in terms of SEPP 33.

Oils, greases and kerosene

Oil is classified as a combustible liquid (Class C2) by AS 1940:2004. Oils are proposed to be stored in drums in the roofed warehouse, approximately 140 m from the Site boundary. A maximum of 15,000 L of lubricant, grease, degreaser and kerosene will be stored here in accordance with *Australian Standard 1940-2017: Storage and Handling of flammable and combustible liquids. (AS 1940-2017).*

The quantities of these materials proposed to be stored at the Project and the storage location are below the guideline threshold and will not be potentially hazardous in terms of SEPP 33.

Explosives

As shown in Table 6.44, over 3,000 kg of class 1.1B and 1.1D will be used during construction of the Project. These explosives will be stored at either the explosives contractor's or IMC's existing facilities, where the storage structure and separation distance requirements in *Australian Standard 2187.1-1998:*

Explosives – Storage, transport and use, Part 1: storage (AS 2187.1-1998) are complied with. The party responsible for storing the explosives will hold a 'Licence to store' explosives under clause 27 of the NSW *Explosives Regulation 2013.*

The explosives will be transported to and used at the Site in accordance with the *Australian Dangerous Goods Code Edition 7.7* and *Australian Standard 2187.2-2006: Explosives – Storage and use, Part 2: Use of explosives (AS 2187.2-2006).* The party responsible for transporting the explosives will hold a 'Licence to transport by vehicle' explosives under clause 25 and the party responsible for using the explosives will hold a 'Blasting explosives user's licence' under clause 28 of the NSW *Explosives Regulation 2013,* respectively.

Pre-cursor materials (ammonium nitrate – not an explosive but a Class 1 oxidizer) that can be prepared in an approved manner for use as explosives may be stored at the Site in quantities permitted under the NSW Dangerous Goods (Road and Rail Transport) Regulation 2014.

The Project would use various types of explosives depending on the detailed blast design and location in shaft. Options include but are not limited to:

- Non-permitted emulsion type explosive – upper part of the shaft but depth not defined.
- Permitted packaged type explosive – lower part of the shaft but depth not defined.
- Boosters.
- Detonators electronic type.

Chemicals

Chemicals proposed to be stored and used are flammable liquids (Class 3), aerosols (Class 2.1) and corrosive substances (Class 8) and are classified as dangerous goods under the ADG code.

The proposed quantities of chemicals will be less than the SEPP 33 potentially hazardous threshold quantity for these classes of materials.

6.11.2.2 Soil and water contamination

In the event of a spill of the hazardous substances or dangerous goods stored and used on-site, via human error, or failure or rupture of the storage vessel, potential impacts may include localised contamination of soil and water, as well as impacts on health and safety.

If released to the environment uncontrolled, hydrocarbons and chemicals may be damaging to soils and aquatic ecosystems, and fires can occur if these materials are ignited.

Potentially hazardous products such as fuels, oils, lubricants, grease and other chemicals required for the Project would be contained within appropriately bunded areas in accordance with relevant Australian Standards, codes and regulations, as outlined previously.

Refuelling and maintenance activities would be restricted to hardstand bunded areas. As such, the risk of soil, surface water and groundwater contamination during the Project arising from spills is anticipated to be low.

Plant and equipment would also be maintained to minimise the potential for leakages, while appropriately sized and stocked spill response kits would be provided around the Site and in vehicles.

Any accidentally contaminated soil will be excavated, stockpiled, chemically classified for disposal and transported to an appropriately licensed waste facility.

6.11.2.3 Explosion

Fire or explosion may arise during construction and operation of the Project due to ignition of flammable or combustible material, or unintentional detonation of explosives resulting in injury or destruction of property.

Fire or explosion within a confined space may have catastrophic consequences, whilst fire may spread to other areas of the Site in strong windy conditions.

The risk of explosion would be minimised by separating storage of explosives during construction and flammable materials during operation.

The potential for fire would be minimised as all storage areas are designed, installed and maintained as required by relevant Australian Standards, codes or regulations. Providing these storage areas are frequently inspected and audited for effectiveness and defects, these materials would be adequately contained and the potential for fire or explosion via a spillage or tank rupture would be minimised.

6.11.2.4 Risk to workers

As with any operational site, daily operations have inherent risk to workers and contractors. Such activities have the potential to result in injury or fatality in the event that workers are not informed of the hazards involved, or risks from plant and machinery are not mitigated via appropriate controls. Examples of activities which could result in injury or fatality include crush injuries by moving plant and equipment, motor accidents or crush by heavy vehicles, exposure to hazardous materials, heat exhaustion, working from heights or confined spaces, blasting events and exposure to airborne dust and industrial noise.

IMC has a rigorous workplace health and safety regime, as required by the WHS Act. All workers, contractors and visitors will be inducted on safety protocols and procedures before entering active parts of the site. All personnel working on the Site will be required to wear personal protective equipment such as hard hats, high visibility clothing and enclosed footwear. Communication of safety requirements and initiatives will also be undertaken on a daily basis.

Provided the continued implementation of workplace health and safety protocols during construction and operation of the Project, as required by the *WHS Act 2011* and other relevant regulations or standards, the potential for injuries or fatalities to workers, contractors or visitors would be minimised.

Designated first aid and emergency rescue facilities and equipment would be available during construction and operation phases of the Project. Appropriately trained personnel will be on site throughout the life of the Project to provide first aid and respond to site emergencies.

6.11.2.5 Public safety

Risks to public safety may arise where members of the public may gain unauthorised access to the Site.

To address the risks to public safety, IMC will install new fencing, gates and signage.

With these security initiatives in place, coupled with a regular review and inspection of the integrity and effectiveness of these measures, the potential for members of the public to gain unauthorised access to the Site will be minimised.

6.11.3 Management measures

When storing and handling hazardous substances, the management objectives are to avoid contamination of soil and water, and to minimise risks to health and safety, which can be achieved by implementing the following management and mitigation measures:

- All personnel are to complete awareness training that includes hazardous substance management, emergency response and the use of spill kits.
- Hazardous materials shall be transported to and from the Site by a licenced contractor, and stored and handled in accordance with relevant regulatory requirements, Australian Standards and the ADG Code.
- Storage facilities for hydrocarbons and other hazardous materials will be designed in accordance with applicable Australian Standards and legislation.
- Storage facilities, vehicles and transport vessels used on-site are to be regularly inspected for leaks, spills or other damage.
- Storage facilities are to be inspected annually by an independent and suitably accredited inspector.
- Storage and handling of chemicals shall comply with Australian Standards, including but not limited to, *Australian Standard 1940-2017: Storage and Handling of flammable and combustible liquids. (AS 1940-2017)*.
- Appropriately sized and stocked spill response kits would be provided within strategic areas of the Mine, and within mobile vehicles used to transport hazardous materials at the Site.
- Spill response kits would be maintained, clearly identified and readily accessible on site for use in case of accidental spill. Key staff would be skilled in their location as well as usage, application and disposal of contaminated material.
- Ensure all dangerous goods are securely stored, with fencing, signage and restricted access for authorised personnel only.
- During construction activities, all potential chemical pollutants (e.g. fuels, oils, lubricants, paints, etc.) would be stored in appropriate containers in bunded areas within mobile vehicles, or designated storage areas to minimise the risk of spillages and mobilisation of any pollutants into the soil or aquatic environments.
- Conduct refueling, fuel decanting and vehicle maintenance work within work compounds where possible.
- Equipment will not be used if there are any signs of fuel, oil or hydraulic leaks. Leaks will be repaired immediately or the equipment will be removed from the Site and replaced with a leak-free item.
- All chemicals and fuels will be stored, labelled, transported and used in accordance with Australian Standards and in line with best practices. All hazardous substances or chemicals imported to the Site shall be accompanied by a SDS.
- A database would be maintained to assist in the recording and management of chemicals and hazardous substances stored at the Site.
- Any fuels spillage will be collected and the contaminated material disposed of at a licensed waste management facility.
- Develop emergency procedures for dealing with spillage of chemicals or fuels.
- Ensure contractors abide by IMC HSEC policies and management systems.

6.11.4 Residual impacts

The Project will not involve transport, storage and use of hazardous materials at sufficient quantities and/or distances to public areas to qualify as hazardous industry under SEPP 33. The Project will not qualify as offensive industry under SEPP 33 as it will operate under an EPL and all licence requirements will be complied with.

The Project has been designed to minimise the occurrence of contamination, explosion and public safety risks and/or their consequences. These risks will be further examined as part of detailed project design and re-assessed in an ongoing hazard assessment process to ensure that risks are kept as low as reasonably and practically possible.

6.12 Waste

6.12.1 Introduction

This section addresses the potential waste impacts from both the construction and operational phases of the Project.

6.12.1.1 Summary of assessment methods

This section has been prepared with consideration to the original SEARs for the approved Project. The SEARs note the following for potential waste impacts:

- Robust estimates of the quantity and nature of the potential waste streams of the Project.
- A detailed description of the measures that would be implemented to minimise, reuse, recycle and dispose of any waste produced on-site, including the proposed coal reject disposal strategy.

6.12.2 Potential impacts

Construction Phase

The majority of waste associated with the construction phase would be from the construction of the ventilation shafts. Spoil generated from this process is proposed to be used as engineered fill and for the construction of earthen screening bunds, construction sediment dams and the Site sediment pond. VS7 and VS8 are expected to generate approximately 30,454 m^3 and 16,365 m^3 of spoil respectively. The emplacement of the shaft spoil on-site is being undertaken so that this material can be used to backfill the shaft at the completion of the operational phase.

The emplacement of the shaft spoil material on-site also minimises the transport requirements, and associated environmental impacts such as noise, traffic and GHG emissions in the construction and rehabilitation phases of the Project. It also negates the requirement to find a suitable disposal site for the spoil or to find a source for the large volumes of fill required to backfill the shaft at the completion of operations. An allowance has been made to dispose of 5% of in-situ material off-site where the material is found to be unsuitable for onsite storage. This would be transported by truck to an appropriate facility.

Other waste streams include cleared vegetation, fuels and hazardous material, general waste and sewage. Vegetation waste would be stored separately and re-used wherever possible as mulch. All fuels and other hazardous materials would be stored and transported in a manner that avoids risk of land or water contamination.

Operational Phase

During the operational phase, the Project would generate waste streams of a similar nature to waste generation at existing Mine surface facilities. The key waste streams for the Project are summarised in Table 6-30.

It is noted that production of operational waste from the Project would potentially correspond with decreases in waste production at other facilities within the Mine, as personnel are redistributed to the Site. However, decreases in waste production at specific sites has not been estimated.

Table 6-30 Expected waste that would be generated during the operational phase of the Project.

Waste description	Waste classification	Source	Approximate quantity	Re-used on-site?	Recycled?	Disposed of on-site / off-site
Sewage	Liquid	Main Office	5,500 L every 7 weeks	No	Yes	On-site
		Facilities				
Oil and grease	Liquid	Maintenance of mobile equipment	800 L / year	No	Where possible	Off-site
Maintenance / Production waste	Solid	Workshop waste, packaging, waste from quarry processes	6 m^3 / month	No	No	Off-site
Office	Solid	General office waste	5 m^3 / month	No	No	Off-site
Paper	Solid	Office	540 kg / year	No	Yes	Off-site
Scrap steel	Solid		5 t per year	No	Yes	Off-site

6.12.3 Management measures

Spoil generated from the shaft construction process is proposed to be used as engineered fill on the Site. The emplacement of the shaft spoil material on-site minimises the transport requirements, and associated environmental impacts such as noise, traffic and GHG emissions in the construction and rehabilitation phases of the Project. This design negates the requirement to find a suitable disposal site for the spoil or to find a source for the large volumes of fill required to backfill the shaft at the completion of operations. Other waste generated during the construction phase of the Project will be managed in accordance with the relevant environmental management plans for the Project.

