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MANGOOLA
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MANGOOLA COAL CONTINUED OPERATIONS PROJECT

Preliminary Environmental Assessment

FINAL

July 2017

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OPEN CUT
GLENCORE

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Preliminary Environmental Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mangoola Coal Operations Pty Ltd

Project Director:	John Merrell
Project Manager:	Daniel Sullivan
Report No.	4004/R03/Final
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umwelt

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	**Date**	**Name**	**Date**
Final	John Merrell	24/07/2017	John Merrell	24/07/2017

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1.0 Introduction

Mangoola Coal Mine is an open cut coal mine located approximately 20 kilometres (km) west of Muswellbrook and 10 km north of Denman in the Upper Hunter Valley of NSW (refer **Figure 1.1**). Mangoola Coal Operations Pty Limited (Mangoola) has operated the Mangoola Coal Mine in accordance with Project Approval (PA) 06_0014 (as modified) since mining commenced at the site in September 2010.

Following exploration within Mangoola's Assessment Lease (AL) 9, Mangoola has identified further coal resources to the north of Wybong Road. Mangoola proposes to seek approval to extract these further coal resources by continuing the existing Mangoola Coal Mine into this area which is located to the immediate north of the existing mine. The Mangoola Coal Continued Operations (MCCO) Project represents approximately seven years of additional mining and would provide access to approximately 45 Million tonnes (Mt) of additional coal resources.

The MCCO Project Area includes the existing approved Project Area for Mangoola Coal Mine and the MCCO Additional Project Area as shown on **Figure 1.1**.

The MCCO Project is State Significant Development (SSD) as defined under *State Environmental Planning Policy* (*State and Regional Development) 2011* and will require development consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The new development consent being sought will replace PA 06_0014 (as modified) and the MCCO Project will operate under the new SSD consent which will cover the existing Approved Project Area and the MCCO Additional Project Area.

1.1 Project Overview

The MCCO Project will allow for the continuation of mining at Mangoola Coal Mine into a new mining area to the immediate north of the existing operations. The MCCO Project will utilise the existing infrastructure, emplacement areas and equipment at Mangoola Coal Mine. The MCCO Project will extend the life of the existing operation providing for ongoing employment opportunities for the existing Mangoola workforce.

The MCCO Project generally comprises:

- open cut mining at up to the same rate as that currently approved (13.5 Million tonnes per annum (Mtpa) of run of mine (ROM) coal) using truck and excavator mining methods
- mining operations in a new mining area located north of the existing Mangoola Coal Mine, Wybong Road, south of Ridgelands Road and east of the 500 kV Electricity Transmission Line (ETL)
- construction of a haul road overpass over Big Flat Creek and Wybong Road to provide access from the existing mine to the proposed Additional Mining Area
- establishment of two out-of-pit overburden emplacement areas including a culvert crossing of Big Flat Creek to provide access to the emplacement area
- distribution of overburden between the proposed Additional Mining Area and the existing mine in order to optimise the final landform design of the integrated operation. The design of the emplacement areas and final landform will be refined throughout the assessment process
- realignment of a portion of Wybong Post Office Road

- the use of all existing or approved infrastructure and equipment for the Mangoola Coal Mine with some minor additions to the existing mobile equipment fleet

- construction of a water management system to manage sediment laden water runoff, divert clean water catchment, provide flood protection from Big Flat Creek and provide for reticulation of mine water. The water management system will be connected to that of the existing mine

- establishment of a final landform in line with current design standards at Mangoola Coal Mine including use of micro-relief and with overburden emplacement heights of up to approximately 240 m RL, consistent with the existing site. A final void will remain in the north-west of the proposed Additional Mining Area. Further integrated mine planning work is being completed to optimise the final landform and void strategy for the integrated operations

- rehabilitation of the proposed Additional Mining Area using the same revegetation techniques as at the existing mine. These existing techniques are recognised as industry leading

- a likely construction workforce of approximately 120 persons. No change to the existing approved operational workforce

- continued use of the mine access for the existing operational mine and access to/from Wybong Road, Wybong Post Office Road or Ridgelands Road to the MCCO Additional Project Area for construction, emergency services and ongoing operational environmental monitoring.

Figure 1.2 illustrates the key features of the MCCO Project.

Integration of the Mangoola Coal Mine operations and the MCCO Project will provide a number of key benefits. These include:

- maximising efficient recovery of the States' coal resources

- providing for ongoing use of the existing Mangoola Coal Mine infrastructure which has an operational life beyond the life of the existing mine

- providing for a fully integrated rehabilitation program and final landform in accordance with leading practice natural landform principles across the existing and proposed open cut mining areas

- utilising the same leading practice environmental management approach and controls as the existing operation

