



APPENDIX A

Agricultural Impact Statement

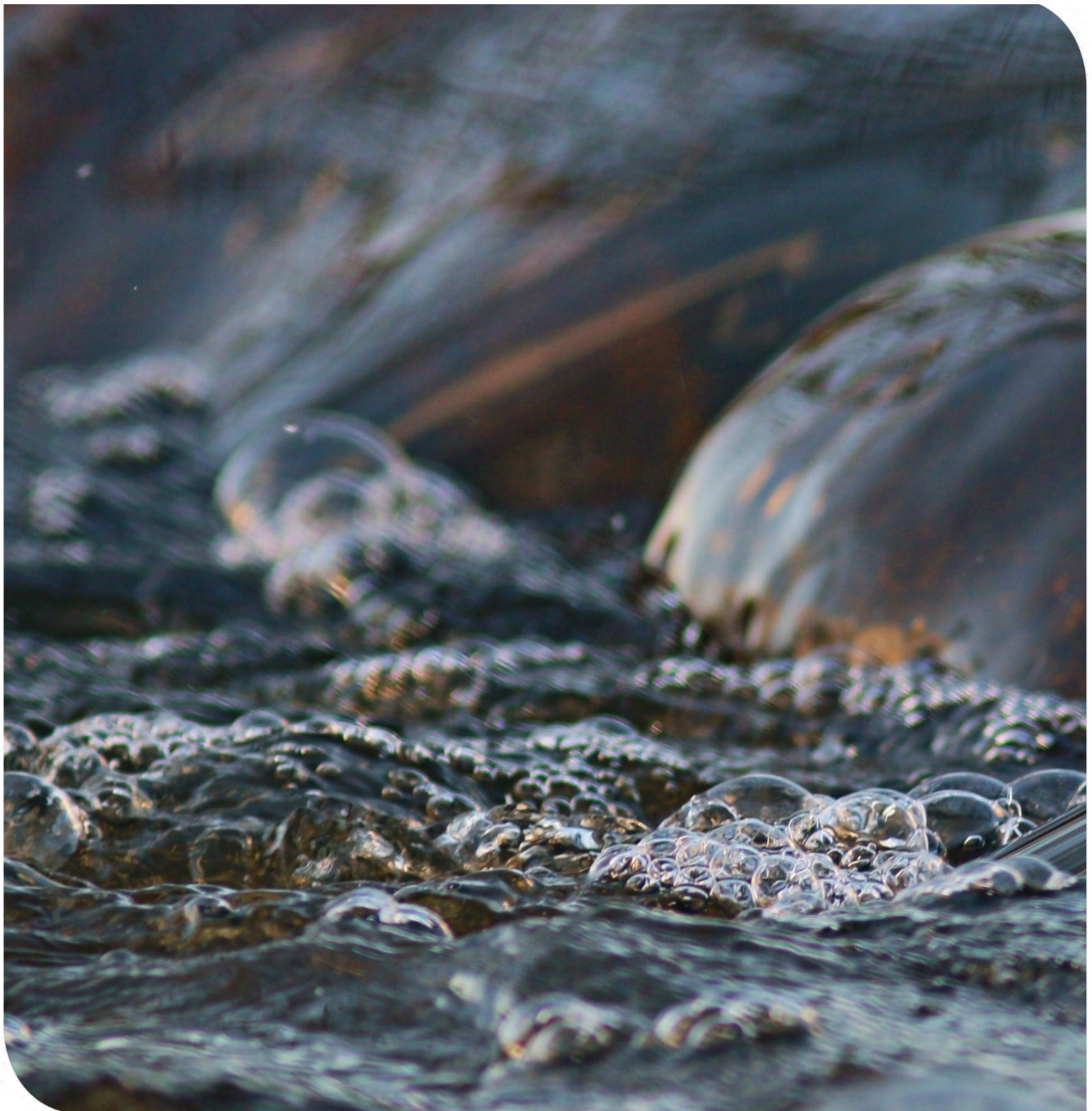
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Appin Mine Ventilation and Access Project

Agricultural Impact Statement

Prepared for South32 Illawarra Metallurgical Coal | 29 June 2021



Document control

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Glossary and list of abbreviations

Term or abbreviation	Definition
AIS	Agricultural Impact Statement
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BSAL	Biophysical Strategic Agricultural Land
CIC	Critical Industry Clusters
DPIE	Department of Planning, Industry and Environment
DRE	Division of Resources and Energy
DRG	Division of Resources and Geoscience
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ha	Hectare/s
LSC	Land and Soil Capability
OEH	Office of Environment and Heritage (formerly DECCW, DECC, DEC)
Project	Means the proposed modification
REF	Review of Environmental Factors
SAL	Strategic Agricultural Land
Site	The proposed site of the modification
study area	Means the lots encompassing the Development site and surrounding land (refer figures).
TEC	Threatened Ecological Community
Threatened Biodiversity	Threatened species, populations and/or ecological communities listed under the BC and/or EPBC Acts

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1. Introduction

1.1 Project Overview

The Appin Mine (the Mine) is an existing underground coal mine situated in the Southern Coalfield of New South Wales (NSW) approximately 25 kilometres north-west of Wollongong. Endeavour Coal Pty Ltd, a subsidiary of Illawarra Coal Holdings Pty Ltd, which is a wholly owned subsidiary of South32 Limited, is the owner and operator of Appin Mine. Appin Mine, Cordeaux Colliery and Dendrobium Mine (and associated facilities) collectively operate as South32 Illawarra Metallurgical Coal (IMC).

IMC received Project Approval 08_0150 (the Appin 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 Bulli Seam Operations (BSO). The Appin Mine approval was gazetted as a State Significant Development for the purposes of future modifications on 23 November 2018.

IMC is seeking to modify the existing Appin Mine approval, pursuant to Section 4.55(2) of the NSW *Environment Planning and Assessment Act 1979* (EP&A Act), to incorporate the construction and operation of infrastructure critical to the ongoing viability of the Appin Mine referred to as the Appin Mine Ventilation and Access Project (hereafter referred to as the Project).

1.2 Existing operations

The Appin 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 domains, Area 9 and Area 7, following completion of longwall mining activities at West Cliff Colliery in early 2016. Key surface facilities at the Mine 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 Appin 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, or to 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.

1.3 Project Area (the Site)

The Project Area (hereafter referred to as the Site) is approximately 35 km northwest of Wollongong and 8 km northwest of Appin (Figure 1). The township of Menangle is located approximately 1.3 km to the northeast of the Site. The Site is located on land owned by IMC, within the BSO Project Longwall Mining Area and within the South Campbelltown Mine Subsidence District in the Southern Coalfield of NSW.

The Site will incorporate Ventilation Shaft 7, Ventilation Shaft 8, mine access facilities and additional areas for associated works and infrastructure, such as the construction site access and the provision of services to the Site. The boundary of the Site and the extent of the assessment area are shown on (Figure 2).

Infrastructure that will be developed on the Site will be positioned to align with the approved layout of the underground workings for Appin Area 7 (Figure 3), to be proximal to required services and to minimise the potential impacts on the environment and communities of Menangle and Douglas Park.

1.4 Appin Mine Ventilation and Mine Access Project (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. Appin Mine operations are progressing further away from the existing surface infrastructure located in the Appin and Douglas Park areas, and additional infrastructure is required to support the ongoing operations.

The Project involves the construction and operation of a downcast ventilation shaft (Ventilation Shaft 7), an upcast ventilation shaft (Ventilation Shaft 8), three (3) extraction fans, ducting and evases and associated ancillary infrastructure. Based on the current mining schedule, the additional ventilation shafts are required to be operational prior to 2025.

The Project also involves the development of mine access facilities including headframe and personnel and materials winder (within Ventilation Shaft 7) and surface facilities consisting of offices, stores, bathhouse facilities and car parking areas. The establishment of these facilities would provide access for personnel and consumable materials to the Mine and will increase the safety and efficiency of transporting personnel and consumable materials underground.

To support the key infrastructure noted above, the Project will also include the following activities:

- Installation of temporary and permanent site access arrangements, including upgrade or 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, power supply and transmission and 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.
- Other associated minor infrastructure, plant, equipment and activities.

The Project would be similar to previously approved ventilation and mine access infrastructure of the Appin Mine and will not increase the volume of coal produced. Coal handling infrastructure is not proposed as part of the Project.

The shafts would be constructed from the surface down to the underground workings using conventional shaft sinking methods (mechanical excavation, drilling and controlled blasting) with material from the excavation being removed from the top of the shaft. The excavated material resulting from the construction of the shafts would be used as engineered fill and for construction of earth screening bunds and sediment dams. Where practicable, excess material would be stockpiled on-site, revegetated and used for future rehabilitation of the shaft site upon decommissioning. The two shafts would be lined progressively during excavation.

1.5 Project timing

The project would comprise multiple phases of construction and operation.

Construction of the ventilation shafts is critical to the ongoing safe and efficient operation of the Appin Mine, and as such, will take priority for the construction phase. Construction of the downcast shaft will commence first. Once the shaft sinking is complete and the ventilation infrastructure is installed, each shaft would commence commissioning and operation immediately.

The construction phase for establishing mine access infrastructure would occur subsequent to the ventilation infrastructure. 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.

1.5.1 Hours of construction and operation

Activities associated with sinking the shafts would occur 24 hours per day, seven days per week. The remainder of construction activities associated with the facility (e.g. installation of surface infrastructure) would generally be limited to daytime construction hours¹. Once operational, the site would be required to operate 24 hours per day, seven days per week, consistent with other similar facilities of the Mine.