Operational waste will be managed in accordance with the existing Appin Mine IMC Waste Management Plan (WMP), which would be updated by IMC and submitted for approval. IMC would continue to apply general waste minimisation principles (i.e. reduce, re-use and recycling where practicable) to minimise the quantity of wastes that require disposal.

Waste sorting would be limited on-site with the majority of recyclable and general waste being recycled or disposed of off-site at an approved waste management facility.

Sewage waste from the operational phase of the Project would be managed on-site at the STP and irrigation spray field, which are described in Section 3.7.9.

6.12.4 Residual impacts

Given that the majority of waste (including spoil) generated during construction would be incorporated into the operational design of the Site, and eventually used to rehabilitate the Site, the residual waste impact from the construction phase of the Project is considered to be low. The residual waste impact from the operational phase of the Project is considered to be low, and would be comparable to other existing sites within the Mine.

6.13 Visual amenity

6.13.1 Introduction

This section describes the nature, extent and significance of the potential visual impacts of the Project with reference to the range of public and private places that could be affected.

6.13.1.1 Summary of assessment methods

Impacts to landscape character and key viewpoints (VP) were assessed in terms of their sensitivity and magnitude of change. Sensitivity refers to the number, type and nature of receptors in the area, how sensitive the area is to change, and the value attached to the landscape. Magnitude refers to the size and scale of proposed change, its reversibility and duration.

The predicted level of visual impact (Table 6-31) takes into account the nuanced relationship between the two aspects of 'sensitivity of the VP' and 'magnitude of change' to arrive at an overall impact level.

Table 6-31 Visual impact categories

Impact	Description
High	The project becomes a dominant and overall negative feature to which other elements become subordinate when seen from the VP, and the Project significantly and adversely affects the scenic quality of the scene and its valued landscape characteristics.
High-Moderate	The project forms a significant and immediately apparent part of the scene that adversely affects and changes its overall scenic quality and valued landscape characteristics, when seen from a particular VP.
Moderate	The project forms a visible and recognisable new element within the overall scene that affects and changes its scenic quality and overall landscape character, potentially in an adverse way, when seen from a particular VP.
Low-Moderate	The project constitutes a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the Project would not have a marked effect on the overall scenic quality of the scene when seen from a particular VP.
Low	Only a very small part of the Project is discernible and/or is at such a distance that it is scarcely appreciated. Consequently, it would have very little effect on the scenic quality scene when seen from a particular VP.
Negligible	No part of the project, or work or activity associated with it, is discernible from a particular VP or discernibly reduces the scenic quality of the scene.

The general area in which the Project would be visible was identified and the possible sensitive VPs from the private and public domains.

An area of 'theoretical' visibility was identified and potential receivers were categorised as 'high priority' and 'low priority'. The high priority receivers were those near the Site which could have direct views of it and the low priority receivers were those that had potential views to the Site obscured by topography or were too distant for the Site to feature significantly in the viewscape.

Photomontages (i.e. simulated images) were prepared from key VPs which represent the most prominent potential viewing locations to illustrate a 'worst case' scenario.

6.13.2 Visual context

6.13.2.1 General

As described in Section 2.2.3, the Site is on the southern margins of the Cumberland Plain, which is characterised by low lying, gently undulating plains and hills. As described in Section 1.4.5, the

vegetation on the Site has largely been cleared, and comprises mainly exotic pasture, but contains remnants of native vegetation. As described in Section 1.4.5.1, existing land uses in the area include rural residential, residential township, stock grazing, mixed agriculture, and small business.

In summary, the Site is predominantly sloping from the south-west to a low area near Foot Onslow Creek and is mostly cleared of vegetation other than grass. The wider area is characterised by mostly cleared hills used for grazing to the east and small rural holdings on mostly cleared hills to the north, west and south.

6.13.2.2 Viewpoints

The Site is publicly visible from Menangle and Finns Roads, so the intersection of these roads was taken as being representative of public visibility to the Project. The other high priority VPs with likely views to the Project are at nearby residences, which are summarised in

Table 6-32 (including direction of view of photomontage showing the potential view of the Project and figure reference).

Note some of the VPs have two figure references in the table, where the first figure shows the Project in red (to enhance visibility in this report) then 'natural' i.e. in the proposed colour palette.

A number of other high priority receivers have not been assessed further as the photomontages demonstrated they will be unlikely to view the Project due to intervening terrain.

Viewpoints 1, 3 and 8 have been generated over three stages; the existing view, view at year 3 of operation and view at year 5 of operation, to show the progression of visual screening.

Table 6-32 High priority viewpoints with views to Project

VP	Location	Direction to view of project	Figure
Public			
1	Menangle/Fins Road intersection	From the roadside, looking east	Figure 6-5, Figure 6-6, Figure 6-7
Private			
2	143 Menangle Road	From frontage looking south-south-west	Figure 6-8, Figure 6-9
3	310 Menangle Road	From house looking south	Figure 6-10, Figure 6-11, Figure 6-12
4	475 Menangle Road	From house looking north-north-east	Figure 6-13, Figure 6-14
5	485 Menangle Road	From house looking north-north-east	Figure 6-15, Figure 6-16
6	545 Menangle Road	From house looking north-north-east	Figure 6-17, Figure 6-18
7	30 Finns Road	From house looking east-south-east	Figure 6-19

A viewpoint from the western footpath of Menangle Road in Menangle township is also presented, as summarised Figure 6-20, Figure 6-21and Figure 6-22. The views are highly obscured by intervening terrain.

Table 6-33 Community viewpoints with minor views to Project

VP	Location	Direction to view of project	Figure
Public			
8	Menangle Road (near 132 Menangle Road)	From the roadside, looking south-south-west	Figure 6-20, Figure 6-21, Figure 6-22

6.13.3 Potential impacts

The VPs in

Table 6-32 will have moderate to significant visibility to the Project as described in Table 6-34. The Project will have a high-moderate impact to VP3 and VP7. The proposed colour palette will help the Project contrast with colours in the surrounding landscape. However, the built form and bulk will not contrast well with shapes and contours in the surrounding landscape and additional management measures will be required.

Table 6-34 Impact to viewpoints

VP	Existing visual sensitivity	Magnitude of change	Impact
1	To arrive at this viewpoint road users could have passed extractive/industrial land uses along Menangle Road and commercial/agribusiness uses along Finns Road, characterised by surface disturbance and large structures. The Project will have similar characteristics to these land uses. There are large residences and agribusiness related structures very near the intersection. Therefore, the VP is not visually sensitive.	The magnitude of change to the viewscape to the immediate east of the intersection will be significant. However, the magnitude of change will not be significant in the wider context of Menangle and Finns roads.	**Moderate** The project will constitute a significant component of the view to the east of the intersection (Figure 6-5, Figure 6-6, Figure 6-7) However, road users will not view the Project for a significant amount of time.
2	This VP is a residence along Menangle Road in the township of Menangle. The residence has uninterrupted views over vegetated hills in the background and cleared paddocks in the foreground. It has views to other residences to the immediate north, east and south. It is likely sensitive to changes in the viewscape.	The Project will be a very minor component of the view to the south from the front verge of the property and will not cause significant change to the viewscape.	**Negligible** The Project will be barely visible to the south from the front verge of the property (Figure 6-8, Figure 6-9).
3	This VP is a rural holding including a residence on Menangle Road. The residence has filtered views of the surrounding rural landscape and is likely sensitive to visual changes.	The Project will comprise a minor component of the wider view but a significant component of the view to the south of the residence. It will cause change to the viewscape in that direction.	**High-moderate** The Project will constitute a significant component of the view to the south of the residence and the built form of structures will not contrast easily with the surrounding rural landscape with application of the proposed colour palette (Figure 6-10, Figure 6-11, Figure 6-12).
4	This VP is a rural holding including a residence on Menangle Road. The residence has filtered views of the surrounding rural landscape and is likely sensitive to visual changes.	The Project will be a very minor component of the view to the north-north-east from the residence and will not cause significant change to the viewscape.	**Negligible** The Project will be barely visible to the north-north-east from the residence (Figure 6-13, Figure 6-14).
5	This VP is a rural holding including a residence on Menangle Road. The residence has filtered views of the surrounding rural landscape and is likely sensitive to visual changes.	The Project will be a minor component of the view to the north-north-east from the residence and will not cause significant change to the viewscape.	**Low-moderate** The Project will partially feature in the view to the north-north-east from the residence and will contrast well with the surrounding landscape with application of the proposed colour palette (Figure 6-15, Figure 6-16).
6	This VP is a rural holding including a residence on Menangle Road. The residence has filtered views of the surrounding rural landscape and is likely sensitive to visual changes.	The Project will be a minor component of the view to the north-north-east from the residence and will not cause significant change to the viewscape.	**Low-moderate** The Project will partially feature in the view to the north-north-east from the residence and will contrast well with the surrounding landscape with application of the proposed colour palette (Figure 6-17, Figure 6-18).
7	This VP is a rural holding including a residence on the corner of Finns and Menangle roads. The residence has filtered views of the	The Project will comprise a minor component of the wider view but a very significant component of the view	**High-moderate**

VP	Existing visual sensitivity	Magnitude of change	Impact
	surrounding rural landscape and is likely sensitive to visual changes.	to the east-south-east of the residence. It will cause change to the viewscape in that direction.	The Project will constitute a significant component of the view to the east-south-east of the residence and the built form of structures will not contrast easily with the surrounding rural landscape with application of the proposed colour palette (Figure 6-19).
8	To arrive at this viewpoint road users could have passed medium density residential areas and commercial business in Menangle township. There are residences and business related structures very near the location. Therefore, the VP is not visually sensitive.	The Project will be a minor component of the view to the south-south-west from the roadside and will not cause significant change to the viewscape.	**Negligible** The Project will be barely visible to the north-north-east from the road (Figure 6-20, Figure 6-21, Figure 6-22)

Figure 6-5 Photomontage – VP1 (Existing view)

Figure 6-6 Photomontage – VP1 (Proposed View – Year 3)

Figure 6-7 Photomontage – VP1 (Proposed View – Year 5)

Figure 6-8 Photomontage – VP2 – red

Figure 6-9 Photomontage – VP2 – natural

Figure 6-10 Photomontage – VP3 (Existing view)

Figure 6-11 Photomontage – VP3 (Proposed View – Year 3)

Figure 6-12 Photomontage – VP3 (Proposed View – Year 5)