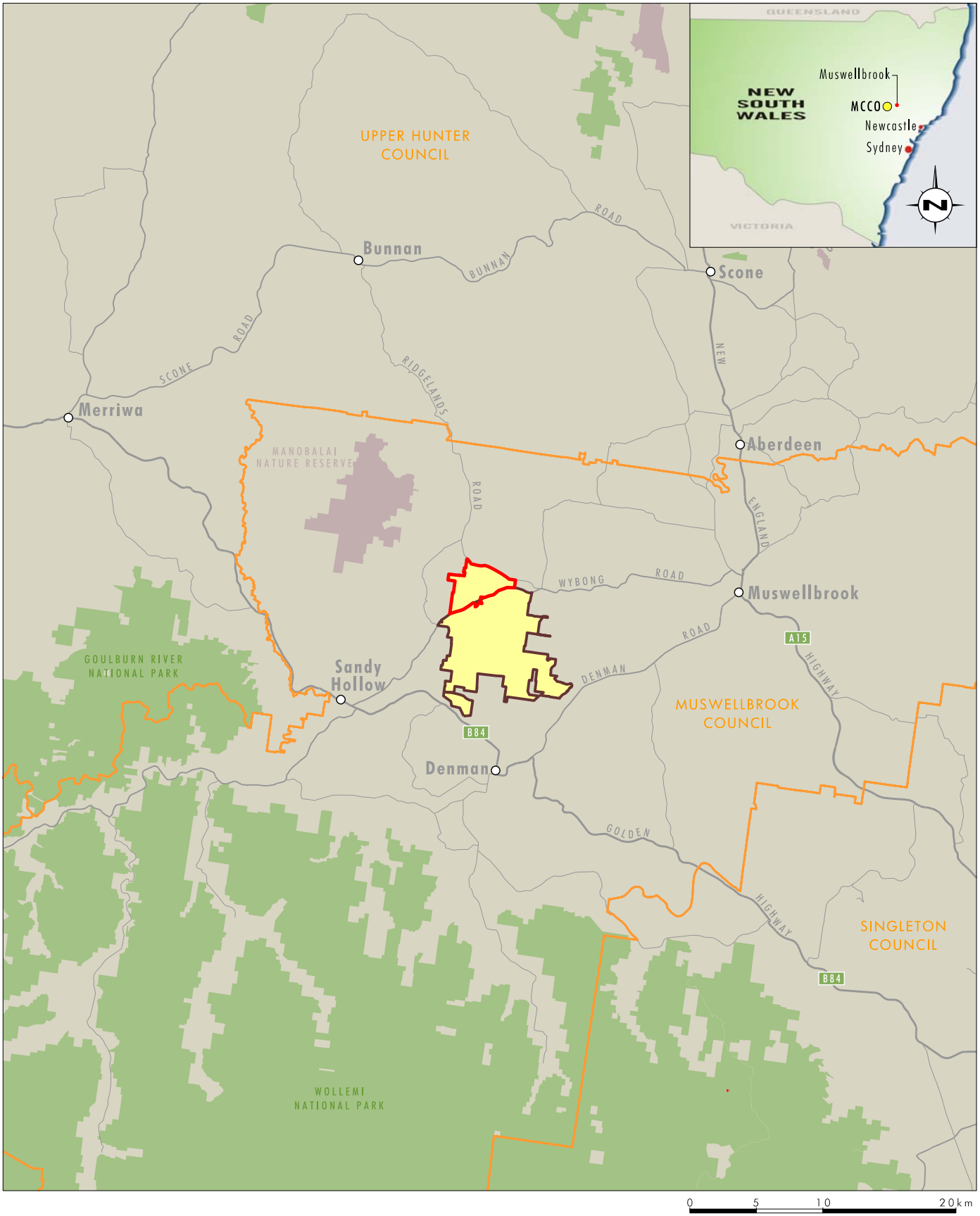
- ongoing employment opportunities for the existing workforce, and

- ongoing provision of the economic benefits of the existing operations.

Further detail about the MCCO Project is contained in **Section 3.0**.

1.2 The Proponent

The proponent for the MCCO Project is Mangoola Coal Operations Pty Ltd which is a subsidiary of Glencore PLC.



Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Project Area
- Local Government Area

FIGURE 1.1

Regional Locality Plan

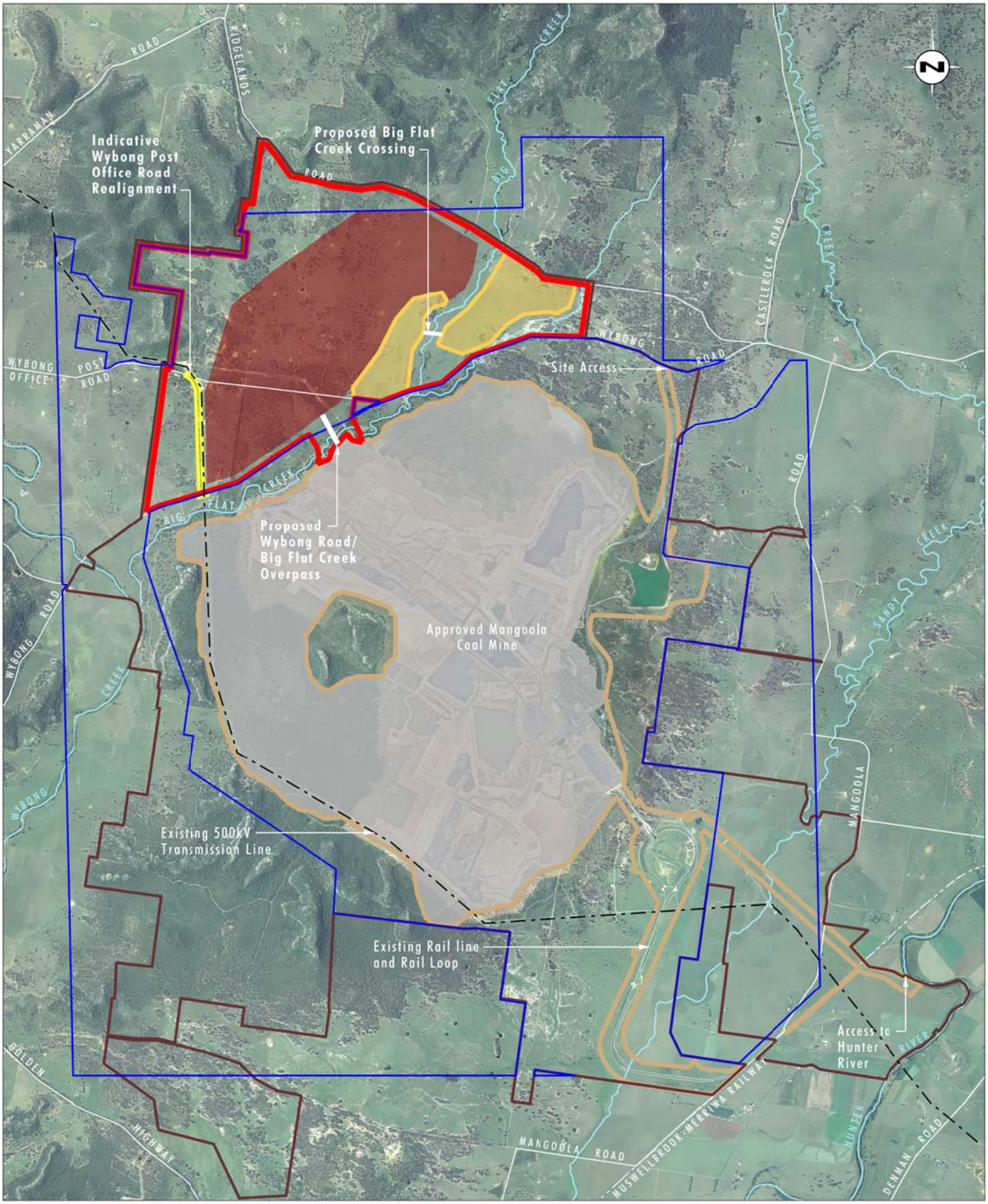


Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)