¹ Daytime construction hours are defined as Monday to Saturday, 7.00am to 6.00pm.

1.6 Description of area (agricultural context)

The Site is located within the Wollondilly Local Government Area (LGA), on land designated as Zone RU2 Rural Landscape under the Wollondilly Local Environmental Plan 2011 (LEP).

1.7 Purpose of the report

This Agricultural Impact Statement (AIS) has been prepared in response to the request from the NSW Department of Planning, Industry and Environment (DPIE) to consider the agricultural impacts of the proposed modification.

1.8 Methodology

The AIS was assessed using the methodology set out below:

- A desktop review of all publicly available information relating to the Project.
- Field visit and inspection.
- Description of the biophysical environment for the Site and surrounding locality.
- A review of specialist impact assessments prepared for the Project.
- Assessment of potential impacts on agricultural resources and industry, including mitigation measures for any identified impacts.
- A review of IMC's demonstrated capacity for rehabilitation.

2. Existing environment and agricultural resources

2.1 Climate

The Site and the local area more broadly, experiences a wet temperate climate. Rainfall at Menangle Bridge, the closest Bureau of Meteorology (BoM) rainfall gauges with reliable long-term statistics, has mean annual rainfall in the order of 984 mm per year, with rainfall decreasing from east to west across the general study area.

Modelling conducted by EMM Consulting Pty Ltd for the Air Quality and Greenhouse Gas Assessment, indicates that the prevailing winds at the Site are from a south-westerly direction.

2.2 Geology

The Site is located within the region known as the Southern Coalfield, which lies in the southern part of the Sydney Basin; and is infilled with sedimentary rocks of Permian age (<270 million years ago) and of Triassic age (<225 million years ago). Immediately overlying the Bulli Coal unit of the Illawarra Coal Measures are sandstones and claystones of the Narrabeen Group. At the top of the sequence within the Study Area is the Hawkesbury Sandstone overlain by the Wianamatta Group (Figure 4)

The majority of mining operations in the Southern Coalfield extract coal from the Bulli or Wongawilli Seams, with some mining also occurring in the Balgownie Seam (DoP 2008). The coal seams generally deepen from south to north, with mining activities in the north more than 500 m below the surface.

Surface geology at the Site is mapped as the Ashfield and Bringelly Shales, which are component layers of the Wianamatta Group (Triassic Period) (Figure 4). Soils at the Site are consistent with those associated with the surface geology and are described in Section 2.6.

2.3 Topography

The Site is located within the Cumberland Plain, which slopes gently from approximately 250 m Australian Height Datum (AHD) in the Appin – Wilton area in the south along the Nepean Valley to 60 m AHD near Menangle Park to the north. Higher relief within the Cumberland Plain is found in the west of the Site in the vicinity of the Razorback Range, which reaches an elevation of 348 m AHD at Evelyn's Ridge.

The topography on the Woronora Plateau consists of Hawkesbury Sandstone dip slopes falling to the north-west. The Wianamatta Group is the uppermost unit in the stratigraphic sequence across the general local area; however, on the Woronora Plateau, the Wianamatta Group occurs only infrequently as scattered remnant areas. The Wianamatta Group is predominantly found over the Cumberland Plain to the west of the Site.

2.4 Hydrology

2.4.1 Surface water

The Site is broadly located within the Nepean River catchment, downstream of the Douglas Park Weir. Foot Onslow Creek is located along the eastern boundary of the Site, which is classified as a 3rd order stream based on the Strahler classification scheme and NSW hydroline spatial data (Figure 5). Foot Onslow Creek is an ephemeral creek with a small catchment of approximately 8.5 km². During extended dry periods, the creek is reduced to isolated pools and generally only exhibits continuous surface flow following significant rainfall. The confluence of Foot Onslow Creek with the Nepean River is located approximately 500 m

downstream of Menangle Weir. A first order ephemeral drainage line runs eastward via a series of two small farm dams across the Site into Foot Onslow Creek.

Flood mapping on the Wollondilly Shire Council website indicates that a 1 in 100-year flooding event of the Nepean River would extend into the area north of the Site, approximately 650 m from the most northern extent of the Site.

2.4.2 Groundwater

Apart from aquifers within the coal seams at depths of greater than 300 m, the recognised aquifers in the stratigraphic sequence at the Site are the Hawkesbury Sandstone and the sandstones of the Narrabeen Group (Merrick 2009). Whilst of low permeability, the Hawkesbury Sandstone has the relatively higher permeability compared to other units in the region and is capable of higher groundwater yields (Merrick 2009).

Vertical continuity of Hawkesbury Sandstone with the underlying Narrabeen Group aquifer is interrupted by a major aquitard, the Bald Hill Claystone. The thickness of the Bald Hill Claystone is generally consistent and continuous across the Southern Coalfields (Merrick 2009). The Bald Hill Claystone will retard vertical groundwater flow downwards from the Hawkesbury Sandstone.

The only recognised economic aquifer in the area is the Hawkesbury Sandstone. The water quality in the Hawkesbury Sandstone is considered to be good beneath the Woronora Plateau and the Illawarra Plateau, but deteriorates rapidly towards the northern limits of the Southern Coalfield (Merrick 2009). Within the BSO Project area, the salinity is generally in the range 1,000-3,000 mg/L (Merrick 2009.)

2.4.3 Licenced water users

The Site is located within the area regulated by the Water Sharing Plan (WSP) for the Greater Metropolitan Region Unregulated River Water Sources 2011, which was developed under the *Water Management Act 2000* (WM Act). The WSP covers 87 management zones that are grouped into six water sources. Water sharing rules that the WSP focuses on are:

- Environmental water rules – the share of the water reserved for the environment.
- Access rules – which determine when extraction is allowed (for example above a set river flow rate).
- Dealing rules – which control the trade of water, both the transfer of share components of an access licence and assignment of water allocation between access licences, as well as changing the location for water extraction.

As described by the WSP, management zone relevant to the Project is the Menangle Weir Management Zone, which is part of the Hawkesbury and Lower Nepean Rivers Water Source, described as: *all unregulated surface water in the hydrological catchment of the Nepean River below Douglas Park Weir and Warragamba Dam and in the hydrological catchment of the Hawkesbury River, excluding the hydrological catchments of Mangrove Creek and Mooney Mooney Creek.*

There is a total of 20 Water Access Licences (WAL) in the Menangle Weir Management Zone (Table 2-1); of these, two are registered for domestic and stock watering purposes.

Table 2-1: Summary of Water Access Licences for the Menangle Weir Management Zone

WAL No.	Share Components (ML)	Usage Type
26953	7.00	Domestic and Stock
26981	640.00	Unregulated River
27024	111.00	Unregulated River
26989	75.00	Unregulated River
26998	42.00	Unregulated River
26990	12.00	Unregulated River
27017	67.00	Unregulated River
27027	95.00	Unregulated River
27010	152.00	Unregulated River
26828	17.00	Unregulated River
26848	20.00	Unregulated River
26843	7.00	Domestic and Stock
26850	1,560.00	Unregulated River
26834	10.00	Unregulated River
26877	32.00	Unregulated River
26916	10.00	Unregulated River
26894	2.00	Unregulated River
26863	13.50	Unregulated River
26874	13.50	Unregulated River
30145	53.00	Unregulated River

2.5 Vegetation and Land Use

The area local to the Site is bounded by the Nepean River to the east and Razorback Ranges to the west. This area has been extensively cleared and generally reflects the Rural Landscape (RU2) zoning under the Wollondilly LEP.

The Site has been previously cleared and historically grazed. As such, it is dominated by grassland, the composition of which is predominantly exotic. The introduced African Boxthorn (*Lycium ferocissimum*) is common at the Site.

The native vegetation present at the Site is restricted to a small isolated patch of weed infested Blackthorn (*Bursaria spinosa*) shrubland that has naturally regenerated over time and an isolated Forest Red Gum (*Eucalyptus tereticornis*).

Two plant community types (PCT) were mapped within the Site:

- 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.

Both PCTs are listed as Threatened Ecological Communities (TEC) under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). However, only the PCT 849 on the Site meets the condition thresholds for protection under the BC Act. Neither of the PCTs on the Site meet the condition thresholds for protection under the EPBC Act. Further detail is provided in the Biodiversity Development Assessment Report (BDAR) for the Project.

2.6 Soil Landscape Units

Soil mapping, provided by DPIE (Hazleton and Tille 1990), indicates that there are two soil landscape units mapped within the Site: the Blacktown Residual and the Theresa Park Alluvial soil landscape units (Figure 5).

The Blacktown Residual soil landscape unit is characterised by gently undulating topography, broad rounded crests and ridges; with slopes less than 5 %, but occasionally up to 10 % and local relief is up to 30 m. It occurs on the Wianamatta Group geological unit, which is predominately comprised of Wianamatta Shale. The dominant soils are shallow to moderately deep Chromosols on crests, upper slopes and well drained areas, and deep Dermosols on lower slopes and in drainage depressions. Limitations to the soil landscape unit include moderately reactive soil, low soil fertility and seasonal waterlogging. This soil landscape unit is suitable for cropping (requiring intensive management practices) and grazing. Much of the Blacktown Residual soil landscape unit has been urbanised or under rural residential development.

The Theresa Park Alluvial landscape soil unit is characterised by 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 %. The dominant soil types within this landscape are Red Earths and Red Podzolic Soils on terraces, and Prairie Soils on current floodplains. Limitations to the soil landscape unit include localised flooding, seasonal waterlogging, and very high soil erosion hazard for concentrated flows.