Figure 6-13 Photomontage – VP4 – red

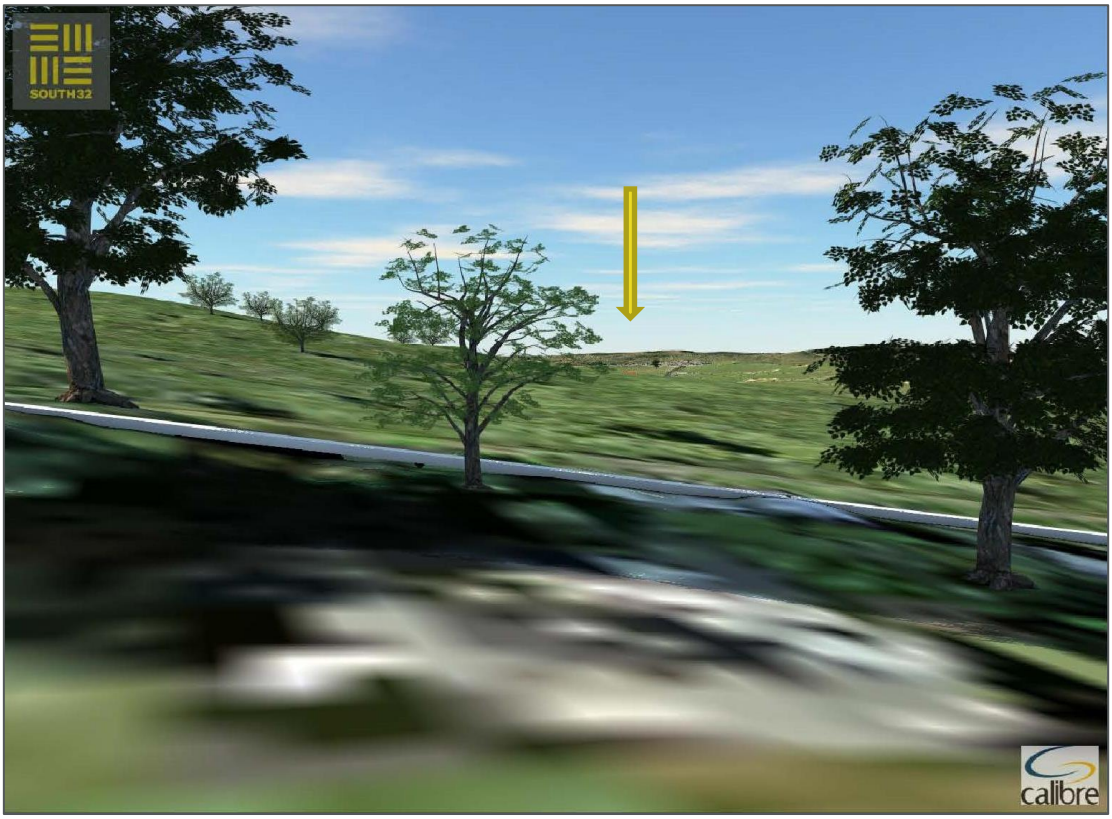


Figure 6-14 Photomontage – VP4 – natural

Figure 6-15 Photomontage – VP5 – red

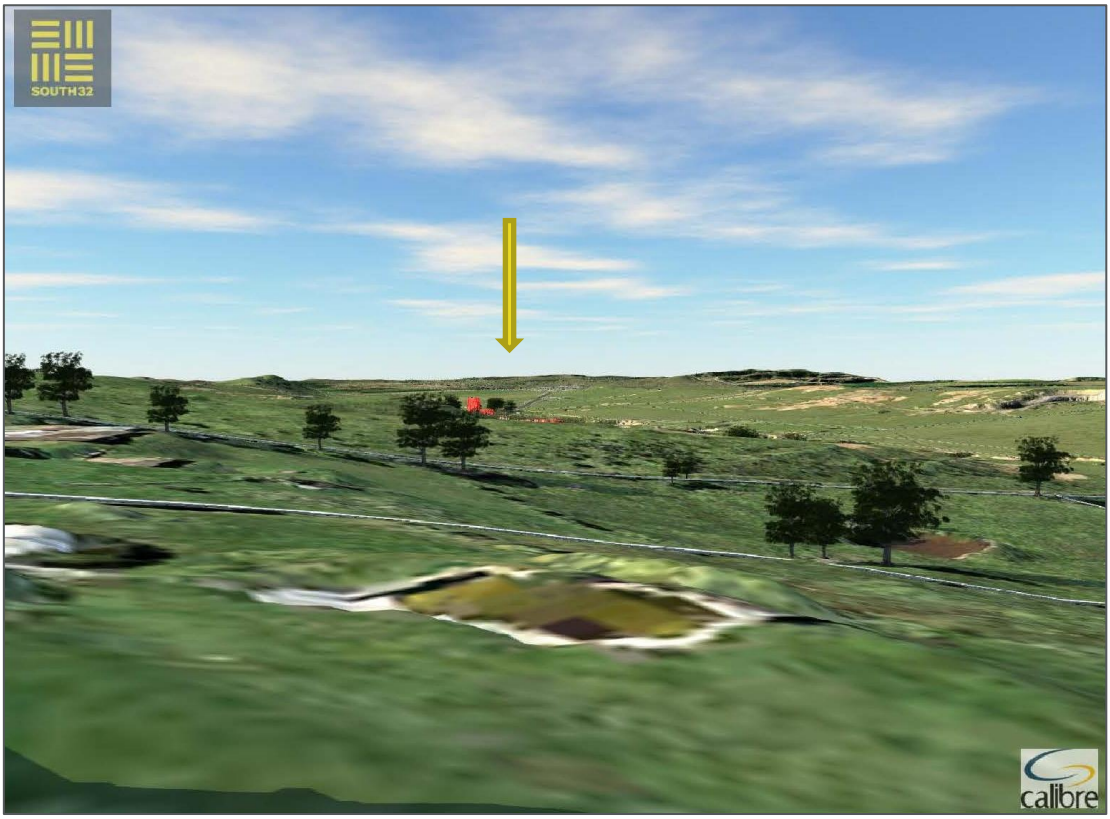


Figure 6-16 Photomontage – VP5 – natural

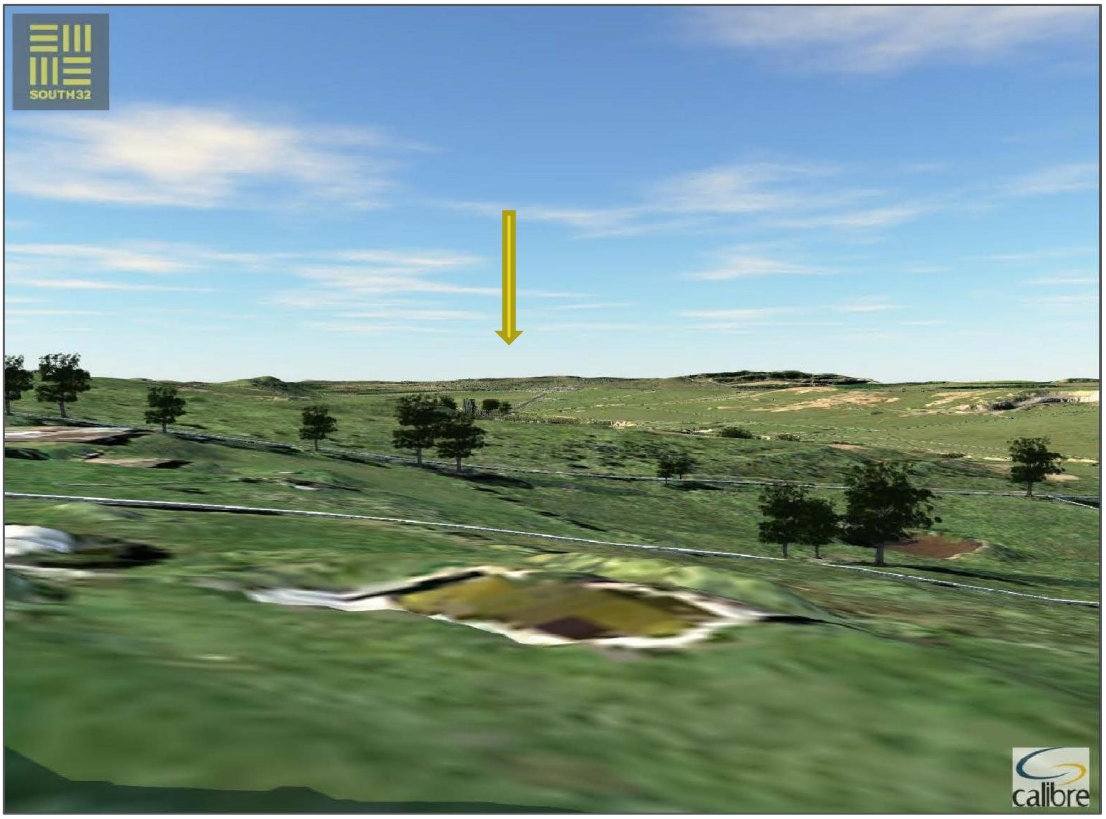


Figure 6-17 Photomontage – VP6 – red

Figure 6-18 Photomontage – VP6 – natural

Figure 6-19 Photomontage – VP7 – natural

Figure 6-20 Photomontage – VP8 (Existing view)

Figure 6-21 Photomontage – VP8 (Proposed View – Year 3)

Figure 6-22 Photomontage – VP8 (Proposed View – Year 5)

6.13.4 Management measures

Colours for use on visible structures on the Site have been selected to minimise potential visual impact by reducing visual contrast when seen against its surrounding visual environment. The dominant materials used would be metal cladding such as COLORBOND™, and other types of metal such as steel.

The recommended colour treatment is for an overall colour of mostly green and grey tones for the tallest, most visible components. The use of highly reflective materials on the tallest components should be minimised and limited to those components that require other finishes for operational/safety purposes.

That colour range is generally consistent with the depiction in the photomontages.

Vegetation is proposed to be planted at 310 Menangle Road and 30 Finns Road in the direction of the views to the Project. The locations of the plantings and species, maturity and maintenance of the plantings will be agreed with the land owners and carried out prior to the start of Project operations.

As described in Section 3.7.5, noise barriers may be installed pending the outcomes of the detailed design phase. If these are required, vegetation will be planted on the public-facing sides of the walls to soften the view to these.

6.13.5 Residual impacts

As described in Section 6.13.3, the Project will have a high-moderate impact to VP3 and VP7 and the built form and bulk of the Project will not contrast well with shapes and contours in the surrounding landscape. As described in Section 6.13.4, vegetation is proposed to be planted on the impacted properties to shield views of the Project.

Depending on the maturity of the plantings, it is likely the properties will continue to be impacted in the short to medium term as the vegetation grows. Once the vegetation is mature there could still be glimpses of the Project through gaps in the foliage. However, the impact will be significantly reduced.

The plantings will comprise a new element in the viewscape, however, it will be far more sympathetic to the overall rural viewscape and present less impact than unmitigated views of the Project.

6.13.5.1 Night lighting

Lighting will comprise lights along the access road and carpark, which point towards the ground and inwards to the Site. Lights will be mounted as required on and around structures for safe operation of the Project at night. Light shading will be employed to minimise the spill of light from the Site to the surrounding environment.

Outdoor lighting will be installed and operated in accordance with *Australian Standard 4282–2019 – Control of the obtrusive effects of outdoor lighting*.

6.14 Other environmental matters and cumulative impacts

The EA assessed other environmental and social matters which have not been addressed in detail in this report as summarised in

Table 6-35.