0 1.0 2.0 3.0km
1:60 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9 Boundary
- 500kV Transmission Line
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Indicative Wybong Post Office Road Realignment

FIGURE 1.2

Proposed Mangoola Coal Continued Operations Project

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20170721 14.44

1.3 Purpose of the Document

This Preliminary Environmental Assessment (PEA) has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Mangoola in order to brief relevant government agencies, the community and other stakeholders about the proposed Project. This PEA is provided to accompany Mangoola's request for the Secretary's Environmental Assessment Requirements (SEARs) as required for SSD in accordance with Division 4.1 of Part 4 of the EP&A Act.

This PEA provides an overview of the MCCO Project and identifies the key issues and planned approach for the environmental and social assessments to be undertaken as part of the Environmental Impact Statement (EIS) for the Project.

2.0 Existing Operations

2.1 Existing Mangoola Coal Operations

Mangoola Coal Mine commenced mining activities in September 2010 and currently operates under PA 06_0014 (as modified) to produce predominately thermal coal at a maximum rate of 13.5 Mtpa ROM coal. This coal is provided to the Australian domestic market and the export market. The Mine is approved to operate until November 2029. Product coal is transported from Mangoola Coal Mine by rail, with an approved rail capacity of up to 10 trains per day.

Truck and excavator methods are used to move overburden material and excavate ROM coal for transport to the Coal Handling and Preparation Plant (CHPP) for processing. Overburden is fractured using typical open cut drill and blast processes. ROM coal is crushed and washed within the CHPP and conveyed to trains via the approved train loading facility.

Mangoola Coal Mine operates 24 hours a day, seven days per week and is serviced by site infrastructure facilities which include an administration office, workshop and warehouses, bathhouse, CHPP, rail loadout facilities, conveyors and other ancillary facilities.

The existing Mangoola Coal Mine operations are shown in **Figure 2.1**.

Mangoola holds Mining Lease (ML) 1626 and ML 1747 for the existing approved mining operations and also currently hold AL9 and Exploration Lease (EL) 5552 as shown on **Figure 2.2**.

2.1.1 Existing Development Approvals

PA 06_0014 has been modified on eight occasions. The approvals history for Mangoola Coal Mine is presented in **Table 2.1** below.

Table 2.1 Approval History for Mangoola Coal Mine

Reference	Title	Details	Approval Granted	Expiry
06_0014	Project Approval	Initial approval of Mangoola (formerly Anvil Hill) Coal Project	07/06/2007	20/11/2029
06_0014 MOD 1	Minor Modification to Project Approval ("Early Works")	Altered timing of early construction works to align with agreed Wybong Road upgrades and provision of temporary site access in lieu of appropriate access via Bengalla Link Road at this time	22/07/2008	20/11/2029
06_0014 MOD 2	Modification to Project Approval ("Pipeline Modification")	Relocation of the approved Hunter River water supply pipeline and associated infrastructure	26/06/2009	20/11/2029

Reference	Title	Details	Approval Granted	Expiry
06_0014 MOD 3	Modification to Project Approval ("Mining Infrastructure Area and CHPP")	Relocation of Mining Infrastructure Area and reconfiguration of CHPP design within the approved mine disturbance boundary	04/11/2009	20/11/2029
06_0014 MOD 4	Modification to Project Approval ("500 kV Powerline relocation and Mining Area")	Relocation of 500 kV ETL to the western boundary of approved Project Disturbance Area to provide improved operational efficiencies and maximise resource recovery	22/06/2012	20/11/2029
06_0014 MOD 5	Modification to Project Approval ("Night Time Works")	Permitting Hunter River Pipeline installation works to occur during a single night time period in order to safely pass underneath the Mangoola-Ulan Rail line without train interactions	23/02/2010	20/11/2029
06_0014 MOD 6	Modification to Project Approval ("Extraction Rate Increase")	Increase in ROM Coal extraction rate for improved operational efficiency	28/04/2014	20/11/2029
06_0014 MOD 7	Modification to Project Approval ("Removal of Traffic Noise Criteria")	Removal of duplicated road traffic noise management conditions	22/08/2016	20/11/2029
06_0014 MOD 8	Modification to Project Approval ("Amendment of Mine Layout Plan")	Replace the Project layout plan to reflect a revised agreement with TransGrid	14/06/2017	20/11/2029

Table 2.2 identifies the key mining titles held by Mangoola Coal Mine.

Table 2.2 Mining Titles

Reference	Title	Granted	Expiry
ML 1626	Mining Lease	20/11/2008	20/11/2029
ML1747	Mining Lease (Mining Purposes)	24/008/2016	05/12/2037
EL5552	Exploration Lease 5552	08/05/2006	07/11/2019
AL 9	Assessment Lease 9	08/11/2004	07/11/2019