2.7 Land and Soil Capability Classification

The Land and Soil Capability (LSC) assessment scheme uses the biophysical features of the land and soil to derive detailed rating tables for a range of land and soil hazards. Each hazard is given a rating between 1 (best, highest capability land) and 8 (worst, lowest capability land), and the final LSC class of the land is based on the most limiting hazard.

The Site is comprised of LSC Class 5 and 6 land (Table 2-2 and Figure 6). The proposed maximum disturbance footprint (depicted in Figure 6) indicates that a very small area of LSC Class 4 land would potentially be disturbed (Table 2-2). However, from site inspections and aerial imagery, this portion of land is part of the Menangle Road verge area. Areas of mapped higher capability land are located approximately 2 km to the north of the Site.

Table 2-2: LSC classification of the Site as per NSW Office of Environment and Heritage (2013) Land and Soil Capability mapping of NSW.

LSC Class	Description	Land Management Considerations	Disturbance Area (ha)
4 Moderate to Severe Limitations	Moderate to severe limitations: Moderate to severe limitations for some land uses that need to be consciously managed to prevent soil and land degradation. The limitations can be overcome by specialised management practices with high levels of knowledge, expertise, inputs, investment and technology.	Class 4 land can be cultivated occasionally for sowing of pastures and crops. However, it has cropping limitations because of erosion hazard, weak structure, salinity, acidification, shallowness of soils, climate, wetness, stoniness, or a combination of these factors. It is only suitable for intermittent cultivation with specialised practices. Required erosion control practices include advanced conservation tillage, pasture cropping, well-planned rotations and maintenance of ground cover.	0.002785
5 Severe Limitations	Moderate–low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to	This land is not capable of supporting regular cultivation due to the various limitations. Soil erosion can be severe without adequate erosion	12.20

	grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.	control measures. Windbreaks and ground cover should be retained in areas prone to wind erosion. Class 5 land can be cultivated occasionally for fodder crops and pasture renewal or establishment.	
6 Very Severe Limitations	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	Soil erosion can be very severe without adequate erosion control measures. Fertility varies with geology, soil depth and type. This land is suited for less productive grazing. Limitations prevent most other land uses. Grazing pressures need to be lower than those used on Class 4 and 5 land. Rotational grazing systems with adequate recovery time for plant regrowth are essential. It is important to minimise soil disturbance, retain perennial ground cover and maintain high organic matter levels.	9.245

2.8 Acid Sulphate Soils

There are no acid sulphate soil risk areas mapped within proximity to the Site. Acid sulphate soils are not considered further in this assessment.

2.9 Strategic Agricultural Land (SAL)

Strategic Agricultural Land (SAL) is defined as highly productive land that has both unique natural resource characteristics (such as soil and water resources) as well as socio-economic value (such as high productivity, infrastructure availability and access to markets). SAL is comprised of Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CIC). As CIC only pertain to the Upper Hunter region, they are not considered further within this assessment. BSAL is characterised as land with high quality soil and water resources capable of sustaining high levels of productivity.

The Site is not located on or near (within the 2 km threshold) any areas of mapped potential BSAL, identified under the Strategic Regional Land Use Policy or any of its current Strategic Regional Land Use Plans (Figure 7). There is an area of mapped BSAL located approximately 2.1 km to the north of the Site.

3. Local and Regional Agricultural Enterprises

3.1 Regional Agricultural Land Use

Land use for the Wollondilly LGA is summarised in Table 3-1. Intensive agriculture operations account for only a relatively minor amount of land use within the LGA (Intensive animal productions 0.236%; intensive horticulture 0.038%).

Table 3-1 Excerpt from NSW Land Use 2017 v1.2 mapping data for the Wollondilly LGA. Source DPIE June 2020.

Land Use Category	Total Ha	%
Nature conservation	351,290	65.320
Managed resource protection	51,226	9.525
Transport and communication	37,708	7.012
Other minimal use	25,212	4.688
Grazing native vegetation	17,412	3.238
Residential and farm infrastructure	17,094	3.179
Grazing modified pastures	16,594	3.085
Lake	7,791	1.449
River	3,949	0.734
Reservoir/dam	2,396	0.446
Cropping	1,672	0.311
Intensive animal production	1,271	0.236
Services	1,030	0.192
Mining	624	0.116
Irrigated seasonal horticulture	464	0.086
Irrigated cropping	343	0.064
Manufacturing and industrial	290	0.054
Waste treatment and disposal	238	0.044
Land in transition	229	0.043
Intensive horticulture	205	0.038
Irrigated perennial horticulture	158	0.029
Perennial horticulture	138	0.026
Utilities	106	0.020
Seasonal horticulture	106	0.020
Channel/aqueduct	93	0.017
Grazing irrigated modified pastures	76	0.014
Marsh/wetland	75	0.014
Plantation forests	5	0.001
Wollondilly LGA Total	537,795	100.00

3.2 Agricultural employment

The latest Census data (2016) from the Australian Bureau of Statistics indicates that of the 24,054 employed persons in the Wollondilly LGA, 577 (2.4 %) are employed in the agricultural, forestry or fisheries industries.

3.3 Local Agricultural Operations

A desktop search of nearby agricultural operations was conducted; results are presented in Table 3-2 below. A total of four, relatively small, agricultural operations were identified within the general proximity of the Site (Figure 9).

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) (Figure 9).

Table 3-2: 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

4. Assessment of Potential Impacts

4.1 Land Resources

4.1.1 Land Temporarily Removed from Agriculture

Given that the Site is currently not being used for agricultural purposes, the Project would not result in the temporary removal of any land from agricultural activities. 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). The temporary removal would be throughout the operational lifespan of the Project, estimated to be until 2041; followed by rehabilitation till approximately 2046.

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.

4.1.2 Land Permanently Removed from Agriculture

No land would permanently be removed from potential agricultural use as the Site would be rehabilitated to a quality that is commensurate with current conditions (subject to final Site closure planning). Excavated material will be stockpiled on the Site, incorporated into the design of the Site and ultimately used on the Site during rehabilitation. During rehabilitation, any contaminated soil will be removed from the Site (disposed of appropriately) and be replaced with soil of similar or better condition than the original material. Site rehabilitation would be undertaken in accordance with the BSO Mining Operations Plan, which outlines the general closure and rehabilitation strategies to be used. A site-specific rehabilitation plan would be developed for the Project and incorporated into mine closure planning at an appropriate time ahead of closure.

4.1.3 Impact on Biophysical Strategic Agricultural Land

As detailed in Section 2.9, the Site is not located near (within 2 km) of any mapped BSAL (Figure 7). The closest mapped BSAL is located 2.1 km to the north of the Site. Appropriate drainage and discharge measures will be implemented on the Site to prevent and mitigate potential downstream impacts via Foot Onslow Creek to mapped BSAL.

4.1.4 Acid Sulphate Soils

As outlined in Section 2.8 there are no Acid Sulphate Soil Risk Areas mapped in proximity to the Site.

4.2 Water Resources

4.2.1 Surface Water

It is noted that the Site drains eastward into the ephemeral stream Foot Onslow Creek (Figure 5), and subsequently to the Nepean River. Potential impacts to surface water from the construction phase include sedimentation resulting in the degradation of water quality to Foot Onslow Creek and the Nepean River downstream. During the operational phase, potential impacts to surface water include runoff from the Site, which may contain hydrocarbons and other pollutants from equipment and vehicles.

The Project requires the construction of a range of surface water management measures, which will be installed during site establishment. These measures have been designed to mitigate potential water quality impacts to Foot Onslow Creek and the Nepean River from the construction phase of the Project.

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, in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom 2004), will be used to minimise the generation and discharge of dirty water from construction activities. Other surface water management measures being installed as part of the construction phase of works include (see Section 3 of the Modification Report):

- Clean water diversion swales and culverts that divert clean water runoff around the construction site towards Foot Onslow Creek.
- Dirty water swales that capture and direct dirty water runoff from the construction site areas into the sedimentation pond.
- Clean water diversion swales and culverts that divert clean water runoff from the vegetated bunds around the construction site towards Foot Onslow Creek.
- Sedimentation pond to receive dirty water runoff from the general construction site, sized to capture a 1 in 10-year frequency 72-hour duration storm event. A pump system and emergency spillway will be required.
- Mobile coagulant dosing plants for the sedimentation ponds, if required.
- Oil/water separation sumps in areas likely to be in contact with hydrocarbons.

Discharge from the Site will be conducted in accordance with an existing Environmental Protection Licence, which would be sought to be modified by IMC for this purpose under the *Protection of the Environment Operations Act 1997*.

Given that the appropriate environmental safeguards will be implemented during the construction and operational phases, it is considered that the Project would have negligible impacts to surface water. Further details of environmental safeguards are provided in Section 6 of the Modification Report.

4.2.2 Groundwater

As detailed in Section 2.4.2, recognised aquifers such as the Hawkesbury Sandstone would be encountered during the construction phase of the project, specifically during the construction of the shafts. The principal risk to groundwater associated with the Project is the depressurisation and drainage of aquifers as they are exposed during the construction of the shafts. The construction methodology, detailed in Section 3 of the Modification Report, requires that each shaft would be progressively lined during construction, which would effectively seal any aquifers encountered during the shaft sinking process.