Table 6-35 Other environmental and social matters

Matter	BSO EA summary	Modification summary
Bushfire	Any uncontrolled wildfires originating from Project activities may present potentially serious impacts to the townships of Appin, Douglas Park, Menangle, Wilton and Picton, other residential and rural properties, Special Areas, Dharawal State Conservation Area and other surrounding areas. Similarly, fires originating in nearby bushland, residential or rural areas could pose a significant risk to Project infrastructure and ICHPL staff, contractors and equipment. Smoke from bushfires can also have adverse impacts on the operation of mine ventilation, transportation routes, tourism, urban interface areas and hospitals. The degree of potential impact would vary with climatic conditions (e.g. temperature and wind) and the quantity of available fuel. Self-heating of coal can give rise to smouldering fires in coal stockpiles. However, there have been no incidents of spontaneous combustion in the operational life of the Mine. Spontaneous combustion is also a very rare occurrence at the West Cliff Colliery, however, in 2000 one incidence of self-heating of approximately 1,000 t of coal was recorded at the base of the jig stockpile (Endeavour Coal, 2003). A number of management measures have been put in place to minimise the potential for re-occurrence. The continuation and expansion of surface activities for the Project could increase the potential for fire generation. However, given the range of management measures proposed to be in place to manage the behaviour of people in the Project area, it is unlikely that there would be an increase in fire frequency resulting from the Project. The PHA included consideration of the potential for bushfire.	There is a small area of bushfire prone land associated with 'vegetation buffer' surrounding category 2 bushfire prone vegetation along the south-east corner of the Site. No project components are proposed in the area subject to the vegetation buffer. The Project will not involve the extraction or handling of coal and will not involve coal related fire risks. Existing bushfire management measures will be implemented at the Project.
Subsidence	**Streams** At the substantial depths of cover at the Project, connective cracking from the ground surface to the mined seam is not expected. Although stream beds with exposed rock base can experience subsidence induced fracturing to a depth of 10 to 20 m, there is considered to be negligible potential for the loss of surface water to the mine due to the lack of continuity of fractures from the surface to the mine. A portion of surface water flows may be diverted through the rock fractures beneath the stream bed, with emergence further downstream. Therefore, the Project would not result in adverse consequences to the quantity of water reaching the Cataract Dam, Woronora Dam or Broughtons Pass Weir. **Aboriginal heritage**	The Project will include construction and operation of a downcast ventilation shaft and an upcast ventilation shaft. These will be lined in concrete as the shafts are excavated, partly to ensure the stability of the surrounding rockfaces. Installation of this concrete lining will prevent movement and collapse of the rockfaces. Therefore, the Project will not result in subsidence impacts additional to that described in the BSO EA summary column.

Matter	BSO EA summary	Modification summary
	Of the 76 sites of high or moderate archaeological significance or particular cultural significance, 26 (34%) sites were assessed as having a negligible risk (impacts are highly unlikely and would likely be indistinguishable from the natural background environment and natural deterioration process), 31 (41%) a very low risk (impacts are highly unlikely), 12 (16%) sites a low risk (impacts are unlikely) and 7 (9%) sites a moderate risk (impacts are possible, but likely to occur in less than 10% of cases). No sites were assessed as having a high risk. **Major cliff lines** **Above solid coal** It is possible that isolated rock falls could occur as a result of the extraction of the longwalls. It is not expected, however, that any large cliff instabilities would occur as a result of the extraction of the longwalls (i.e. the risk of cliff instability is extremely low). **Douglas Park Drive** Longwalls are located approximately 700 m from the cliff lines along Douglas Park Drive at their closest point. The likelihood of mining-induced impacts to these cliff lines is considered to be extremely low at this offset distance. **Above goaf** Any rock falls or cliff instabilities, resulting from the extraction of the longwalls, are expected to represent in the order of 3 to 5% of the total linear length of cliff lines that are directly mined beneath. **Private dwellings** The majority of houses within the study area (approximately 80%) are predicted to experience no material impacts. While approximately 20% of the houses are expected to experience impacts, the majority of these are expected to be minor and only a small proportion (less than 5%) would experience moderate to extensive damage.	
Groundwater	**Perched groundwater** Surface fracturing resulting from mine subsidence within upland swamps is not expected to result in an increase in the vertical movement of water from the perched watertable into the regional aquifer as the sandstone bedrock is massive in structure and permeability decreases with depth. **Shallow groundwater** The Project would result in negligible adverse consequences to the quantity of water reaching the Cataract Dam, Woronora Dam or Broughtons Pass Weir. **Depressurisation of deep groundwater system** At the substantial depths of cover in the Project area, connective cracking from the ground surface to the mined coal seam is not expected. Groundwater modelling for the Project indicates that there is expected to be eventual recovery of deep groundwater system pressures over many decades following the cessation of mining. **Registered production bores** It is not known whether nine bores (which are estimated to potentially bottom in the Bulgo Sandstone) are in productive use. There would be substantial loss of pressure in the Bulgo Sandstone formation after 30 years of mining, with predicted water levels to be lowered by 30 to 85 m at the locations of known bores. There are also some registered bores for which records of the depth of the bore are not available. Most are	The Project will not impact Upland Swamps. The Project unlikely to impact groundwater systems and it is unlikely to impact any registered production bores.

Matter	BSO EA summary	Modification summary
	located away from the zone of maximum drawdown, however, potential impacts on these bores are provided in Appendix B of the EA based on the conservative assumption that they are developed into the lower Hawkesbury Sandstone.	
Socio-economic	The Project would provide direct employment for 1,170 people (ICHPL staff and on-site contractors) who are expected to all reside in the region. Production-induced employment impacts would mainly occur in the services sectors, transport sectors, mining sectors, manufacturing sectors, building construction sectors and wholesale/retail trade sectors. Consumption-induced employment flow-on effects would mainly occur in the services sectors, wholesale/retail trade sectors and accommodation/cafes/restaurants sectors. The potential impacts of the Project on the NSW economy are expected to be substantially greater than for the regional economy alone, as more Project expenditure would be captured and there is a greater level of inter-sectoral linkages in the larger NSW economy. Cessation of the mining operations would result in a contraction in regional economic activity.	There will be short term local economic benefits due to expenditure from the approximately 76 construction employees. There will be a minor medium- and long-term economic benefit from the employment of a small number of additional employees (compared to current Mine workforce) during operation of the Project. Demand for community services and housing will not change significantly.

6.15 Risks and hazards (Public Safety)

The EA assessed hazards and risk matters which have not been addressed in detail in this report as summarised in Table 6-36.

Table 6-36 Hazards and risks assessed in the EA applicable to this Project

Matter	BSO EA summary	Modification summary
Hazard and Risk	Potentially hazardous materials required for the Project include diesel, petrol, hydrocarbons (oils, greases, degreaser and kerosene), gas cylinders and explosives. The risks posed by the usage of these materials for the Project would include their transport, handling and consumption. For the purposes of risk identification, the Project was subdivided into a number of operational areas and potential incidents were identified and divided into generic classes for each operational area including: • leaks/spills; • fire; • collision; • explosion; and • theft. Other classes of incidents identified included: • release of noxious gases to atmosphere; • subsidence in excess of predictions and safety factors; and • equipment/mine infrastructure malfunction. The potential risks identified in the PHA related to the following Project elements/activities: • transport to pit top facilities; • on-site storage; • construction/development; • underground mining operations; • coal handling and preparation; • ROM and product coal transport; • coal wash transport; • water management; • exploration/monitoring activities; • rehabilitation and remediation works; and • other infrastructure and supporting systems.	Potentially hazardous materials are addressed in Section 6.11. The Appin Safety Management System, including the Principal Hazard Management Plans (PHMP) established under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*, continue to manage hazards such as fire and explosion underground. The modification, being substantially the same as the existing Project, introduces similar hazards and risks to those identified and addressed in the EA. The hazard prevention and mitigation measures adopted by IMC to reduce the likelihood and/or consequences of potentially hazardous incidents associated with the Mine will apply to the Project.

An assessment of the potential environmental risks associated with the Project has been provided in Section 6.

Hazards and risks to public safety associated with the modified project were identified by undertaking a desktop review of existing available information and assessments. The following sections assess the potential risks to public safety, not addressed previously in this report.

6.15.1 Interception of existing infrastructure

There is potential for services and utilities such as electricity and telecommunications to be intercepted by the shaft, boreholes, pipelines and excavation woks on the Site and within the Menangle Road corridor, resulting in damage to infrastructure. It is understood that the Site is not serviced by gas, potable water, sewage or stormwater infrastructure.

The layout of the shaft, boreholes and bulk excavation have taken into consideration the location of any known underground services and subsurface works carried out as part of the proposed development and are unlikely to coincide with any existing infrastructure.

Prior to commencing works, a survey of all below-ground infrastructure will be undertaken. The survey will seek to confirm that the locations selected for drilling of boreholes and trenching works do not coincide with any existing infrastructure. This will also include desktop searches with on ground validation.

The risk of this impact occurring is predicted to be minimal provided appropriate management measures, including consultation with infrastructure owners, is undertaken prior to the commencement of works.

6.15.2 Interaction with future transport infrastructure

The layout and location of the Project avoids impact to existing public transport infrastructure, including the Main Southern Railway, Menangle Road and the Hume Highway.

While detailed design information on the future proposed road corridor for the OSO1 is not yet available, the Outer Sydney Orbital Transport Corridor Draft Strategic Environmental Assessment (AECOM Australia Pty Ltd, 2018) provides high level design parameters. The assessment provides indicative widths of the various infrastructure proposed to be established within the corridor, indicating there is space within the corridor which would allow for other infrastructure to be established. It also includes that the treatment of the proposed crossing of Menangle Road is proposed to be via a bridge, indicating the OSO1 would be raised from ground level near the location of the Project.

Based on the concept level information available, it is acknowledged that OSO1 infrastructure may be required to be constructed within the Site boundary. Mine critical infrastructure within the recommended corridor (including fans and ducting of Ventilation Shaft 8, safety equipment, access infrastructure and the power supply) have been located such that they can remain uninterrupted during the construction and operation of the OSO1 to ensure safe underground operations.

It is anticipated that IMC and Transport for NSW would work together during the detailed design phase of the OSO1 to establish the design parameters required for both Projects to co-exist on 345 Menangle Road.

Should the OSO1 corridor be preserved within the operational boundary and should the construction of the OSO1 be proposed to occur during the operational life of the Site, its proposed that a specific Infrastructure Management Plan would be developed in consultation with Transport for NSW. This plan would include;

- The detailed design and engineering parameters required for co-existence.
- Assessment of risks generated by co-location of surface infrastructure.

- Measures to ensure the ongoing safety and serviceability of the Site and OSO1 during construction and operation.

Any upgrades or augmentations to the Site associated with the construction and operation of the OSO1 would occur as part of this Project.

7 EVALUATION OF MERITS

7.1 Evaluation of modified Project as a whole

During the preliminary modification application, DPIE requested IMC include an evaluation of the modified project as a whole. A comparison of the Project and the existing and approved Mine is given in Table 3-2.

The impact assessments determined the Project is unlikely to have significant residual impacts, that is, it is unlikely to exceed government standards and criteria. Exceptions are biodiversity and visual, where:

- Biodiversity – there will be unavoidable impacts to PCT 849 and PCT 835, which will require offsetting under the BC Act. The BAM Calculator has determined that two ecosystem offset credits will be required for PCT 849. These ecosystem credits also cover the credit requirement for ecosystem credit species.
- Visual – vegetation will be planted to screen views to the Project. Depending on the maturity of the plantings, it is likely the properties will continue to be impacted in the short to medium term as the vegetation grows. Once the vegetation is mature there could still be glimpses of the Project through gaps in the foliage. However, the impact will be significantly reduced.

The Mine approval approves amongst other things:

- The underground longwall mining operations, which extract coal from the Bulli Seam using underground longwall mining methods, and the associated surface activities.
- Upgrade of existing and construction of new surface facilities and supporting infrastructure (e.g. access roads, ventilation shafts, sumps, pumps, pipelines, water treatment and waste water disposal or treatment).

The EA explicitly contemplated the need to develop future mine ventilation and mine access facilities to maintain a safe working environment within the underground mine (subject to separate assessment and approval). The Project is substantially the same development as the BSO Project as it involves the construction and operation of mining infrastructure subject to PA 08_0150, that is, *ventilation and mine access shafts, on land within the longwall mining domain.* Therefore, DPIE may approve a modification to the Mine approval to allow for development of the Project.