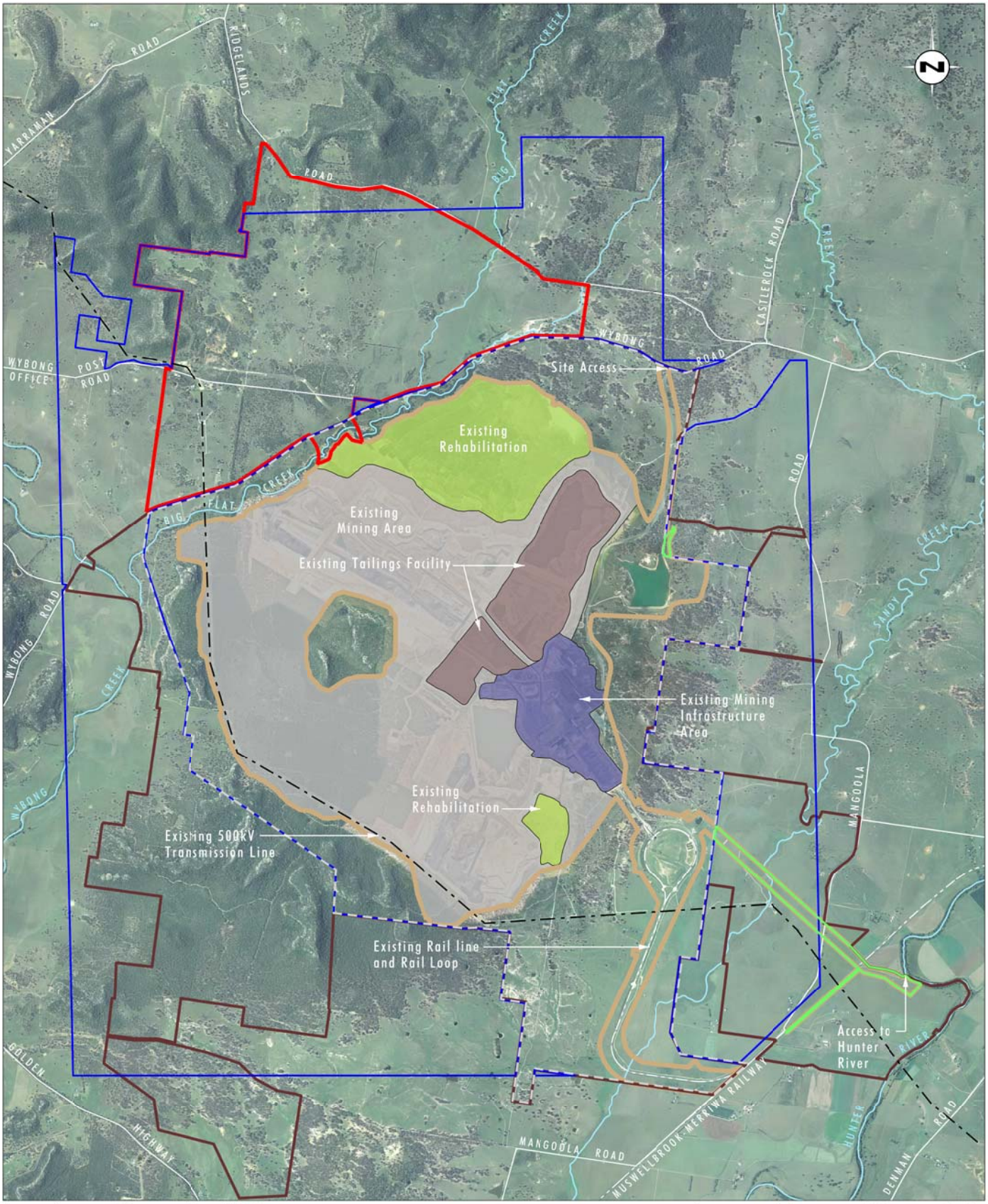


Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)