Potential subsidence impacts to groundwater were assessed as part of the BSO Environmental Assessment. It is unlikely that impacts to groundwater aquifers would be greater than those already predicted in the BSO Hydrogeological Assessment.

4.2.3 Water Reallocation

The Project would utilise existing IMC's existing water access licence (WAL 30145), under the WM Act, issued for the Appin Mine No. 6 Ventilation Shaft (VS6). The VS6 operations involve water being pumped from the Nepean River by the 50 mm Submersible Pumps located in the River and transferred via pipeline to the VS6 site.

It is proposed that water will be sourced from the existing tanks at VS6 and transported to the Project site via water cart, up to the maximum share component of 53 ML/year. Minor upgrade or augmentation to the existing tanks, pipeline and standpipe may be required to provide adequate water supply. It is proposed that a mains water source would have been established for the Site for use during operations.

The Project would not require additional water licenses for both the construction and operational phases. Furthermore, the Project would involve reallocating personnel from currently used Appin Mine surface facilities to the proposed Site. This would result in a reduction of water usage from other Appin Mine surface facilities.

4.2.4 Groundwater boreholes

Registered groundwater boreholes are recorded in the National Groundwater Information System (NGIS). Borehole spatial data was downloaded from NGIS during April 2021. Registered boreholes in proximity to the Site (within 2 km of the Site boundary) are recorded below (Table 4-1) and depicted in Figure 8.

As detailed above in Section 4.2.2, it is unlikely that the Project would cause significant impact to groundwater aquifers. Therefore, it is unlikely that registered groundwater boreholes would be impacted by the Project.

Table 4-1 Registered groundwater boreholes within 2 km of the Site.

Borehole ID	Easting	Northing	Borehole Drilled Depth (m)	Date Drilled	Usage Type	Approximate Distance from the Site (km)
GW108990	290347	6219588	150	8/07/2008	Water Supply	0.21
GW105574	289656	6218908	210	12/12/2003	Water Supply	0.34
GW106574	290123	6218350	238	27/11/2002	Water Supply	0.57
GW105376	289443	6218380	218.5	6/07/2002	Water Supply	0.81
GW105388	289888	6217892	230	10/11/2002	Water Supply	1.04
GW072196	288911	6218867	Unknown	15/11/2006	Water Supply	1.06
GW106675	288797	6218642	183	24/10/2003	Water Supply	1.23
GW100289	288686	6218937	30	18/02/1994	Water Supply	1.27
GW107791	289415	6220392	231	19/03/2003	Water Supply	1.34
GW112481	288663	6219694	633.2	29/05/2007	Commercial and Industrial	1.43
GW108907	288602	6218547	210	16/08/2007	Water Supply	1.44
GW105339	291919	6218356	238	10/06/2003	Water Supply	1.46
GW112381	288743	6218191	152	18/01/2010	Water Supply	1.49
GW108312	291534	6217750	175	1/02/2004	Commercial and Industrial	1.51
GW112441	289940	6217284	294	13/01/2010	Water Supply	1.65
GW072874	288601	6217630	189	11/09/1992	Water Supply	1.94

4.2.5 Water Resource Impacts on Agricultural Productivity

It is anticipated that the construction phase, including the sinking of the shaft, borehole drilling and dust suppression activities will require a total water supply of approximately 16 ML based on a daily average demand of 25 kL/day. During construction it is proposed that water will be brought to site via water cart.

During the operational phase, it is anticipated that the overall water required will be 6.6 ML/year, based on a 21.8 kL/day peak demand. The predominant uses of water would be for underground pods, administration buildings, bathhouses, warehouses, emergency fire capacity and fan cooling.

The Project would not involve the extraction of groundwater and will utilise IMC's existing surface water access licence (WAL 30145) and mains water sources. Therefore, it is considered that the Project would not significantly impact water resources for agricultural production.

4.3 Other Impacts

4.3.1 Noise, vibration and construction blasting

A specialist noise and vibration impact assessment, prepared by RWDI Australia Pty Ltd (RWDI), is summarised in Section 6.3 of the Modification Report. The noise and vibration impact assessment has been prepared with consideration given to sensitive receivers in proximity to the Site.

The primary source of noise and vibration during the construction phase of the Project would be from the conventional shaft sinking methodology proposed to sink the shafts. Construction at the Site would take place 24 hours per day, 7 days per week. In order to mitigate noise and vibration impacts, acoustic shed(s) (or similar noise mitigation measures) would be constructed around shaft excavation areas during the early stages of construction, where excavation works are proposed. Other noise mitigation measures are detailed Section 6.3.3 of the Modification Report.

The specialist assessment demonstrated that predicted noise levels from the construction activities, including out of hours work, are expected to comply or they can be effectively mitigated to comply with the Noise Management Levels (NML) of the *Interim Construction Noise Guideline 2009* (ICNG). With the proposed mitigation measures, the Project is not likely to exceed acceptable noise or vibration limits at the location of sensitive receivers, most of whom are much closer to the site than any of the noted Agricultural enterprises identified in Table 3-2.

During the operational phase, noise would primarily be generated by:

- Two ventilation fans (continuous operation).
- Power substation (continuous operation).
- Vehicle movements (particularly during shift change).
- Mobile plant activities.
- Water treatment plant.

The *Noise Policy for Industry 2017* (NPfI) recommends the development of project noise trigger levels, which provide a benchmark for assessing a proposal or site. Project noise trigger levels were developed by RWDI from baseline noise monitoring. The predicted operational noise levels comply with the established project noise trigger levels for all condition scenarios that were assessed by RWDI.

A Blast Management Strategy will be prepared prior to blasting. The strategy would include a trial blast, which will inform the blasting parameters. 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. The blast management strategy would be developed with consideration to sensitive receivers.

Based on the noise and vibration assessment (RWDI 2021), it is unlikely that the Project would generate significant noise or vibrations that would impact agricultural operations (including livestock). Furthermore, noise and vibration mitigation measures have been designed with regards to sensitive receivers that are in closer proximity to the Site than surrounding agricultural operations (Table 3-2).

4.3.2 Air Quality

Potential impacts to air quality from the Project were assessed in the Air Quality and Greenhouse Gas Assessment conducted by EMM Consulting (EMM 2021). The air quality impact assessment is summarised in detail in Section 6.5 of the Modification Report.

The purpose of mine ventilation is to provide a safe working environment for mine employees underground. Mine Ventilation Air will typically contain dust/particulate matter and gaseous pollutants. Potential air quality impact sources from the Project would include:

- Fugitive dust from site preparation, earthworks, construction and shaft spoil handling.
- Explosive fumes (Nitrous Oxides) during shaft sinking.
- Emissions from ventilation fan evases during operation.

Relevant Environmental Management Plans will be developed and implemented for the Project and will include appropriate air quality safeguards. A full list of mitigation measures are outlined in Section 6.4.3 of the Modification Report.

Regular visual inspections of activities would be undertaken and recorded to monitor the effectiveness of dust controls and allow for reactive and corrective measures to be implemented. The inspections will focus on the following key issues:

- 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.

Based on the Air Quality and Greenhouse Gas Assessment (EMM 2021), it is unlikely that the Project would result in a significant change to air quality for agricultural purposes.

4.3.3 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 4-2).

During additional field surveys, conducted by Niche as part of the BDAR for the project, 14 weed species were recorded at the Site (Table 4-2). Of these, four are listed as Weeds of National Significance: African Boxthorn, Blackberry, Fireweed and Lantana.

Table 4-2 Noxious weeds identified from the BSO Terrestrial Flora Assessment.

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
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	4	Yes	Yes
<i>Olea europaea subsp. cuspidata</i>	African Olive	-	NA	-	Yes
<i>Rubus fruticosus agg. Sp.</i>	Blackberry	Yes	4	Yes	-
<i>Asparagus asparagoides</i>	Bridal Creeper	Yes	4, 5	Yes	-

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
<i>Stenotaphrum secundatum</i>	Buffalo Grass	-	NA	-	Yes
<i>Axonopus fissifolius</i>	Carpet Grass	-	NA	-	Yes
<i>Briza subaristata</i>	Chilean Quaking Grass	-	NA	-	Yes
<i>Senecio madagascariensis</i>	Fireweed	Yes	5	-	Yes
<i>Lantana camara</i>	Lantana	Yes	4, 5	Yes	Yes
<i>Oxalis purpurea</i>	Large-flowered Wood-sorrell	-	5	Yes	-
<i>Ligustrum lucidum</i>	Large-leaf Privet	-	4	Yes	-
<i>Ehrharta erecta</i>	Panic Veldtgrass	-	NA	-	Yes
<i>Paspalum dilatatum</i>	Paspalum	-	NA	-	Yes
<i>Opuntia stricta, O. elatior</i>	Prickly Pear	Yes	4	Yes	-
<i>Polygala virgata</i>	Purple Broom	-	NA	-	Yes
<i>Chloris gayana</i>	Rhodes Grass	-	NA	-	Yes
<i>Carthamus lanatus</i>	Saffron Thistle	-	NA	-	Yes
<i>Ligustrum sinense</i>	Small-leaf Privet	-	4	Yes	-
<i>Hypericum perforatum</i>	St. John's Wort	-	NA	-	Yes
<i>Cyperus eragrostis</i>	Umbrella Sedge	-	NA	-	Yes

¹Class 4 - Locally Controlled Weeds: Plants that pose a threat to primary production, the environment or human health. Are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.

Class 5 - Restricted Plants: Plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.

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 minimising 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.

Given the mitigation measures that would be implemented, it is considered the Project is unlikely to represent an increased risk to the biosecurity of agricultural resources and enterprises within the local area.