The proposed amendments to the Mine approval, as outlined in Table 3-4 are minor and administrative in nature, and therefore DPIE may approve these modifications to the Mine approval, as part of the Project.

7.2 Evaluation of Merits

Modification applications to the Mine Approval are to be made under Section 4.55 of the EP&A Act and an application to modify a SSD project must be accompanied by a modification report. IMC is seeking to modify the Mine approval under Section 4.55 (2) of the EP&A Act to incorporate the construction and operation of infrastructure critical to the ongoing viability of the Mine and other administrative modifications.

The Project involves the construction of a downcast ventilation shaft (VS7), an upcast ventilation shaft (VS8) and the installation of associated extraction fans and ancillary surface infrastructure to ensure a reliable and adequate supply of MVA to personnel working underground. Approval for the modification is sought to enable operation of the proposed ventilation shafts on or before 2025 to facilitate uninterrupted mining.

The Project also involves the construction and operation of mine access infrastructure (head frame and winder) in VS7 and ancillary mine access facilities. The establishment of mine access at the Site would provide access for personnel and consumable materials via a winder and cage. These facilities would increase the safety and efficiency of transporting personnel and consumable materials underground.

An integral requirement of underground mining is adequate ventilation infrastructure and mine access facilities to ensure a safe and efficient underground working environment. More specifically, mine ventilation is required to:

- Provide air of sufficient quantity and quality for a safe working environment.
- Dilute mine gases to below prescribed concentrations.
- Cool the working areas for comfort and mitigation of heat stress.

The proposed mine ventilation infrastructure is necessary for safe and efficient mining of the Mine.

Developing a mine access facility will greatly improve underground travel times and, therefore, improve production efficiency and safety. Other benefits of the mine access facility include improved safety through reduced egress times in the event of an incident and reduced logistics complexity with timely delivery of consumables and other key underground components. Co-locating the ventilation and mine access infrastructure on the Site will reduce the overall development footprint when compared to the two facilities at separate sites.

The Site is suitable for the proposal for the following reasons:

- The Site is zoned RU2 under the land use table in the LEP. Mining is a prohibited land use in this zone. Notwithstanding, clause 7(1)(a) of the Mining SEPP makes underground mining permissible on any land. Therefore, the Project is permissible pursuant to the Mining SEPP on the land following from the fact that the Mine is an underground mine and the Project involves the development of shafts and access pits associated with the mine.
- The Site is directly over the main underground roadway workings and can provide direct access to the underground workings.
- The Site is mostly cleared and the previous land use (grazing) ceased in November 2020.
- The Project is unlikely to significantly impact agricultural resources as it will be on low capability land, is not on any mapped BSAL and will not impact on any nearby agricultural operations.
- The Site is close to transport, electricity, water and telecommunications infrastructure which will be augmented or extended to service the Project.
- The Site is not in a WaterNSW ‘special areas’ drinking water catchment.
- The Project is consistent with the principles of ESD for the following reasons:
    - Precautionary principle – baseline Site and regional environmental data has been used in predictions of the Project’s potential impacts. Management measures have been proposed where potential impacts to the environment are predicted.
    - Intergenerational equity – the Project will allow for the continued operation of the Mine. This will allow the continued employment mine personnel well as the employment of an small number of additional personnel (associated with the operation of the Project). Construction and operation of the Project as well as the continued operation of the Mine will result in other economic benefits to the region through the purchase of goods and services and associated employment.
    - Conservation of biological diversity and ecological integrity – the layout and location of surface facilities have been thoroughly designed to avoid or reduce impacts to biodiversity values. The Project will have a minor impact on a highly degraded threatened ecological community, which will be offset via retirement of biodiversity offsets.
    - Improved valuation, pricing and incentive mechanisms – IMC has included a number of environmental and social mitigation and management measures to minimise impacts. IMC

will apply for a variation to the EPL, which will specify pollutant loads IMC will be lawfully able to discharge to the environment. EPLs are issued subject to payment of a fee.

Local/State government stakeholders and surrounding landholders were consulted during preparation of the report. Consistent themes in the consultation were construction, traffic and operational noise; construction and operational light spill; impacts to visual amenity; private tank water contamination; runoff during construction and operations; air quality impacts; road safety; impacts on property values; and vibration impacts.

Consultation with government agencies focused on introducing and describing the Project, with further discussion on potential road impacts, electricity requirements and connections, water supply requirements, community engagement, economic impacts associated with the Mine and proposed infrastructure upgrades.

As noted in Section 7.1, the impact assessments determined the Project is unlikely to have significant residual impacts, that is, it is unlikely to exceed government standards and criteria, with exceptions in relation to biodiversity and visual aspects.

The Project will have a short term beneficial economic impact associated with the employment of 76 construction personnel (during peak construction periods). There will be a minor medium-long term economic benefit from the employment of a small number of additional employees during operation of the Project. These personnel are likely to spend some of their income in the LGA. The Project will also have a major medium-long term economic benefit by ensuring the safe and ongoing operation of the Mine and thereby ensuring:

- The continued direct employment of about 1,800 people.
  The continued engagement of numerous local suppliers and business to provide products and services to the Mine. In the 2020 financial year A$236.7M was spent with local vendors.
- The contribution of approximately A$2 billion in royalties and some A$205 million in employee and contractor payroll tax to the State of NSW over the life of the Mine.
- The continued supply of metallurgical coal to Australian steelmakers. The Mine is an essential supplier to BlueScope Port Kembla Steelworks, which is the largest steel production facility in Australia.

On balance, given the need for the Project, lack of alternatives, suitability of the Site, consistency with plans and policies, minor environmental impacts and economic benefit of the Project, it is clear the Project is in the public interest and its approval is likely to benefit the State of NSW.

REFERENCES

ABS (2016). *2016 Census Community Profiles.* https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/SED10091?opendocument accessed 10 March 2021. (Australian Bureau of Statistics [ABS]).

AECOM (2018). *Outer Sydney Orbital Transport Corridor. Draft Strategic Environmental Assessment.*

AEISG (2011). *Code of Good Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting.*

Biosis Research (2009). *Bulli Seam Operations Aboriginal Cultural Heritage Assessment*.

CSPB (2017). *Material Safety Data Sheet: Ammonium Nitrate (90% Solution).*

DoE (2013). *Significant impact guidelines 1.3: Coal seam gas and large coal mining developments – impacts on water resources*.

DEC (2005). *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.* (NSW Department of Environment and Conservation [DEC]).

DEC (2006). *Assessing Vibration: A technical guideline.*

DECC (2009). *Interim construction noise guideline.*

DECCW (2010). *Aboriginal Cultural Heritage Consultation Requirements for Proponents.* (NSW Department of Environment, Climate Change and Water [DECCW]).

DECCW (2010a). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.* (NSW Department of Environment, Climate Change and Water [DECCW]).

DECCW (2010b). *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.* (NSW Department of Environment, Climate Change and Water [DECCW]).

DECCW (2011). *Road Noise Policy.*

DEE (2018). *National Greenhouse Gas Inventory.*

DoEE (2019a). *New South Wales Bilateral Agreement Information*. http://www.environment.gov.au/protection/environment-assessments/bilateral-agreements/nsw accessed 30 June 2019. (Commonwealth Department of Environment and Energy [DoEE]).

DoEE (2020). *National inventory report 2017 National greenhouse accounts factors – Australian national greenhouse accounts.* (Commonwealth Department of Environment and Energy [DoEE]).

DoP (2011). *Applying SEPP 33*, ISBN 978-1-74263-154-7. (Department of Planning [DoP]).

DPE (2018). *A plan for the Wilton Growth Area and Greater Macarthur 2040 – an interim plan for the Greater Macarthur Growth Area.*

DPI – Office of Water (2012). *Guidelines for laying pipes and cables in watercourses on waterfront land.*

DPIE (2019). *Preparing a modification report – Guidance for State significant projects* (Department of Planning, Industry and Environment [DPIE]).

DPIE (2019). *Preparing an environmental impact statement – State significant development guide (exhibition draft)* (Department of Planning, Industry and Environment [DPIE]).

DPIE (2020). *Draft Cumberland Plain Conservation Plan.* (Department of Planning, Industry and Environment [DPIE]).

Endeavour Energy (2018). *Growth servicing plan – 2018.*

EPA (2017). *Noise Policy for industry.*

Hawkesbury-Nepean Catchment Management Authority (2008). *Hawkesbury-Nepean catchment action plan 2007-2016.*

Hawkesbury-Nepean Catchment Management Authority (2007). *Hawkesbury-Nepean River health strategy.*

Heritage Council (2009). *Assessing Significance for Historical Archaeological Sites and 'Relics'*.

Heritage Office (2001). *Assessing Heritage Significance*

ICOMOS (2013). *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance.* Australia International Council on Monuments and Sites.

IMC (2019). *Appin Mine Biodiversity Management Plan (BMP)*.

Landcom (2004). *Managing Urban Stormwater: Soils and Construction 4th edition*. ISBN 0-9752030-3-7

Manning, C. & Greig, L. (2014). *Wollondilly Health Needs Assessment*. Elton Consulting.

Metropolitan Water (2017). *2017 Metropolitan Water Plan Water for a Liveable, Growing and Resilient Greater Sydney*.

National Transport Commission (2020). *Australian code for the transport of dangerous goods by road and rail (ADG Code).*

Niche Environment and Heritage (2021). *Appin Mine Ventilation and Access Project – biodiversity development assessment report. Report prepared for Illawarra Metallurgical Coal.*

Niche Environment and Heritage (2021). *Appin Mine Ventilation and Access Project – Aboriginal cultural heritage assessment report. Report prepared for Illawarra Metallurgical Coal.*

NSW EPA (2006). *Assessment and measurement of odour from stationary sources in NSW.* (NSW Environmental Protection Agency [EPA]).

NSW EPA (2014). *Waste classification guidelines – part 1.*

NSW EPA (2017a). *Approved methods for the modelling and assessment of air pollutants in New South Wales (approved methods).* (NSW Environmental Protection Agency [EPA]).

NSW EPA (2017b). *Noise Policy for Industry (2017).* (NSW Environmental Protection Agency [EPA]).

NSW Government. *NSW public schools master dataset.* https://data.cese.nsw.gov.au accessed 14 June 2021.

OEH (2011). *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*. (NSW Office of Environment and Heritage [OEH]).

OEH (2019). *The Biodiversity Assessment Method* https://www.environment.nsw.gov.au/biodiversity/assessmentmethod.htm accessed 30 June 2019. (NSW Office of Environment and Heritage [OEH]).

Resource Strategies, *Bulli Seam Operations environmental assessment. Report prepared for BHP Billiton.*

RMS (2002). *Guide to traffic generating development.* NSW Roads and Maritime Service [RMS]).

RWDI (2021). *Appin Mine Ventilation and Mine Access Project – noise and vibration impact assessment. Report prepared for Illawarra Metallurgical Coal.*

South32 (2010). *BSO Project Preferred Project Report.* https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/preferred-project-report/preferred-project-report.pdf?sfvrsn=4358364b_5

Standards Australia (1993). *Australian Standard 2890.1–1993: parking facilities part 1: off-street car parking.*

Standards Australia (1998). *Australian Standard 2187.1 – 1998: Explosives storage, transport and use, Part 1: storage (AS 2187.1-1998).*

Standards Australia (2001). *Australian Standard 2601 - 2001: The demolition of structures (AS 2601-2001).*

Standards Australia (2002). *Australian Standard 2890.2–2002: parking facilities part 2: off-street commercial vehicle facilities.*

Standards Australia (2006). *Australian Standard 2187.2 – 2006: Explosives storage, transport and use, Part 2: Use of explosives (AS 2187.2-2006).*

Standards Australia (2009). *Australian Standard 2890.6–2009: parking facilities: off-street parking for people with disabilities.*

Standards Australia (2017). *Australian Standard AS1940 – 2017: Storage and handling of flammable and combustible liquids (AS 1940 – 2017).*

Standards Australia (2019). *Australian Standard 4282–2019 – Control of the obtrusive effects of outdoor lighting*.