0 1.0 2.0 3.0km
1:60 000

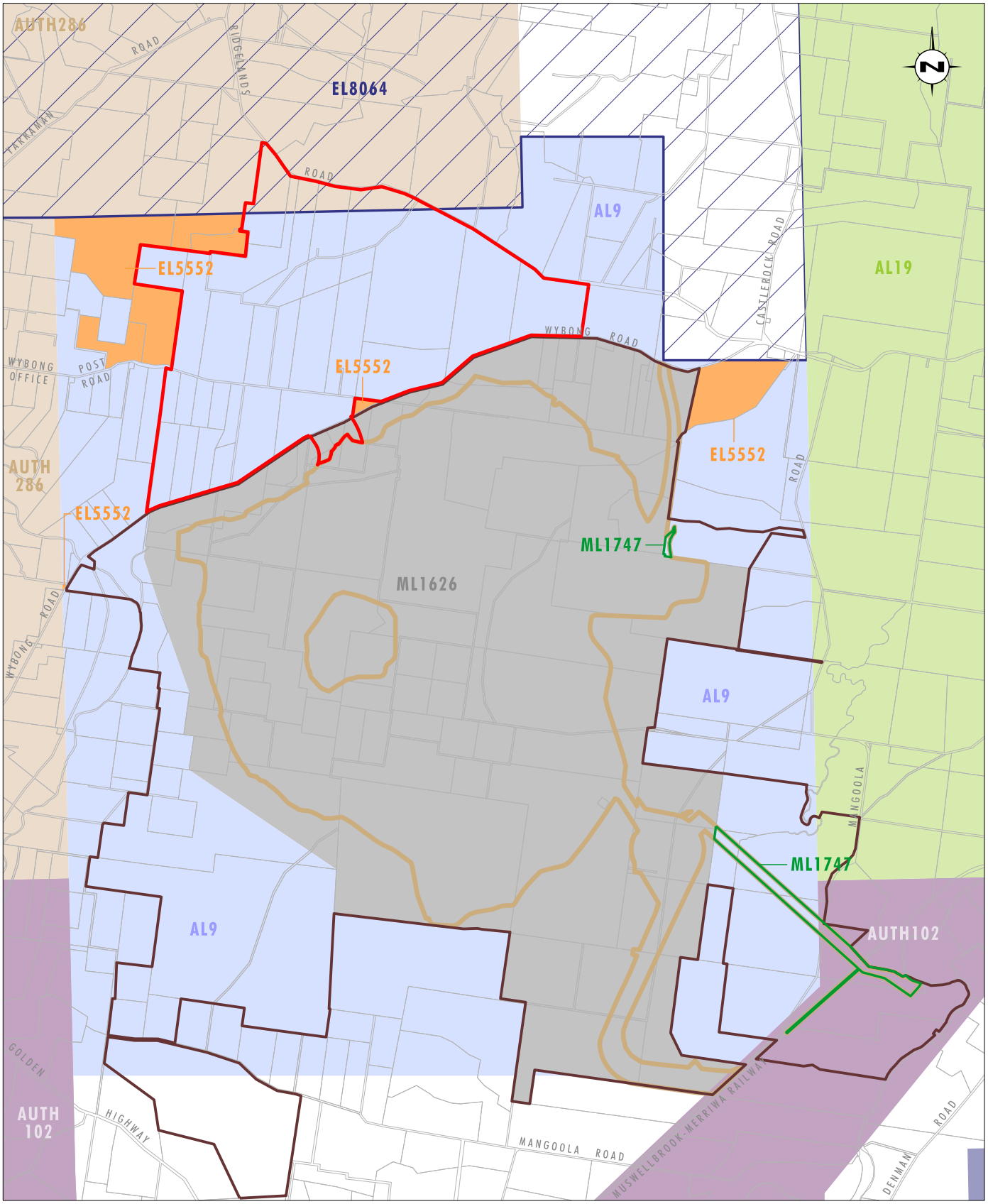
Legend

- MCCO Additional Project Area
- Approved Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9 Boundary
- ML1626
- ML1747
- 500kV Transmission Line

FIGURE 2.1

Existing Mangoola Coal Mine

File Name (A4): R03/4004_025.dgn
20170721 14.48



Data Source: Mangoola Coal (2017), NSW Department of Industry (July 2017)

Legend

- MCCO Additional Project Area
- Approved Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9
- ML1626
- ML1747
- EL5552
- AL19
- AUTH286
- AUTH102
- EL8064

FIGURE 2.2

Existing Mining and Exploration Lease Titles

File Name (A4): R03/4004_024.dgn
20170721 14.52

Mangoola Coal Mine also holds an Environment Protection Licence (EPL 12894) and a number of water licences issued under the *Water Management Act 2000*.

2.1.2 Existing Environmental Management and Monitoring

Operations at the Mangoola Coal Mine are undertaken in accordance with an environmental management system (EMS) including a number of approved Environmental Management Plans. These documents were developed to address key environmental issues relevant to the operations and are based on a number of aspects including previous Environmental Assessments, Project Approval and Environmental Protection Licence (EPL) conditions, previous environmental performance, community concerns and other company requirements. The individual environmental management plans and monitoring programs for the Mangoola Coal Mine are consolidated into an Environmental Management Strategy. All of which are available on the Mangoola website (http://www.mangoolamine.com.au).

This existing EMS has been refined over the life of the operation to continually improve the environmental and social performance of the Mine. The existing EMS will continue to be applied to the MCCO Project.

Noise, blast, dust, meteorological, surface water and groundwater monitoring is undertaken for the Mangoola Coal Mine at the monitoring locations shown in **Figure 2.3**. There are also a number of regional monitoring sites that form part of the monitoring network that are outside of the frame of this figure. A detailed rehabilitation monitoring program and flora and fauna monitoring program is also in place, which is shown on **Figure 2.3**. **Table 2.3** provides a summary of the environmental monitoring network at Mangoola Coal Mine.

As part of its EMS, Mangoola conducts environmental monitoring and auditing on a regular basis to gauge performance, monitor compliance with regulatory requirements, and to minimise impacts on the surrounding community and the environment. Routine review and reporting of environmental performance is provided in both the PA 06_0014 Annual Review and the Annual Return prepared for the EPL. The Annual Review is available to the public through the Mangoola website.

The existing environmental monitoring network will be reviewed and updated for the MCCO Project subject to the outcomes of specialist studies undertaken during EIS development.

Table 2.3 Environmental Monitoring Network Overview

Environmental Aspect	Monitoring Scope
Noise	Attended (compliance monitoring), and un-attended continuous (for pro-active and reactive management purposes) monitoring at locations representing nearest private receptors surrounding Mangoola Coal
Blasting	Nearest private receptors on privately owned land, significant heritage structures (as required), and significant infrastructure (as required) both on and surrounding Mangoola Coal
Air Quality	Continuous monitoring of PM_{10} using TEOM and E-samplers. Measurement of PM_{10}, TSP and $PM_{2.5}$ using High Volume Air Samplers and Dust Deposition gauges

Environmental Aspect	Monitoring Scope
Meteorological	Two meteorological Stations positioned on opposite sides of Mangoola Coal Mine in line with prevailing seasonal wind directions
Surface Water	Routine and high rainfall triggered water quality and flow monitoring undertaken at creeks, streams and rivers in the region surrounding Mangoola Coal
Groundwater	Water level and a variety of water quality parameters are monitored in shallow and deep alluvium and colluvium deposits, coal measures and other non-coal strata using an assortment of vibrating wire piezometers, groundwater boreholes and wells
Ecological	Routine monitoring of flora and fauna in rehabilitation and offset areas