4.3.4 Biodiversity

Potential impacts from the Project to biodiversity values were assessed in the BDAR conducted by Niche and are summarised as follows:

- Direct removal of 18.78 ha of highly modified native vegetation containing one TEC.
- Removal of highly modified non-threatened fauna habitat (native vegetation).
- Removal of highly modified flora habitat.
- Removal of two farm dams.

IMC have aimed to avoid and minimise environmental impacts from the Project through detailed design and siting of the Project and implementation of actions aimed at mitigating and managing potential indirect impacts of the Project as detailed in Section 5.1.

A total of two ecosystem credits for PCT 849 are required to offset impacts to native vegetation that would be impacted by the Project.

The aquatic ecology assessment (conducted by Niche) concluded that the reach of Foot Onslow Creek within the Study Area does not contain suitable habitat for the threatened aquatic fauna. The assessment also concluded that the Project is not likely to have any impact on threatened aquatic species or Key Fish Habitat or other important aquatic habitat within Foot Onslow Creek.

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.

Further detail on potential biodiversity impacts is provided in the BDAR and aquatic biodiversity impact assessment.

Given the mitigation measures that would be implemented and the existing biodiversity within the Site, it is unlikely that the Project would have a significant impact on biodiversity.

4.3.5 Traffic

The Traffic Assessment Report conducted by Transport and Urban Planning Pty Ltd demonstrates that the Project would not significantly impact the local road network. Proposed site access upgrades, outlined in Section 6.6 of the Modification Report, would sufficiently mitigate the effects of traffic increases associated with the Project. Therefore, it is unlikely that the Project would cause an increase in traffic that would adversely impact agricultural operations within the Study Area.

4.3.6 Visual Amenity

Potential impacts to visual amenity have been addressed in Section 6.13 of the Modification Report. The Project would have a high-moderate impact to several viewpoints; and the built form and bulk of the Project would not contrast well with shapes and contours in the surrounding landscape. Mitigation measures, such as vegetation screening and an appropriate colour palette would be used.

Given the mitigation measures that would be implemented, including the design and location of the Site, it is unlikely that the Project would have a significant impact on visual amenity.

5. Mitigation and Rehabilitation

5.1 General mitigation measures

As part of the design phase of the Project, the location for the Site was chosen to minimise potential impact to the environment and community stakeholders, including local agricultural operations.

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 environmental management plans. The environmental management plans will also detail management practices to avoid and mitigate potential weed impacts.

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 environmental management plans, which will include discharge monitoring from the Site.

5.2 Rehabilitation

The operational phase of the Project is expected to continue up to 2041, followed by the rehabilitation of the Site, which is expected to be completed in 2046. Site rehabilitation would be undertaken in accordance with the BSO Mining Operations Plan, which outlines the general closure and rehabilitation strategies to be used. A site-specific rehabilitation plan would be developed for the Project and incorporated into mine closure planning at an appropriate time ahead of closure.

6. Stakeholder Consultation

Community engagement is addressed in Section 5 of the Modification Report. The IMC Corporate Affairs Team is engaging the community in collaboration with the Project Team. 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 Appin Mine operations under the Appin 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. The outcomes of community engagement are detailed in Section 5.2 of the Modification Report.

In addition to executing the CSES, IMC has also engaged with DPIE (as the consent authority), NSW Resources Regulator, Transport for NSW, Endeavour Energy, Sydney Water, Wollondilly Shire Council and Subsidence Advisory NSW during the Modification Application process. Section 5.3 of the Modification Report summarises stakeholder engagement undertaken to date, matters discussed and where these matters have been addressed in the Modification Report.

Should the Project be approved, implementation of the CSES will continue through the construction and operational phases of the Project.

7. Conclusion

This AIS has considered specialist impact assessments for the Project within an agricultural context. It is considered that the Project is unlikely to have a significant impact on agricultural resources. The Site is located on low capability land (primarily LSC classes 5 and 6) and is not located on or within 2 km of any mapped potential BSAL. The Site footprint is relatively small (21.44 ha) and has been located in order to avoid potential environmental and community impacts. Rehabilitation of the Site would be comparable to other currently operational Appin Mine surface facilities.

8. References

BHP Billiton (2009). *Bulli Seam Operations Project Environmental Assessment*.

EMM (2021). *Appin Mine Ventilation and Access Project - Air Quality and Greenhouse Gas Assessment*. J190383 RP5

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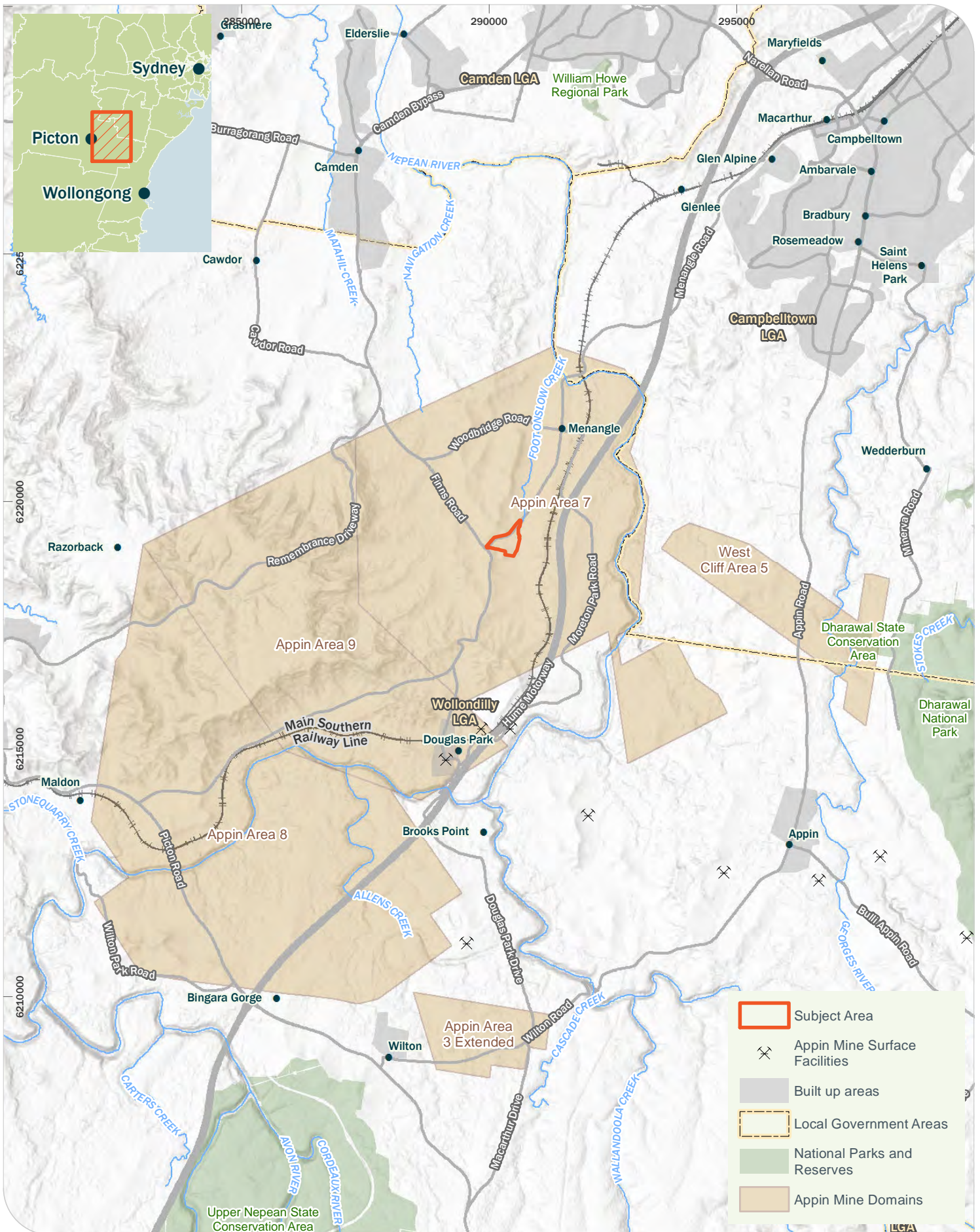
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Niche (2021) *Appin Mine Ventilation and Access Project - Biodiversity Development Assessment Report*

RWDI (2021) *Appin Mine Ventilation and Access Project - Noise and Vibration Impact Assessment*. #2101914

Transport & Urban Planning (2021). *Appin Mine Ventilation and Access Project - Traffic Assessment Report*. Ref. 20087r2