Wollondilly Health Alliance (2020), *Wollondilly Health Needs Review: 2020. (https://www.wollondilly.nsw.gov.au/assets/Uploads/FINAL-2020-Wollondilly-Needs-Assessment-v1.3-2020.10.28.pdf)*

Wollondilly Shire Council (2011). *Wollondilly Local Environmental Plan 2011.*

Wollondilly Shire Council (n.d.). *Community strategic plan 2033.*

ATTACHMENT 1

Statement of Commitments

This section provides an updated version of the Statement of Commitments provided the Mine Approval (Table SOC-3), to include additional commitments specific to the proposed Project.

Table SOC-3

Summary of the Statement of Commitments for Surface Projects

Environment or Community Aspect	Commitments
Working hours and noise	• Construction hours will minimise the impact on the community where practical. • Activities will be undertaken as per the hours in the relevant project assessment (except emergencies), with a preference to undertake audible activities during day-light hours where possible. • Works will be designed with consideration to minimising impacts on the community.
Public Consultation	• IMC will continue to liaise with and provide information regarding surface activities via the IMC Community Consultative Committee, or any other such community group that is deemed appropriate. • IMC will continue to operate the 24-hour telephone line to provide an alternative method for public information.
Noise	• Noise will be mitigated as per the relevant project assessment and/or management plans. • Project layout will give consideration to the mitigation of noise impacts as practicable. • Noise performance will be incorporated into contractor performance requirements for surface projects in noise sensitive areas. • IMC will undertake noise monitoring as per the relevant project assessment document or management plan. • Consultation will be undertaken with receivers subject to significant noise impacts from projects. Consultation will address any additional noise mitigation measures proposed.
Air quality and Greenhouse Gas	• Construction activities will be managed to minimise the generation of dust. • Suitable measures, such as site layout design, dust suppression, stockpile management, appropriate road surfaces and rehabilitation of disturbed areas will be applied to projects to minimise dust generation. • Plant and operating equipment will be maintained appropriately to minimise fuel consumption and associated emissions. • Electrical power consumption will be minimised during the operational phases of the project where at all practicable.

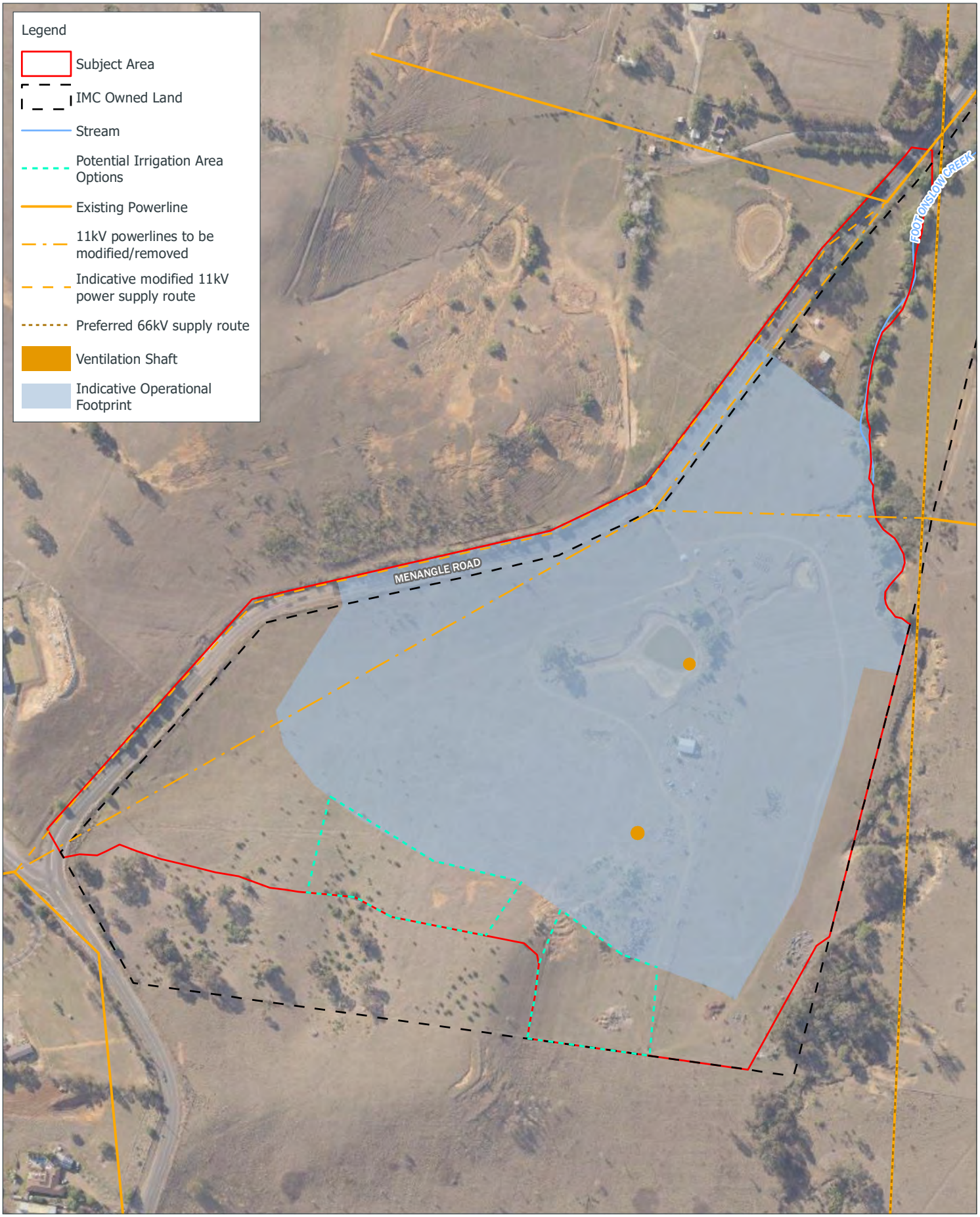
Water resources	• Stormwater runoff, soil and erosion control measures will be managed in accordance with guidelines detailed in the publication Soils and Construction, Volume 1, 4th Edition and Controlled Activities on Waterfront Land. Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land, 2012, where relevant. Water controls will be employed as per the applicable project assessment or management plan documentation.
	• Service supply boreholes will be cased and grouted to address any known regionally significant aquifers.
	• Drilling process waste water will be managed as per the relevant project assessment.
	• Water required for projects will be sourced from appropriate sources, such as:
	  ○ Recycling captured water where possible,
	  ○ Water Licence in accordance with the requirements of the Water Sharing Plan 2010 (DECCW 2009) and the Water Management Act 2000;
	  ○ An authorised Sydney Water supply; or
	  ○ Appin Mine Filtration Plant.

Environment or Community Aspect	Commitments
Biodiversity	• Biodiversity will be managed as per the relevant project assessment and/or management plans. • Projects will be designed and constructed to minimise the amount of clearing of native vegetation and mature trees where practicable. • A two-stage clearing process will be undertaken for the felling of any hollow bearing trees. • Where native vegetation has been cleared, rehabilitation activities will include representative native seed where at all practicable.
Heritage (Aboriginal)	• Heritage will be managed as per the relevant project assessment and/or management plans. • Where identified sites are located adjacent to proposed activities a barrier will be installed to prevent interaction. • Where unexpected sites are identified during construction activities, works in vicinity of the site shall stop and a qualified archaeologist engaged.
Heritage (Non-Aboriginal)	• IMC will manage and conserve the Mountbatten Group in a manner consistent with its heritage values and in accordance with the Conservation Management Plan. • IMC will ensure the sympathetic placement of new buildings and structures on properties subject to heritage infrastructure (such as the Morton Park: Mountbatten Group). • Vegetation clearing for project activities will be minimised and should not include historic plantings. • Any relics discovered during project activities will be assessed and documented by an appropriately qualified cultural heritage expert. Where it is relevant to do so, relics will be retrieved and managed in accordance with any recommendations made by the cultural heritage expert. • Where surface projects interact with heritage items owned by other parties (e.g. the Water NSW Upper Canal), the infrastructure owner will be consulted and relevant approvals obtained prior to works.
Traffic	• Traffic will be incorporated into environmental assessment documentation. Where relevant, a Traffic Management Plan will be developed and implemented to minimise impacts and ensure continued road safety. • IMC will ensure any measures within a Traffic Management Plan will be implemented. • For large projects IMC will advise local residents of the commencement of works and any related potential disruptions to local traffic.
Risks and Hazards	• IMC will ensure contractors abide by Company HSEC policies and management systems. • IMC will ensure contractors undertake the appropriate investigations with regards to underground service locations prior to the commencement of excavation works. • Diesel storages and pipelines shall be constructed and maintained in accordance with the relevant standards. • Appropriate risk management equipment (such as firefighting facilities and spill kits) will be present and maintained, with staff trained in their use. • Safety fencing will be installed around excavations and high risk areas of project sites to mitigate risks associated with unauthorised access. Vehicular accesses will be gated and locked when not in use.
Waste	• To minimise waste generation material generated from construction works will be utilised on site or as capping material at West Cliff emplacement area, where suitable. • Waste will be appropriately captured and transferred to suitable re-use, recycling or disposal locations.

Environment or Community Aspect	Commitments
Visual Amenity	• Clearing of native vegetation and mature trees will be minimised at projects where possible. • For long term infrastructure IMC will look to avoid the use of highly reflective materials or materials not commensurate with the surrounds, as is practicable. • Screening trees will be included in revegetation works, as and where appropriate for long term projects. • Permanent lighting will be installed as per the relevant standards but will consider visual amenity and light spill. • Temporary lighting will be arranged to minimise light spillage as much as possible without compromising safety or operations.
Rehabilitation	• IMC will undertake rehabilitation of any areas disturbed by the project to ensure the environment is returned as close as possible to pre-project condition and/or to meet landowner specific requirements. • De-commissioning of boreholes and shafts will be undertaken in accordance with the requirements of the relevant government department/s.
The Appin Mine Ventilation and Access Project	• A care and control agreement will be prepared and implemented for the long-term management of recovered artefacts. • IMC will provide biodiversity offsets under the NSW Biodiversity Offset Scheme for the Retirement of two (2) PCT 849 Ecosystem Credits. • A Blast Management Strategy will be prepared. • IMC will continue to liaise with and provide information regarding the Project construction via the Menangle Advisory Panel. • An Infrastructure Management Plan will be prepared in consultation with Transport for NSW, should the potential OSO1 be constructed at the Site during the operational life of the Site.

ATTACHMENT 2

Surface Facilities Plan



SOUTH32

FIGURE FOR APPENDIX

Indicative Project Layout

Appin Mine Ventilation and Access Project

N

0 50 100

m

GDA 1994 MGA Zone 56

ATTACHMENT 3

Community Information

Appin Ventilation and Mine Access Project

SOUTH32
Illawarra Metallurgical Coal

PROJECT UPDATE ONE **OCTOBER 2020**

WHO WE ARE AND WHAT WE DO

South32 Illawarra Metallurgical Coal operates in the Illawarra and Wollondilly regions of NSW, producing metallurgical coal for steelmaking.

In the Wollondilly region we operate the Appin Mine, which is currently in the Douglas Park and Menangle area. We are a proud local company, directly employing more than 1,800 people and have been operating in the region for 85 years.