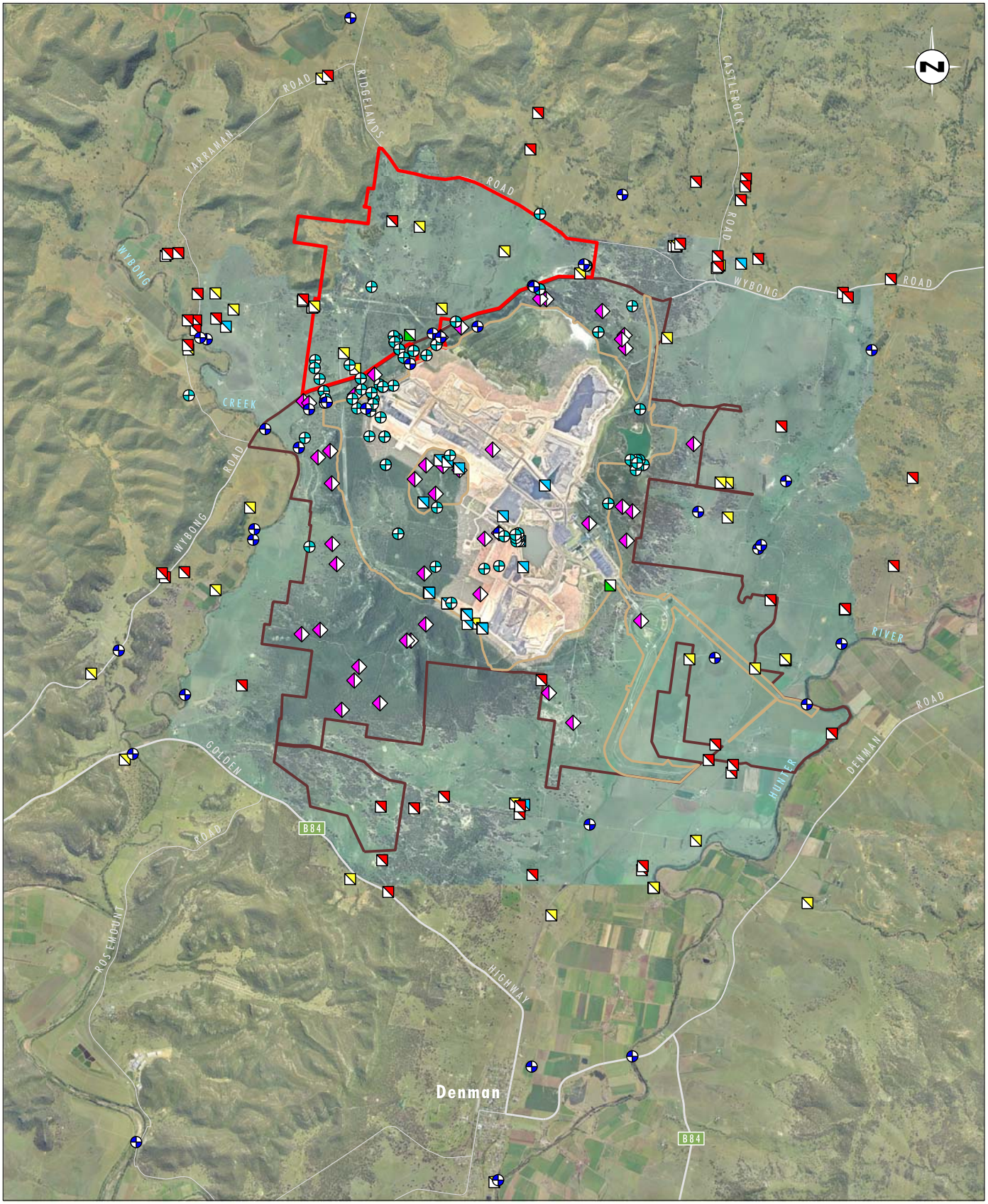


Image Source: Glencore (Apr 2017)

0 1 2 4 km
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Legend

- MCCO Additional Project Area
- Approved Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Air Quality Location
- Biodiversity Location
- Blasting Location
- Groundwater Location
- MET Station Location
- Noise Location
- Surface Water Location

FIGURE 2.3

Existing Monitoring Network

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3.0 Proposed Project

3.1 Key Design Considerations

Mangoola has undertaken exploration within AL 9, north of Wybong Road, to identify the economic potential of future open cut coal mining in this area. The MCCO Project, as proposed is a continuation of the existing Mangoola Coal Mine into a new mining area immediately north of the existing operation. The Project has been designed to maximise resource recovery and operational efficiencies between the MCCO Additional Project Area and existing Mangoola Coal Mine operations whilst aiming to minimise environmental and social impacts.

The MCCO Project Area includes the existing approved Project Area for Mangoola Coal Mine and the MCCO Additional Project Area as shown on **Figure 1.1**.

The MCCO Project will extract coal from the same coal measures as the existing Mangoola Coal Mine operation. A number of alternative options have been considered by Mangoola in planning the MCCO Project, including options that involved conducting mining over a larger area and mining deeper seams. Relevant considerations that have influenced the mine plan design include local geology, the proximity of natural features (e.g. steep topography and Big Flat Creek), Wybong Road, Ridgelands Road, the existing 500kV ETL and a neighbouring mining Exploration Lease (EL) that borders AL 9 to the north.

The MCCO Project provides an opportunity to efficiently integrate the mining of the proposed Additional Mining Area with the existing Mangoola Coal Mine operations and proposes to utilise the approved capacity within the existing Mangoola CHPP and train loading facilities. Further, the proposed haul road overpass for Big Flat Creek and Wybong Road allows the creek to remain and minimises disruption to traffic on Wybong Road.

The haul road that will connect the two operational areas will allow for the distribution of overburden between the proposed Additional Mining Area and the existing mine allowing for optimisation of the final landform across the two mining areas. As an integrated mining operation, there is adequate capacity within existing emplacement areas for tailings disposal while additional available overburden will provide flexibility in the conceptual final landform design.

The same leading practice environmental management approach and controls used at the existing operation will continue to apply to the MCCO Project. This includes integrated mine design and management to minimise dust and noise, manage water, and implementation of the same industry leading rehabilitation techniques as at the existing mine. As part of implementing the MCCO Project, Mangoola Coal will continue to manage and respond to issues or community concerns that arise as it does for the existing operations.

3.2 Key Project Details

The key components of the MCCO Project are shown on **Figure 1.2** and a summary of the key project details are provided in **Table 3-1**. A more detailed description of the MCCO Project is provided in the following sections.

Table 3.1 Summary of Key Project Details

Key Project Components / Aspects	Currently Approved	Proposed
Total Economically Recoverable Reserve	Approximately 150 Mt of ROM coal	Approximately 45 Mt of additional ROM coal
Extraction Rates	Up to 13.5 million tonnes per annum (Mtpa) ROM coal	No change
Life-of-Mine	Approximately 21 years from granting of Mining Lease 1626 (Nov 2029) approval	Approximately 7 years of mining in additional resource
Operating Hours	24 hours per day, 7 days per week	No change
Operational Employees	Up to approximately 540 total Full Time Equivalent operational personnel	No change
Construction Employees	200 associated with initial construction works, now complete	Construction workforce of up to approximately 120 persons
Mining Methods	Open cut mining method using truck and excavator fleet	No change
Extent of Mining Areas	Refer to **Figure 1.2** which shows existing Approved Mangoola Coal Mine Disturbance Area	Refer to **Figure 1.2** which shows proposed Additional Mining Area
Infrastructure	Mangoola owned and operated infrastructure includes a Coal handling preparation plant (CHPP), reclaim and train loading facilities, administration offices, workshop, amenities buildings, pipelines and power systems	Continued use of existing infrastructure within the existing approved capacities Construction of a haul road overpass over Wybong Road and Big Flat Creek to enable direct connectivity to the existing operation maintaining traffic flow on Wybong Road and construction of a culvert crossing of Big Flat Creek