9. Figures

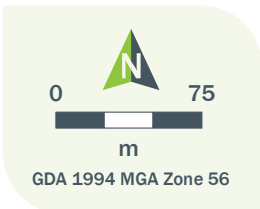
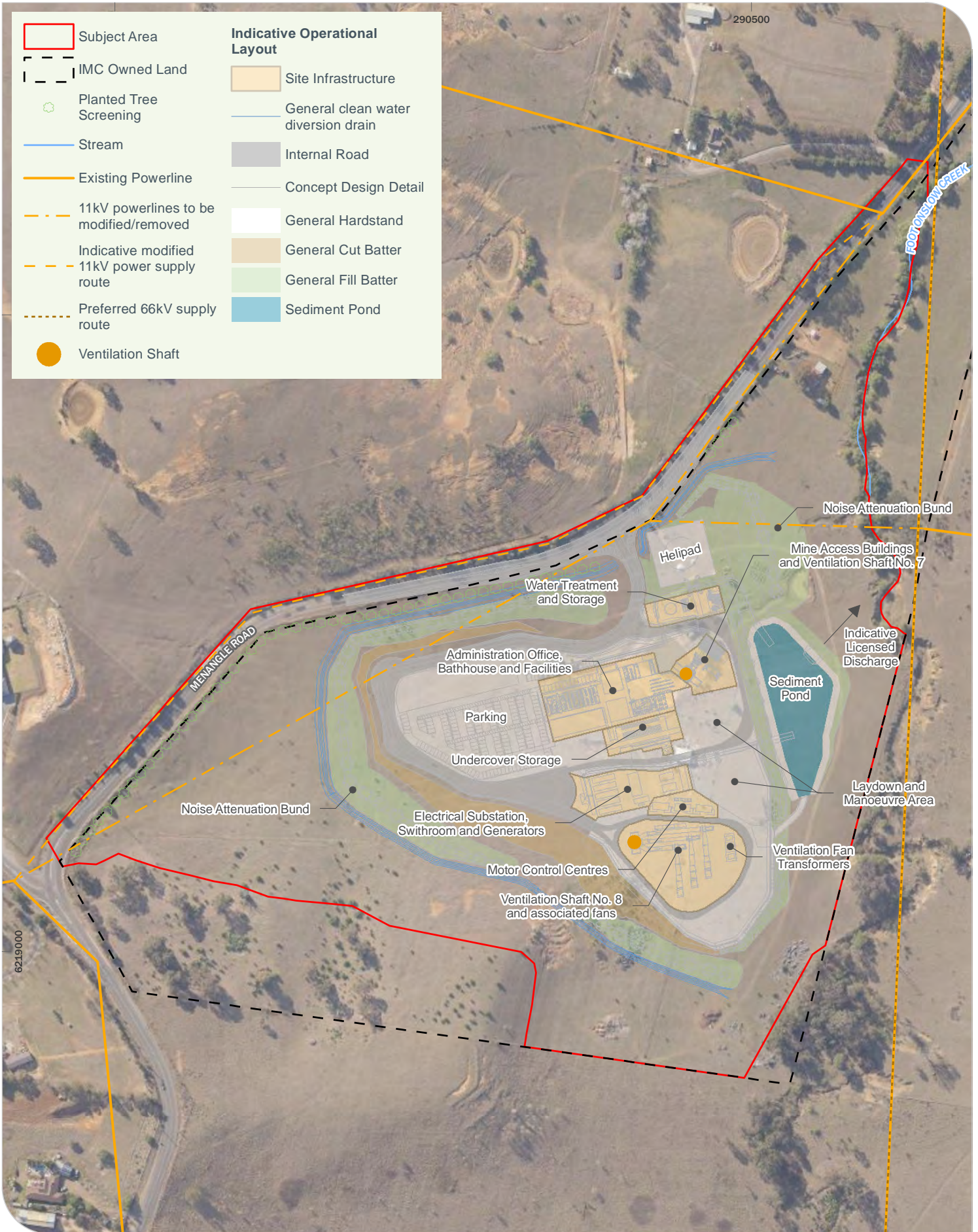


Regional Location
Appin Mine Ventilation and Access Project

Niche PM: Matt Richardson
Niche Proj. #: 5948
Client: South32

Figure 1

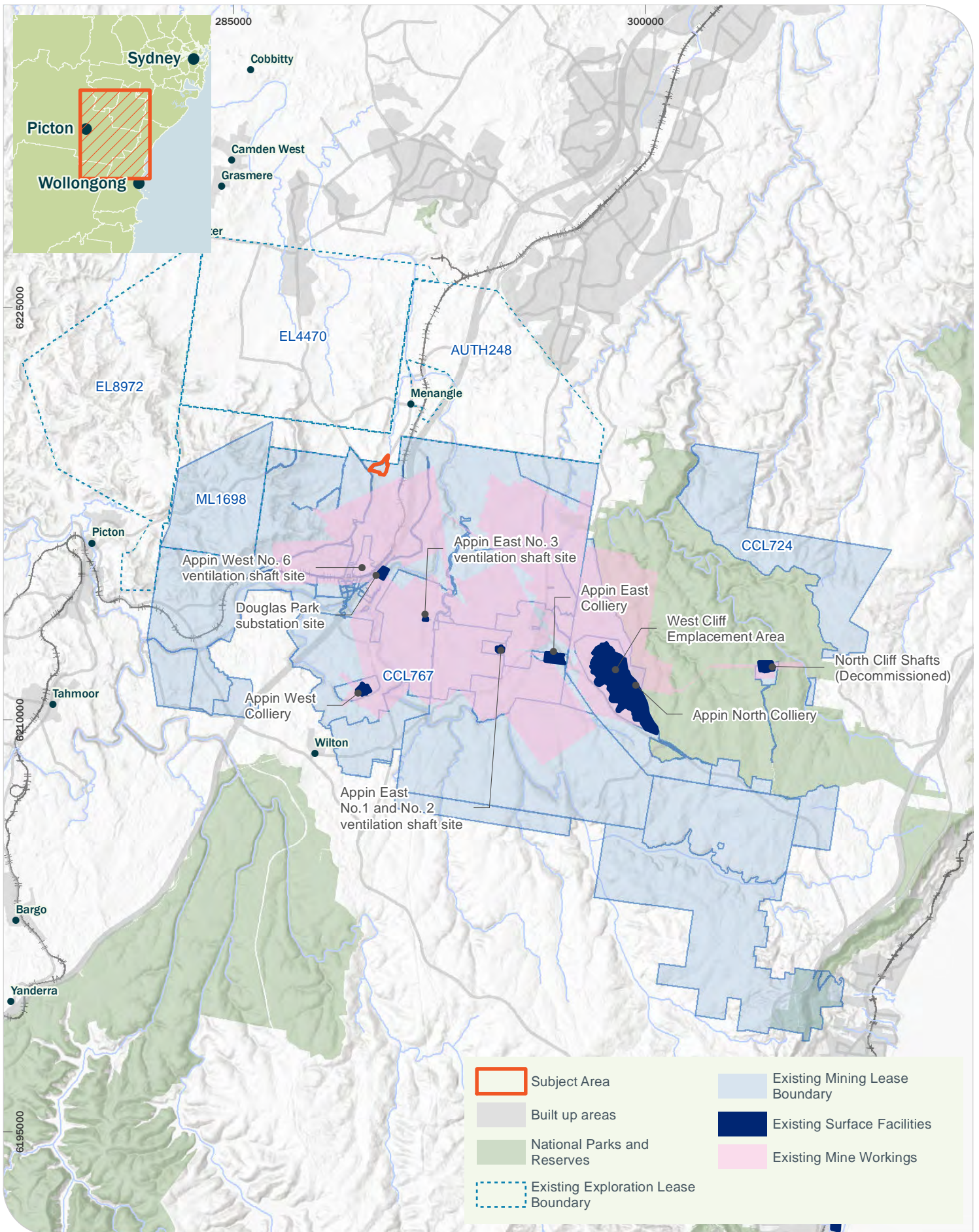
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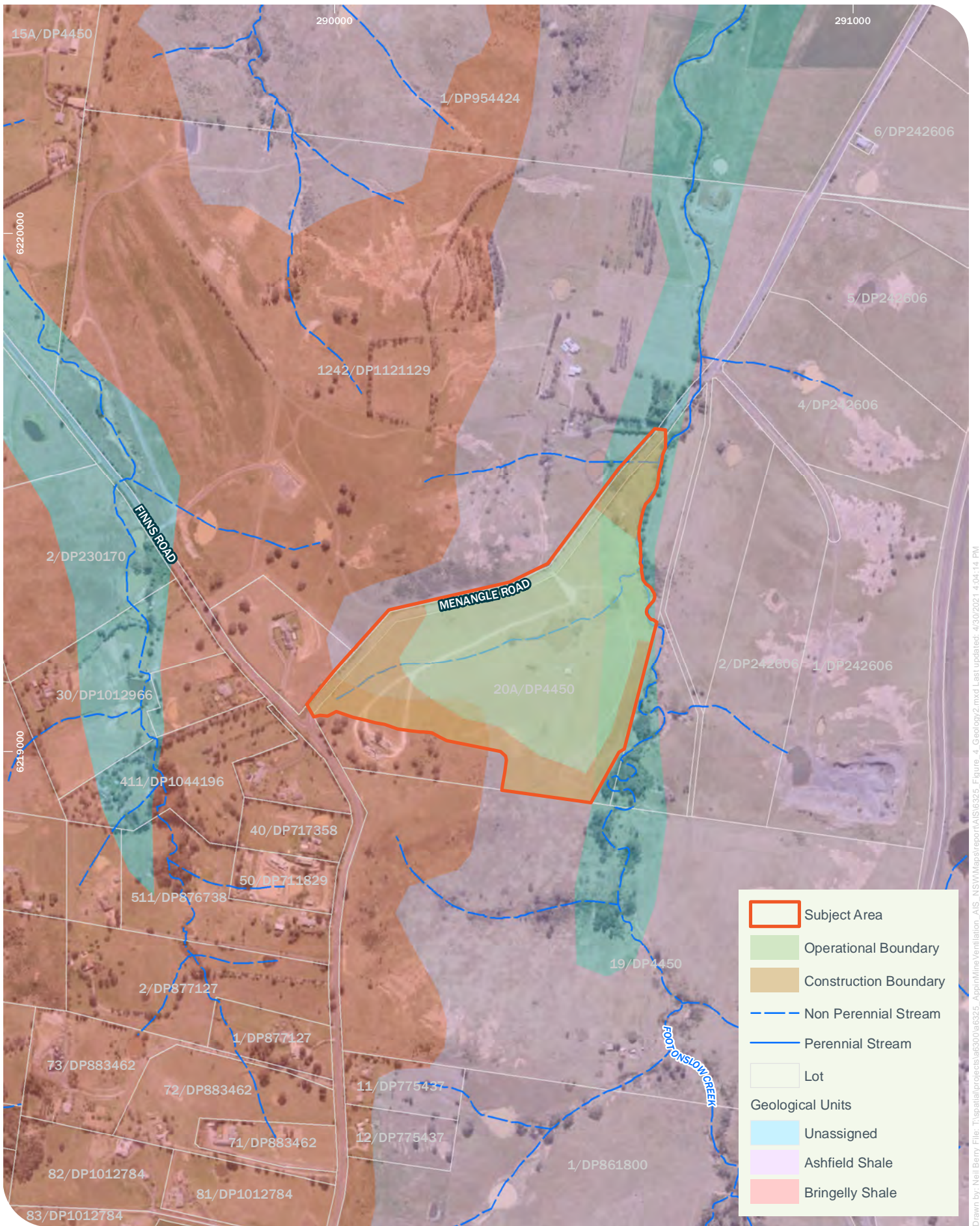