Our metallurgical coal is used by the Port Kembla Steelworks right here in NSW and is part of countless products – from the seat belt buckles that provide safer car journeys to the Colorbond® roofs that keep us warm and dry.

SUPPORTING APPIN MINE'S FUTURE

An integral requirement of underground mining is adequate ventilation and mine access, to ensure a safe and efficient working environment for our people.

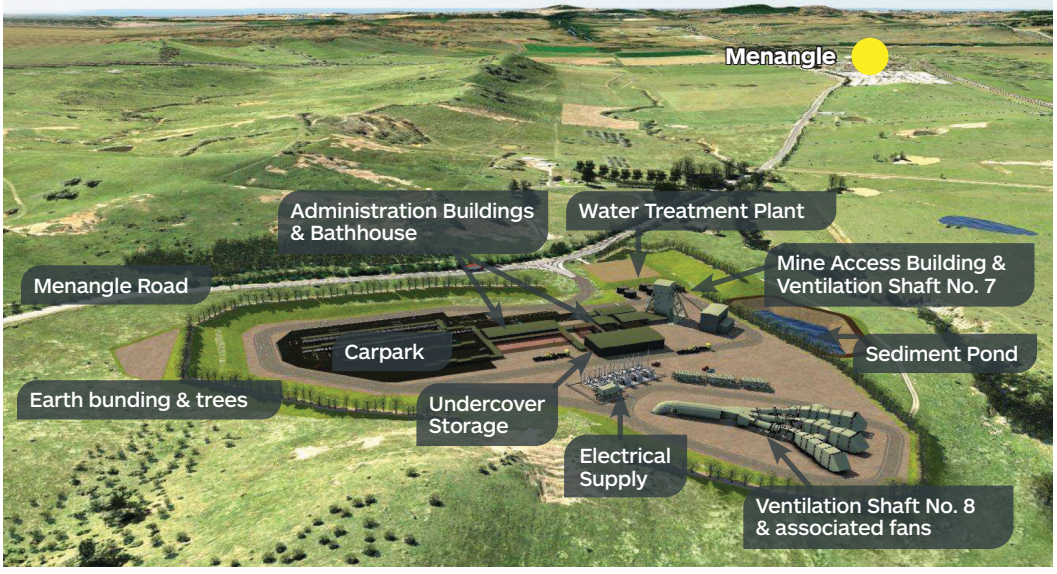
The main surface infrastructure supporting the mine include our pit tops (mine access locations) on Appin Road near the township of Appin, and on Douglas Park Drive, Douglas Park and our six ventilation shafts in the Appin and Douglas Park areas.

As Appin Mine moves further from surface infrastructure, we need to consider the ongoing mine ventilation requirements to ensure we can continue to operate safely. Recently, a thorough assessment of future mine ventilation and access requirements was completed.

It determined one downcast ventilation shaft (draws air into the mine) and one upcast ventilation shaft (draws air out of the mine) is required by 2025 to support the mine.

The proposed shafts would be known as Ventilation Shaft No. 7 and Ventilation Shaft No. 8 respectively. The site will include mine access and associated facilities with the proposed ventilation shafts. Collectively the project is known as the Appin Ventilation and Mine Access Project.

Conceptual image only



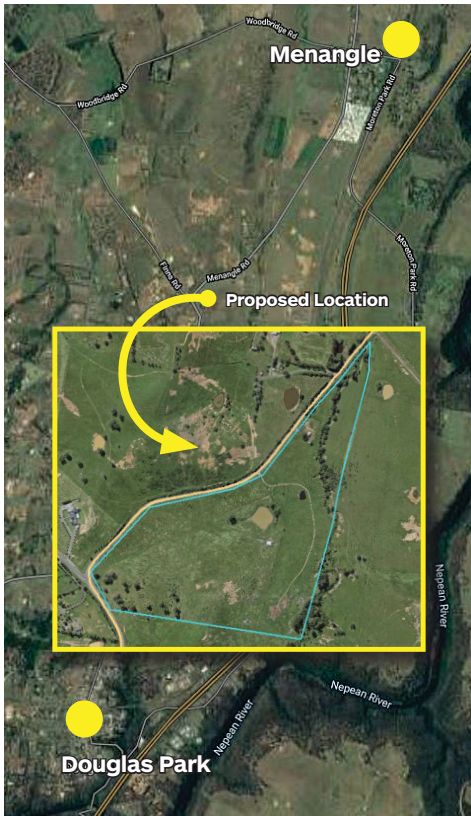
PROPOSED PROJECT LOCATION

The location of the proposed Appin Ventilation and Mine Access Project is near the intersection of Finns and Menangle Roads, Menangle.

This location was determined by the ventilation requirements for the mine and the layout of the approved underground workings. We also considered the location of features on the surface which include the community, cultural heritage, environment and availability of suitable land.

The map below depicts the proposed location of the Appin Ventilation and Mine Access Project. The conceptual image to the left shows what the infrastructure may look like once completed.

Coal handling infrastructure is not proposed for this site.



NEXT STEPS

The proposed Appin Ventilation and Mine Access Project is under early investigation by Illawarra Metallurgical Coal. Further engineering and environmental assessments are required to confirm the proposed site design and required infrastructure.

From October 2020 you can expect to see some activity at the proposed location while these assessments are undertaken.

Typical geotechnical drill rig setup

The environmental and engineering assessments include:

- Geotechnical drilling and test pits
- Heritage surveys, including Aboriginal cultural heritage and European heritage
- Biodiversity surveys
- Air quality studies
- Traffic studies
- Noise studies

Visual amenity and screening opportunities, with initial tree planting along Menangle Road planned before the end of the year.

Information on these assessments will be shared with the community in mid-2021.

APPROVALS AND COMMUNITY CONSULTATION

The proposed Appin Ventilation and Mine Access Project will follow a comprehensive approvals process through the NSW State Government.

We will be seeking a modification to our existing Bulli Seam Operations Project Consent (08-0150) approval as part of the process. This process typically includes an opportunity for community and stakeholder input via submissions. Typical steps in the modification process are outlined below.

While limited details are available on the Appin Ventilation and Mine Access Project at this time, we are committed to understanding and considering the needs of the community. We will establish an Advisory Panel in 2021 to enable two-way communication between the community and Illawarra Metallurgical Coal as part of our engagement. Interested community members are encouraged to contact us for more information. We will keep you informed as information becomes available, and we expect the next update to be in the first half of 2021.

If you would like to discuss the proposed Appin Ventilation and Mine Access Project or for further information on the Advisory Panel, please reach out to us on our free 24/7 Community Call Line 1800 102 210 or email illawarracommunity@south32.net.

We are happy to meet in-person or on virtual platforms to answer any questions.

NSW GOVERNMENT MODIFICATION PROCESS

1. **Illawarra Metallurgical Coal consults with the Department on proposed modifications**
2. The Department issues assessment requirements
3. Illawarra Metallurgical Coal prepares and submits Modification Report to the Department
4. The Department places Modification Report on exhibition and seeks submissions
5. Illawarra Metallurgical Coal responds to submissions
6. The Department completes its assessment

Appin Mine Ventilation and Access Project

SOUTH32
Illawarra Metallurgical Coal

PROJECT UPDATE TWO **FEBRUARY 2021**

WHO WE ARE AND WHAT WE DO

South32 Illawarra Metallurgical Coal operates in the Illawarra and Wollondilly regions of NSW, producing metallurgical coal for steelmaking.

In the Wollondilly region we operate the Appin Mine, which is currently in the Douglas Park and Menangle area. We are a proud local company, directly employing more than 1,800 people and have been operating in the region for over 85 years.

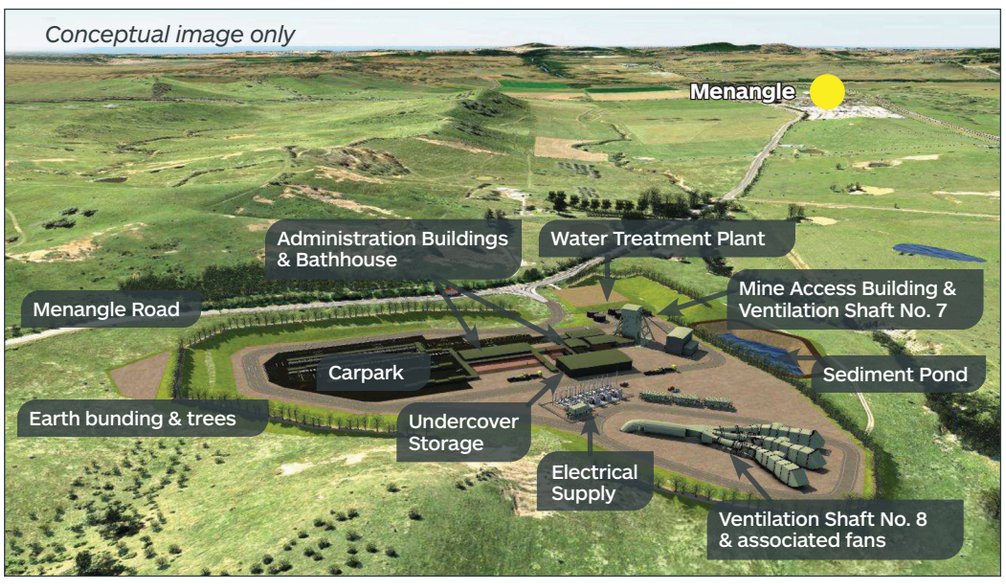
Our metallurgical coal is used by the Port Kembla steelworks right here in NSW and is part of countless products – from seat belt buckles that provide safer car journeys to the Colourbond® roofs that keep us warm and dry.

ABOUT THE PROPOSED PROJECT

An integral requirement of underground mining is adequate ventilation and mine access, to ensure a safe and efficient working environment for our people.

Last year we shared our concept plans for infrastructure to support Appin Mine as it moves further from existing infrastructure located in the Appin and Douglas Park areas. The proposed project, known as the Appin Mine Ventilation and Access Project, includes two ventilation shafts and mine access facilities. It is proposed to be located at 345 Menangle Road, Menangle.

The proposed ventilation shafts are known as Ventilation Shaft No. 7 (a downcast shaft that draws air into the mine) and Ventilation Shaft No. 8 (an upcast shaft that draws air out of the mine) and are required by 2025. The proposed mine access facilities will support access to the mine for some of our workforce. No coal handling infrastructure is proposed for the site.



COMMUNITY ENGAGEMENT

Last year we commenced community engagement on the proposed Appin Mine Ventilation and Access Project.

We have received feedback from some community members which has been shared with the project team for consideration.

We are establishing the Menangle Advisory Panel to enable two-way communication between the community and Illawarra Metallurgical Coal. This Panel will comprise of 6-8 community representatives, Illawarra Metallurgical Coal representatives and an Independent Chairperson. Subject matter experts relating to the proposed project will be invited to attend where necessary.

The first Panel meeting will be held in March 2021 and all meeting minutes will be made available on the South32 website: https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents.

If you would like more information about the Panel or to register an Expression of Interest to join, please email the Independent Chairperson, Kate Kernaghan of Factotum Communications, kate.k@factotumteam.com.au.

TREE SCREENING

In our last update we advised tree screening along the property boundary to Menangle Road would occur to assist in screening activities associated with the proposed project.

On-ground preparations for the tree screening have commenced and we anticipate trees will be planted in Autumn when the weather is more favourable.

The trees to be planted will vary in height and consist of Australian natives. A watering program will commence at the time of planting to provide the trees with the best start.