Key Project Components / Aspects	Currently Approved	Proposed
Tailings and Rejects Strategy	Coarse rejects from coal preparation transported by truck to the open cut overburden areas for emplacement and subsequent covering by overburden material Tailings emplaced in tailings dams	Continued use of existing infrastructure for the life of the MCCO Project and ongoing use of mining areas for emplacement
External Coal Transport	Product coal transported off site via rail from the Mangoola train loading facility at up to 10 trains per day	Continued use of infrastructure within approved capacity
Roads	Mine site access via Wybong Road	Realignment of a section of Wybong Post Office Road in consultation with relevant stakeholders Continued use of existing mine access for operations Access to/from Wybong Road, Wybong Post Office Road or Ridgelands Road to the MCCO Additional Project Area. This may be required for access, construction, emergency services and ongoing operational environmental monitoring
Power Infrastructure	Several 11kV power lines currently service Mangoola owned properties outside of existing mining areas	Several 11kV power lines will require relocation to outside of proposed MCCO Additional Mining Area
Water Management	A network of mine water management controls including dams and pipelines	Construction of additional clean water, sediment laden water and mine water management infrastructure that will be connected to and supplement existing water management infrastructure

3.3 Tenements and Resource Description

Mangoola currently holds mining tenements covering the existing operations, the MCCO Additional Project Area and surrounding lands. These tenements include Mining Lease (ML) 1626, ML 1747, AL 9 and EL 5552 and are illustrated on **Figure 2.2**. The proposed Additional Mining Area and proposed Emplacement Areas are located entirely within AL 9.

Exploration Lease (EL 8064), which is currently held by Ridgelands Coal is located to the immediate north of AL 9 (see **Figure 2.2**). The MCCO Additional Project Area includes a small parcel of Mangoola owned land outside of the AL 9 boundary, which is within EL 8064. This area will require an application for a mining lease for ancillary mining activities only, for the construction of clean water diversion drains. As holders of the adjacent Exploration Lease, Mangoola will continue to undertake consultation with Ridgelands Coal in this regard.

In order of increasing depth, the key target seams for the MCCO Project, which lie within the Newcastle coal measures, include:

- Wallarah seam
- Great Northern seam
- Fassifern seam, and
- Upper Pilot seams.

The coal seams gently dip to the north-west and south-west at about 2 degrees below horizontal, reaching a maximum depth to the floor of the lowest seam of approximately 90 metres.

Figure 3.1 shows the typical stratigraphy within the MCCO Additional Project Area.

The definition of the coal resource within the MCCO Additional Project Area is currently being refined based upon ongoing exploration and geological modelling.

3.4 Conceptual Mine Plan

The MCCO Project is seeking approval to extend the life of Mangoola Coal Mine through the integration of mining within the proposed Additional Mining Area to the north of the existing approved operations (refer to **Figure 1.2**).

The MCCO Project will operate within the currently approved maximum extraction rate for Mangoola Coal Mine of 13.5 Mtpa ROM coal, using truck and excavator methods as currently utilised at the existing mine. The additional resource will take approximately seven years to mine.

Conceptual stage plans for the MCCO Additional Project Area are shown in **Figures 3.2** to **3.4**. While these conceptual plans present the possible extent and footprint requirements of the MCCO Project it should be noted that Mangoola will continue to examine and assess the Project mine plan throughout the environmental impact assessment process. The aim of this ongoing review will be to refine and confirm the extent of the proposed mining and emplacement areas and optimise the final landform for the integrated operations.