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 Niche Proj. #: 5948
 Client: South32

Subject Area
 Appin Mine Ventilation and Access Project
 Operational Site Layout

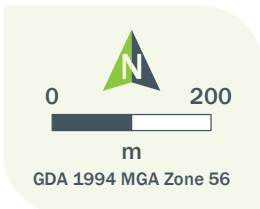
Figure 2





	Subject Area
	Operational Boundary
	Construction Boundary
	Non Perennial Stream
	Perennial Stream
	Lot
Geological Units	
	Unassigned
	Ashfield Shale
	Bringelly Shale

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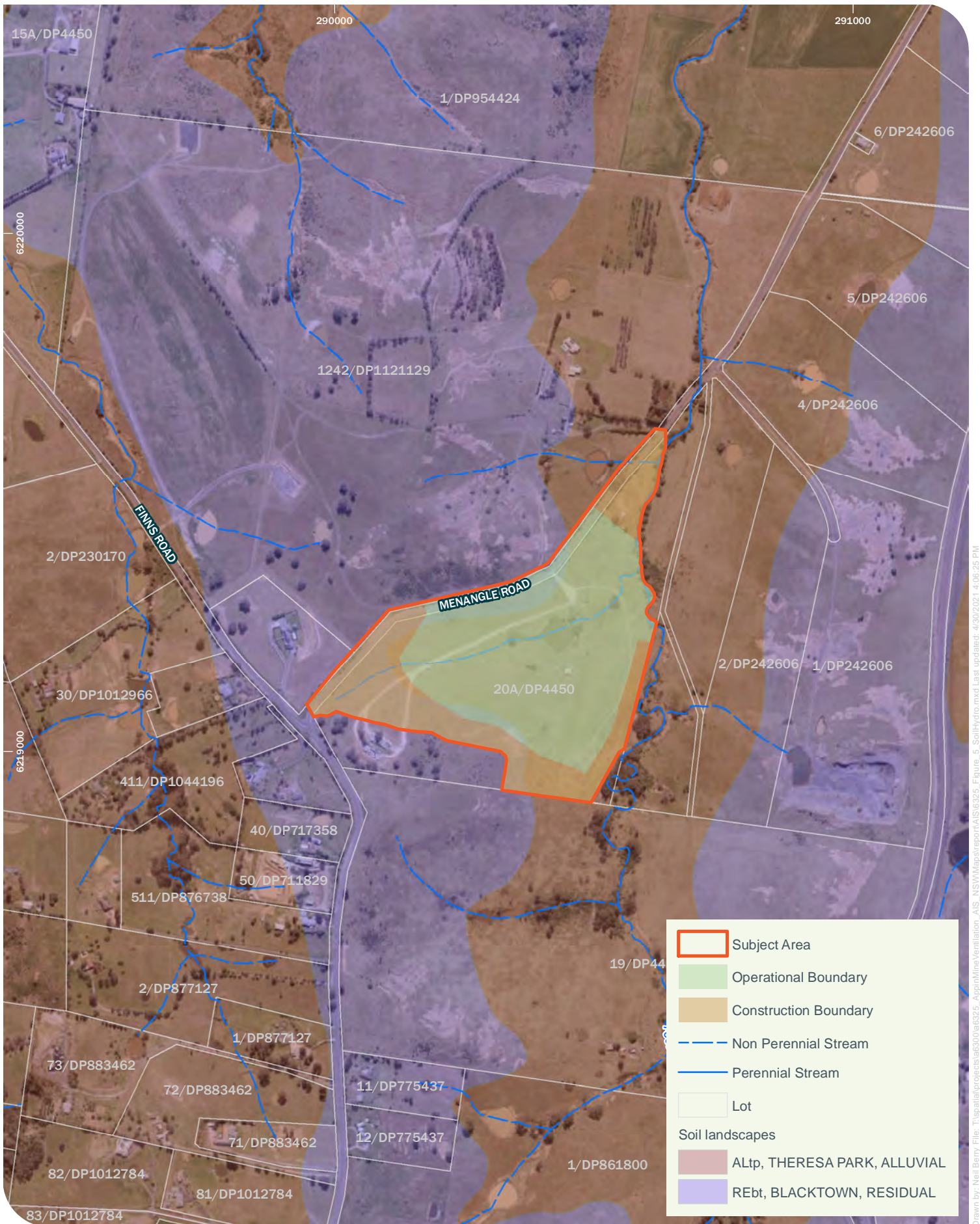


Niche PM: Kai Whitaker
 Niche Proj. #: 6325
 Client: South32 Illawarra Metallurgical Coal

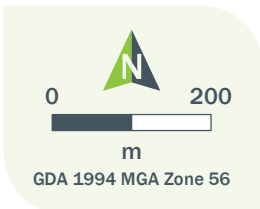
Surface Geology
 Appin Mine Ventilation and Access Project - AIS

Figure 4

Australia latest.



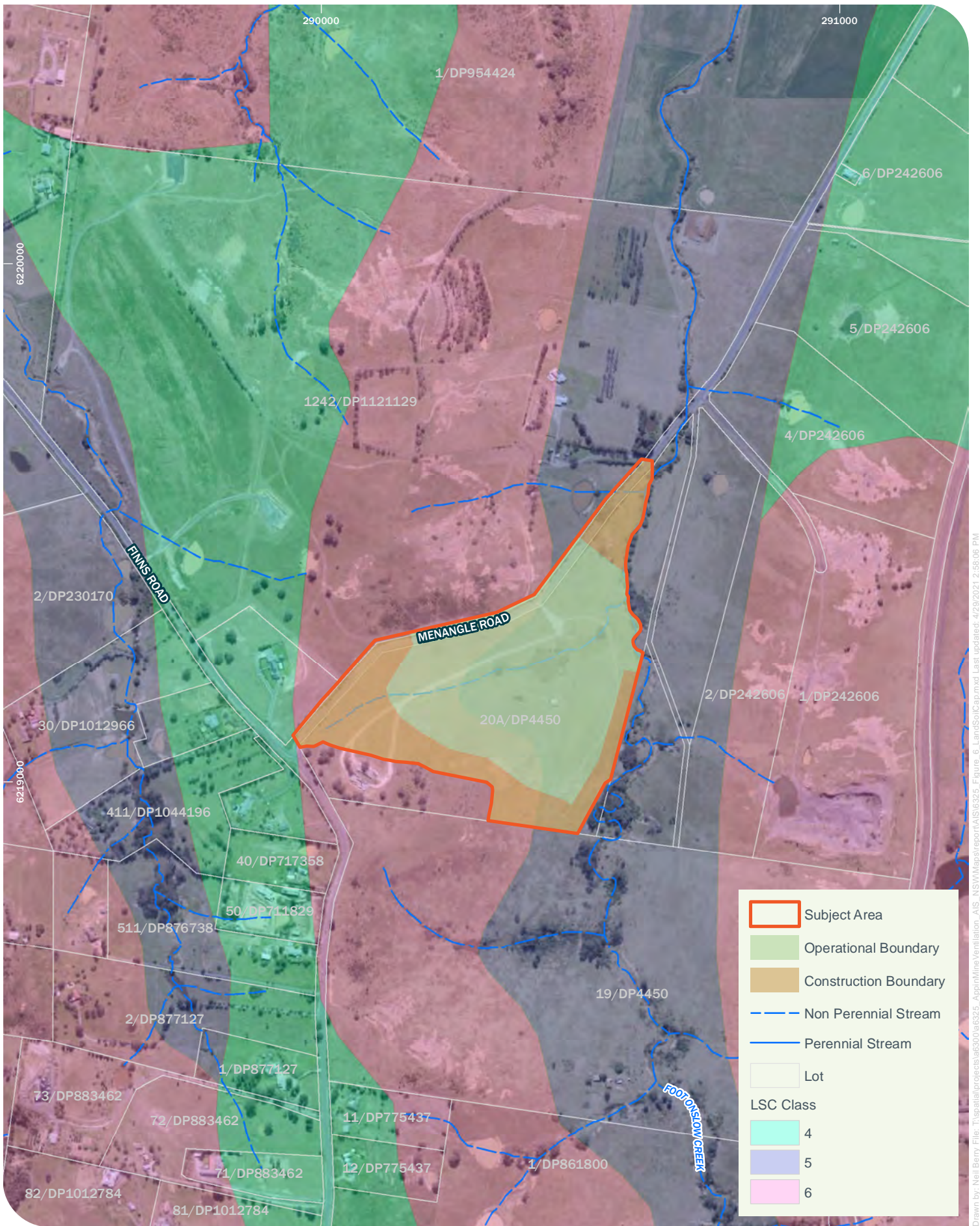
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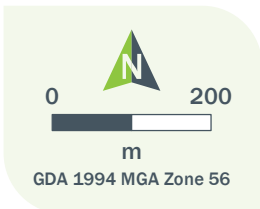
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 Client: South32 Illawarra Metallurgical Coal