ASSESSMENT PROGRESS

We have commenced engineering and environmental assessments to confirm the proposed site design and project scope.

These assessments are completed by technical experts. When complete, the assessments will assist to inform the construction and operation of the proposed facilities. More information on the assessments will be shared in mid-2021.

These assessments include:

- Geotechnical drilling and test pits
- Biodiversity surveys
- Air quality studies
- Traffic studies
- Noise studies
- Aboriginal Cultural Heritage Assessment and European Heritage studies

We would like to thank the community for its ongoing support and patience during these assessment activities, particularly where there has been activity at the property.

Niche Environment and Heritage archaeologists excavating test pits as part of the Aboriginal Cultural Heritage Assessment.

Kirsty Lee, Cubbitch Barta representative, sieving excavated material as part of the Aboriginal Cultural Heritage Assessment.

NEXT STEPS

Activity on the property will continue for the remainder of the year as we work to establish tree screening along the Menangle Road boundary, and complete geotechnical assessments and environment and heritage studies.

We will commence our engagement with the Menangle Advisory Panel on the proposed project to ensure community feedback is captured in designs where practical.

The next project update will be shared mid-2021.

CONTACT US

If you would like to speak with us about our activities, call our free Community Call Line 1800 102 210 or email illawarracommunity@south32.net.

NSW GOVERNMENT MODIFICATION PROCESS

The proposed Appin Mine Ventilation and Access Project is following a comprehensive approvals process through the NSW State Government.

We will be seeking a modification to our existing Bulli Seam Operations Project Approval (08_0150) as part of the process. Typical steps in the modification process are outlined below.

To date we have engaged the Department of Planning, Industry and Environment (DPIE) on the proposed modification and received the assessment requirements to be addressed in the modification application. Documents relating to the modification application will be published by DPIE on the NSW Government Major Projects website during the application process.

1. Illawarra Metallurgical Coal consults with the Department on proposed modification
2. The Department issues assessment requirements
3. **Illawarra Metallurgical Coal prepares and submits Modification Report to the Department**
4. The Department places the Modification Report on exhibition and seeks submissions
5. Illawarra Metallurgical Coal responds to submissions
6. The Department completes its assessment

Appin Mine Ventilation and Access Project

SOUTH32
Illawarra Metallurgical Coal

PROJECT UPDATE THREE **MAY 2021**

WHO WE ARE AND WHAT WE DO

South32 Illawarra Metallurgical Coal operates in the Illawarra and Wollondilly regions of NSW, producing metallurgical coal for steelmaking.

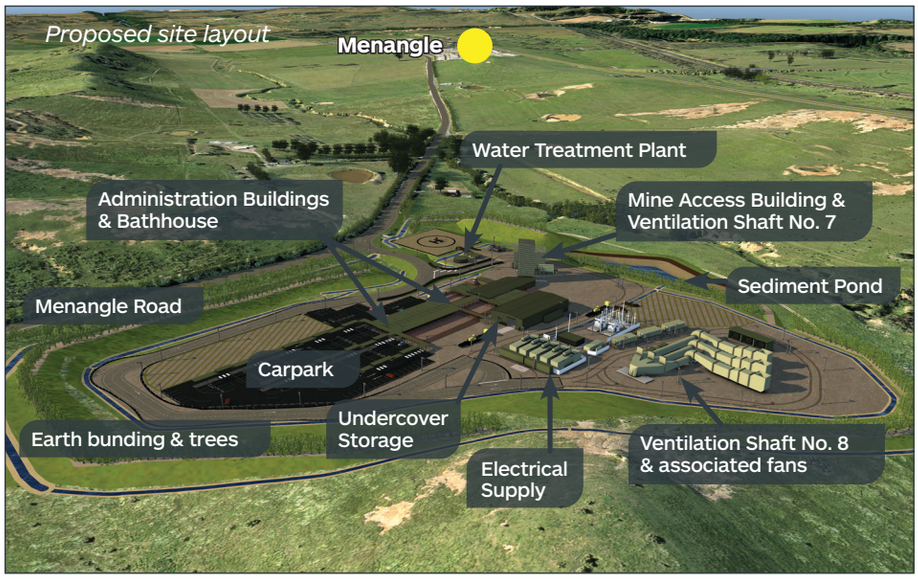
In the Wollondilly region we operate the Appin Mine, which is currently in the Douglas Park and Menangle area. We are a proud local company, directly employing more than 1,800 people and have been operating in the region for more than 85 years.

Our metallurgical coal is used by the Port Kembla steelworks right here in NSW and is part of countless products – from seat belt buckles that provide safer car journeys, to the Colourbond® roofs that keep us warm and dry.

ABOUT THE PROPOSED PROJECT

An integral requirement of underground mining is adequate ventilation and mine access, to ensure a safe and efficient working environment for our people. We are proposing to construct mine ventilation and access facilities at 345 Menangle Road, Menangle.

The proposed ventilation shafts are known as Ventilation Shaft No. 7 (a downcast shaft that draws air into the mine) and Ventilation Shaft No. 8 (an upcast shaft that draws air out of the mine). The proposed mine access infrastructure will support access to the mine for some of our workforce and supplies. This would include a winder and headframe in Ventilation Shaft No. 7, and facilities such as bathhouses and offices. No coal handling infrastructure is proposed for the site.



COMMUNITY INFORMATION

If you would like to find out more about the proposed Appin Mine Ventilation and Access Project, come and see us at dedicated information sessions in June 2021.

The information sessions will be held at Menangle Rural Volunteer Fire Brigade Station (90 Menangle Rd, Menangle).

- Thursday, 24 June 2021, 2.00pm – 5.30pm
- Saturday, 26 June 2021, 10.00am – 4.00pm
- Wednesday, 30 June 2021, 4.00pm – 7.00pm

Pre-registration of attendance is required to ensure correct health controls are in place.

To register your attendance email illawarracommunity@south32.net, or call 1800 102 210.

Alternatively, if you would like to discuss the proposed Project with us outside these times, we are happy to meet with you by appointment. Please contact us on the above details to make an appointment.

PROJECT WEBSITE

More information about the proposed Project is available at

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/appin-mine-ventilation-and-access-project

SINKING THE VENTILATION SHAFTS

Example of a temporary headframe used in the Conventional Shaft Sinking method.

If the Appin Mine Ventilation and Access Project is approved, we propose to use the Conventional Shaft Sinking method, sinking the ventilation shafts from the top down using controlled blasting.

This method involves loosening the rock with small, controlled blasts and removing the rock through the top of the shaft using a pulley system.

The construction of a temporary headframe to support the pulley system is required.

The removed rock will be used to create earthen bunds around the site. Following the rock removal, the ventilation shaft walls will be lined with concrete for support.

Illawarra Metallurgical Coal has selected Conventional Shaft Sinking as it:

- is effective in constructing shafts with an internal diameter of 5.5-7.5 metres
- reduces impacts on the community (short blasts as opposed to constant drilling)
- is less likely to result in delays to construction (blasting can occur in hard and soft rock and allows greater control over varied geotechnical conditions).

CONVENTIONAL SHAFT SINKING AND SAFETY

The shaft sinking program will be strictly regulated under the Project Approval to ensure the activity is conducted safely and with minimal impact. With the right controls and processes in place, controlled blasting is safe.

The controlled blasts will be designed to operate well below levels known to cause damage to structures in accordance with Australian Standards.

As part of the program, we propose to develop a monitoring program and offer property condition surveys to the nearest residences for peace of mind.

Strict controls and safety processes for each controlled blast include the safe transportation and storage of materials, and controlled blast management specialists overseeing the process.

A trial controlled blast is proposed to occur in the coming months after relevant approvals are gained.

Controlled blasting is a tried and tested method. It is used in underground road construction and to excavate ventilation shafts. Examples where controlled blasting has been used include:

- Sydney Metro City and Southwest, NSW
- NorthConnex, NSW
- Clem 7 tunnel, QLD
- Airport Link Brisbane, QLD

Controlled blasting is a common method used to break rock in construction. Typical steps of controlled blasting are:

1. Pre-drilling the rock with a series of holes
2. Loading the holes with small charges and other materials
3. Placing blast mats and other protections over the shaft top
4. Electronically detonating the charges in a timed sequence
5. Removing the broken-up pieces of rock and supporting the shalf walls

VENTILATION SHAFT DESIGN

Ventilation Shaft No. 7 is proposed to be approximately 591 metres deep and 7.5 metres wide.
This shaft will draw air into the mine and will double as mine access for personnel and materials.

Ventilation Shaft No. 8 is proposed to be approximately 560 metres deep and 5.5 metres wide.
This is the shaft that will draw air out the mine.

COMMUNITY AND ENVIRONMENT

MENANGLE ADVISORY PANEL

We have established the Menangle Advisory Panel (MAP) to enable two-way communication between the community and Illawarra Metallurgical Coal.

This Panel comprises eight community members, Illawarra Metallurgical Coal representatives and an Independent Chairperson. Subject matter experts relating to the Project are invited to attend where necessary.

Since March 2021, the MAP has discussed a range of topics related to the proposed Project. These topics include air ventilation, air quality, shaft sinking method, visual amenity and proposed Menangle Road upgrades. Shortly the MAP will be presented a summary of the environmental and engineering assessments.

The meeting minutes and associated materials are published on the Project website.

We are always happy to receive feedback from the community directly, but if you feel more comfortable speaking with a community member, the MAP members can assist. Member details are included on the Project website.

The MAP would like to extend a thanks to the Menangle Rural Volunteer Fire Brigade for enabling the Panel to use its facilities for meetings.

ASSESSMENT PROGRESS

Engineering and environmental assessments commenced in late 2020 to inform the construction and operation of the proposed facilities. These are undertaken by technical experts and include:

- Geotechnical drilling and test pits
- Biodiversity surveys
- Air quality studies
- Traffic studies
- Noise studies
- Aboriginal cultural heritage assessment and European heritage studies

These assessments will form part of our Modification Application to be lodged with the NSW Government mid-2021.

TREE SCREENING

Preparation for tree screening along the property boundary to Menangle Road has commenced.

The Australian native trees are being planted to assist in screening the proposed Project from the community and road users. A watering campaign is planned to provide the trees with the best start.

NEXT STEPS

Activity on the property will continue for the second half of the year as we work to clean up the property, establish tree screening along the Menangle Road boundary and complete geotechnical assessments.

We have started preparing the Modification Application to be submitted to the government in mid-2021. During this time we will continue to liaise closely with the Menangle Advisory Panel on proposed Project plans to ensure community feedback is captured in the design where practical.

CONTACT US

Information about the proposed Appin Mine Ventilation and Access Project is available at:

https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/appin-mine-ventilation-and-access-project.

If you would like to speak with us about our activities, call our free Community Call Line 1800 102 210 or email illawarracommunity@south32.net.

NSW GOVERNMENT MODIFICATION PROCESS

The proposed Appin Mine Ventilation and Access Project is following a comprehensive approvals process through the NSW State Government.

We will be seeking a modification to our existing Bulli Seam Operations Project Approval (08-0150) as part of the process. Typical steps in the modification process are outlined below.

Following submission of the Modification Application the Department of Planning, Industry and Environment (DPIE) will publish the Report on the NSW Government Major Projects website for Public Exhibition. We will keep you informed as to when this occurs via a project update and on the project website.

1. Illawarra Metallurgical Coal consults with the Department on proposed modification ✓
2. The Department issues assessment requirements ✓
3. **Illawarra Metallurgical Coal prepares and submits Modification Report to the Department**
4. The Department places the Modification Report on exhibition and seeks submissions
5. Illawarra Metallurgical Coal responds to submissions
6. The Department completes its assessment