Soil landscapes and hydrology
 Appin Mine Ventilation and Access Project - AIS

Figure 5



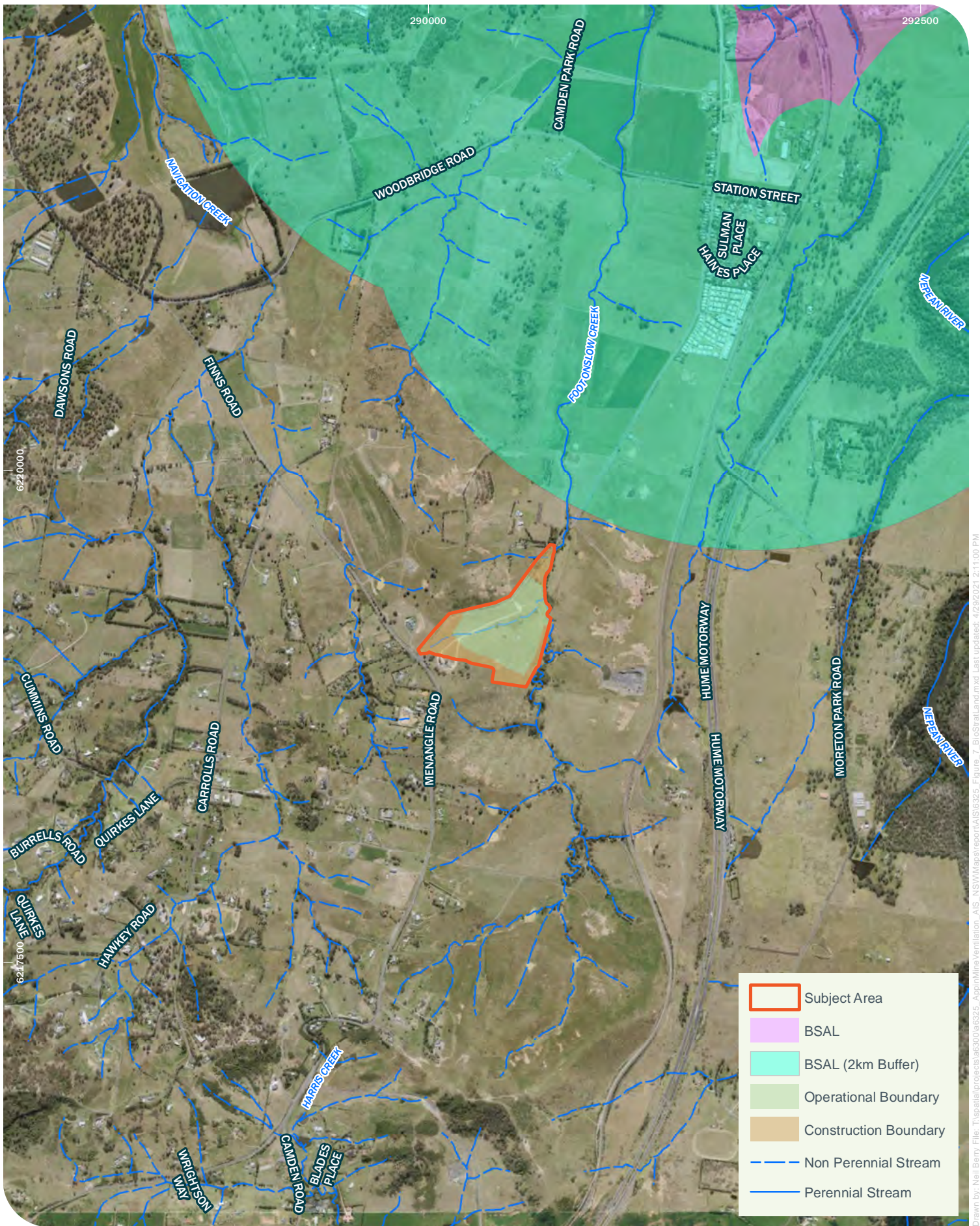
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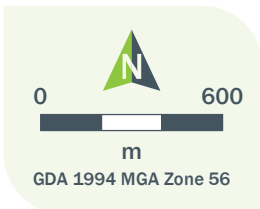
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Land and Soil Capability Class
 Appin Mine Ventilation and Access Project - AIS

Figure 6



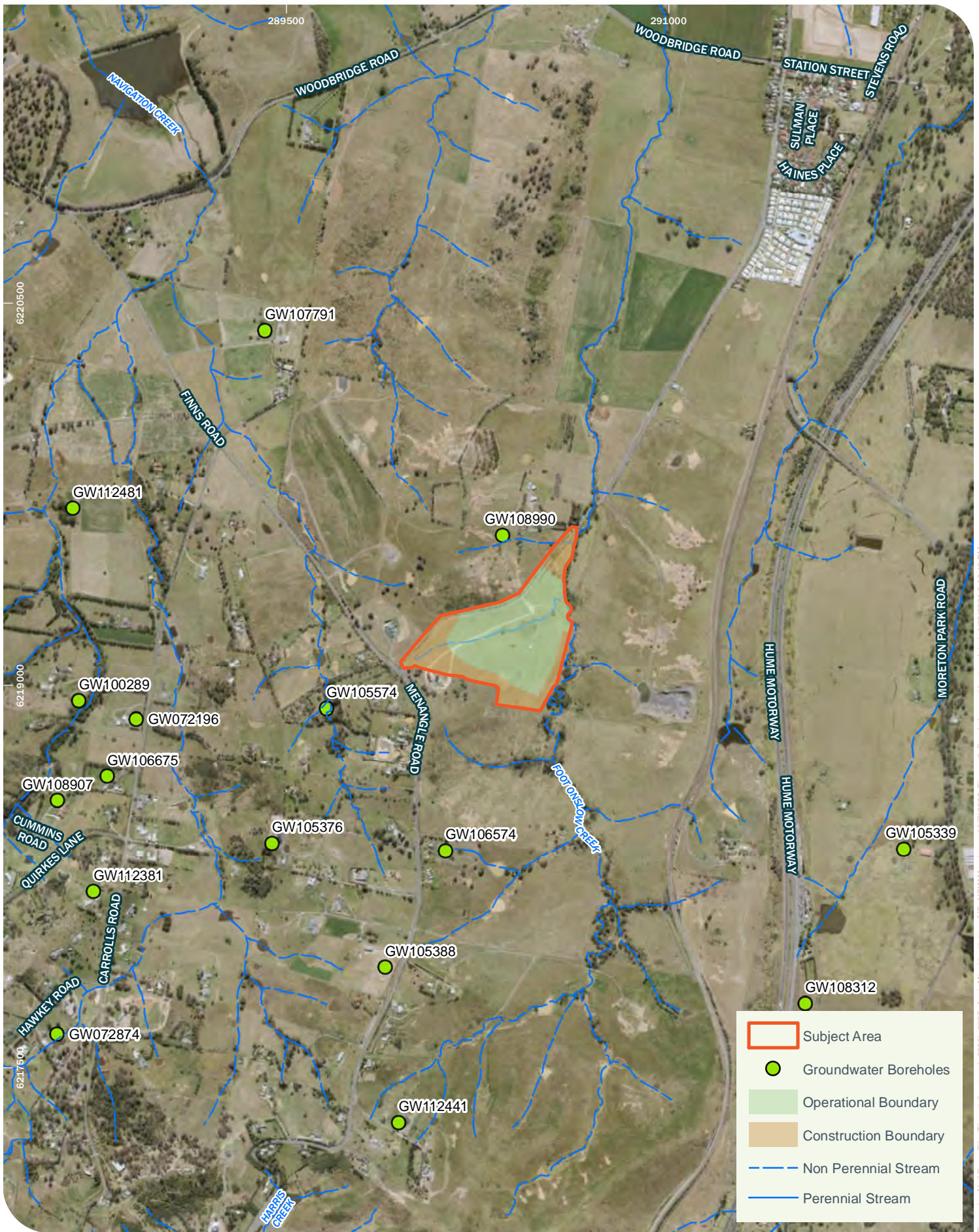
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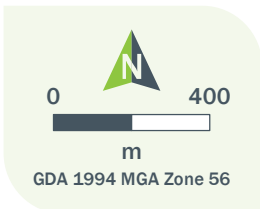
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 Niche Proj. #: 6325
 Client: South32 Illawarra Metallurgical Coal

Biophysical Strategic Land
 Appin Mine Ventilation and Access Project - AIS

Figure 7



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Registered Groundwater Boreholes
Appin Mine Ventilation and Access Project - AIS

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Niche Proj. #: 6325
Client: South32 Illawarra Metallurgical Coal

Figure 8