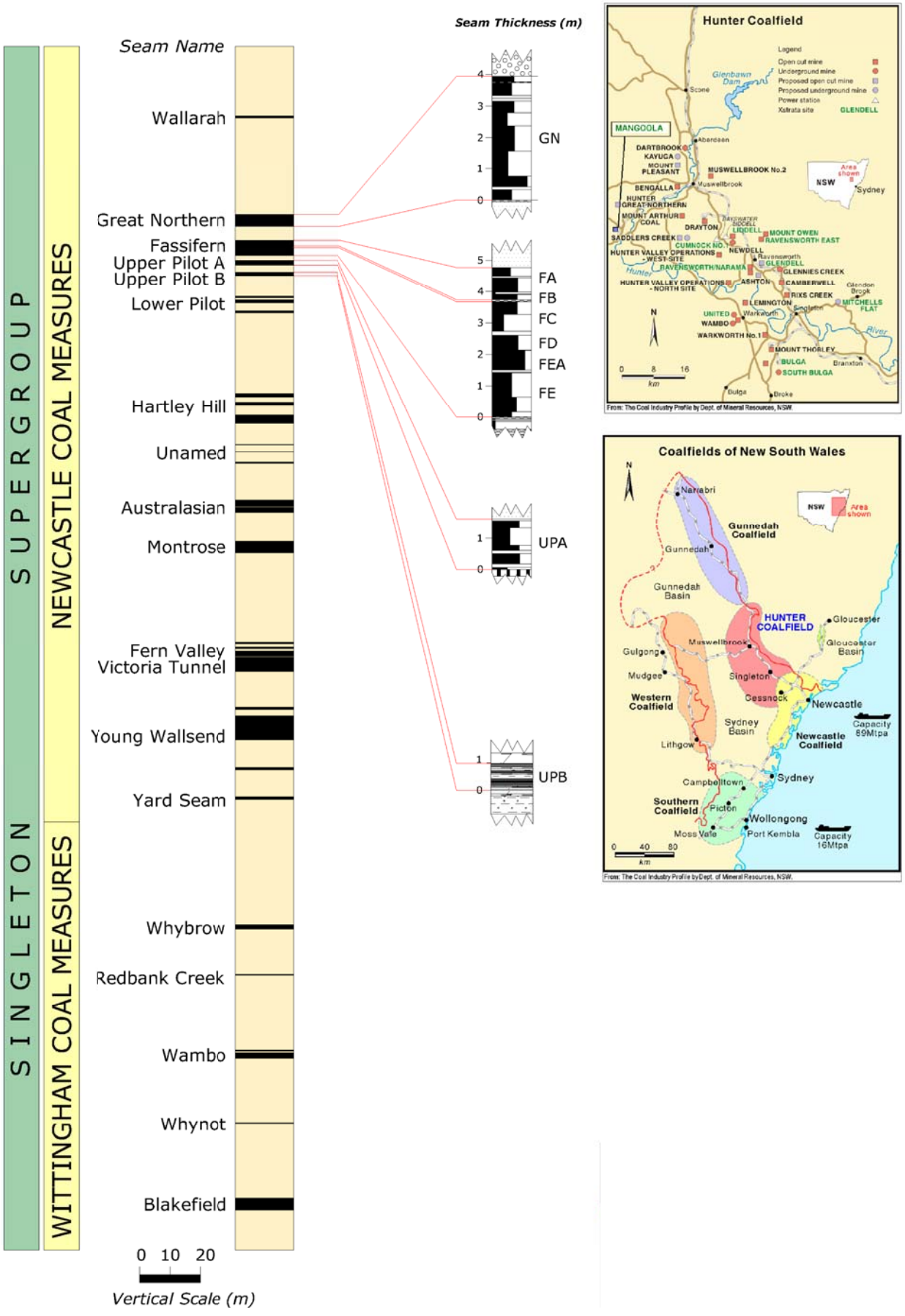

FIGURE 3.1

Typical Stratigraphic Section and Strata Entitlements

Image Source: Glencore (2015)

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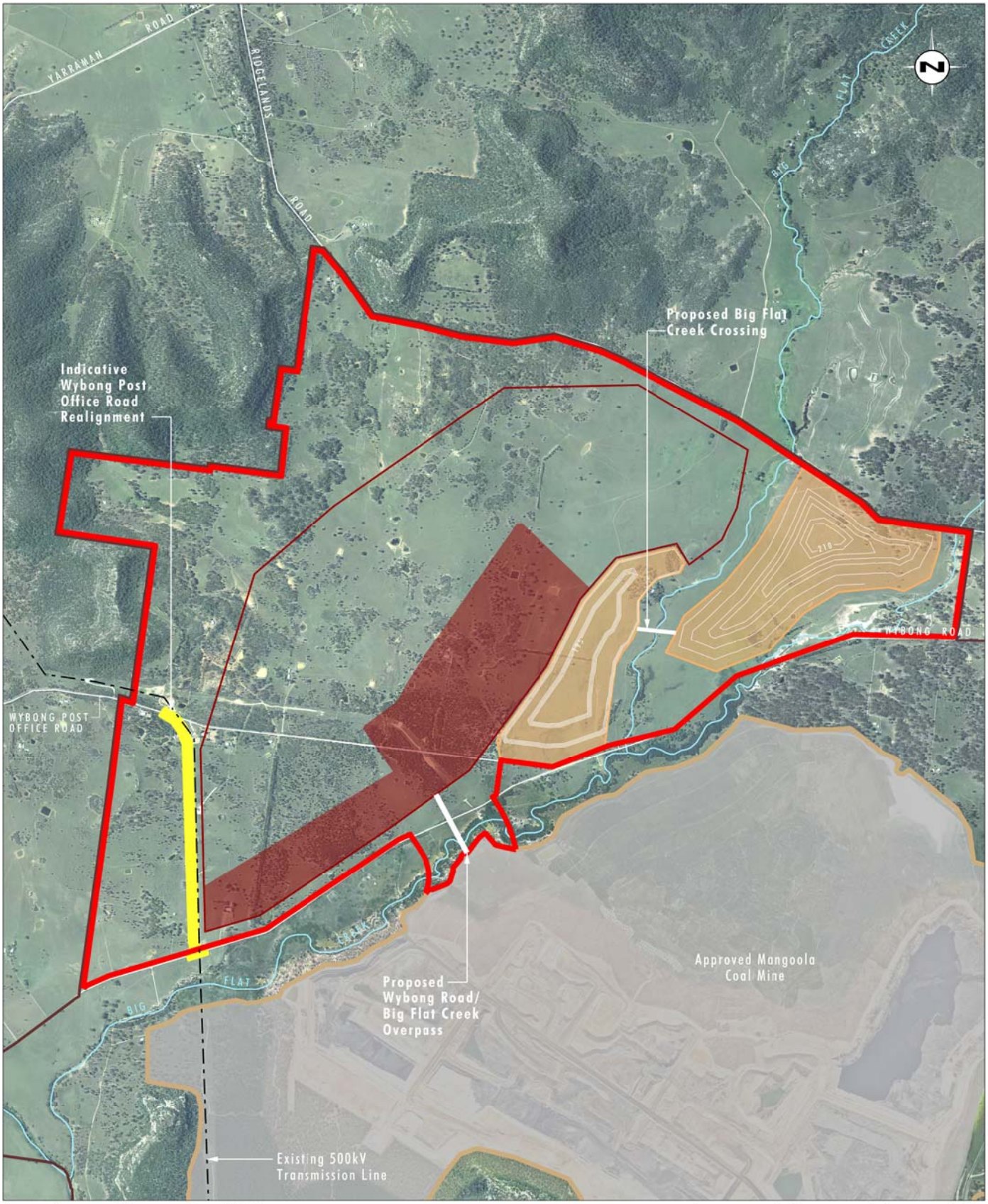

Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)
Note: Contours are pre micro relief landform design

0 0.5 1.0 1.5km
1:30 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Approved Mangoola Coal Mine
- Proposed Additional Mining Area
- Active Mining
- Overburden Emplacement
- Indicative Wybong Post Office Road Realignment
- 500kV Transmission Line

FIGURE 3.2

Conceptual Progression of Mining Stage 1

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20170721 10.45

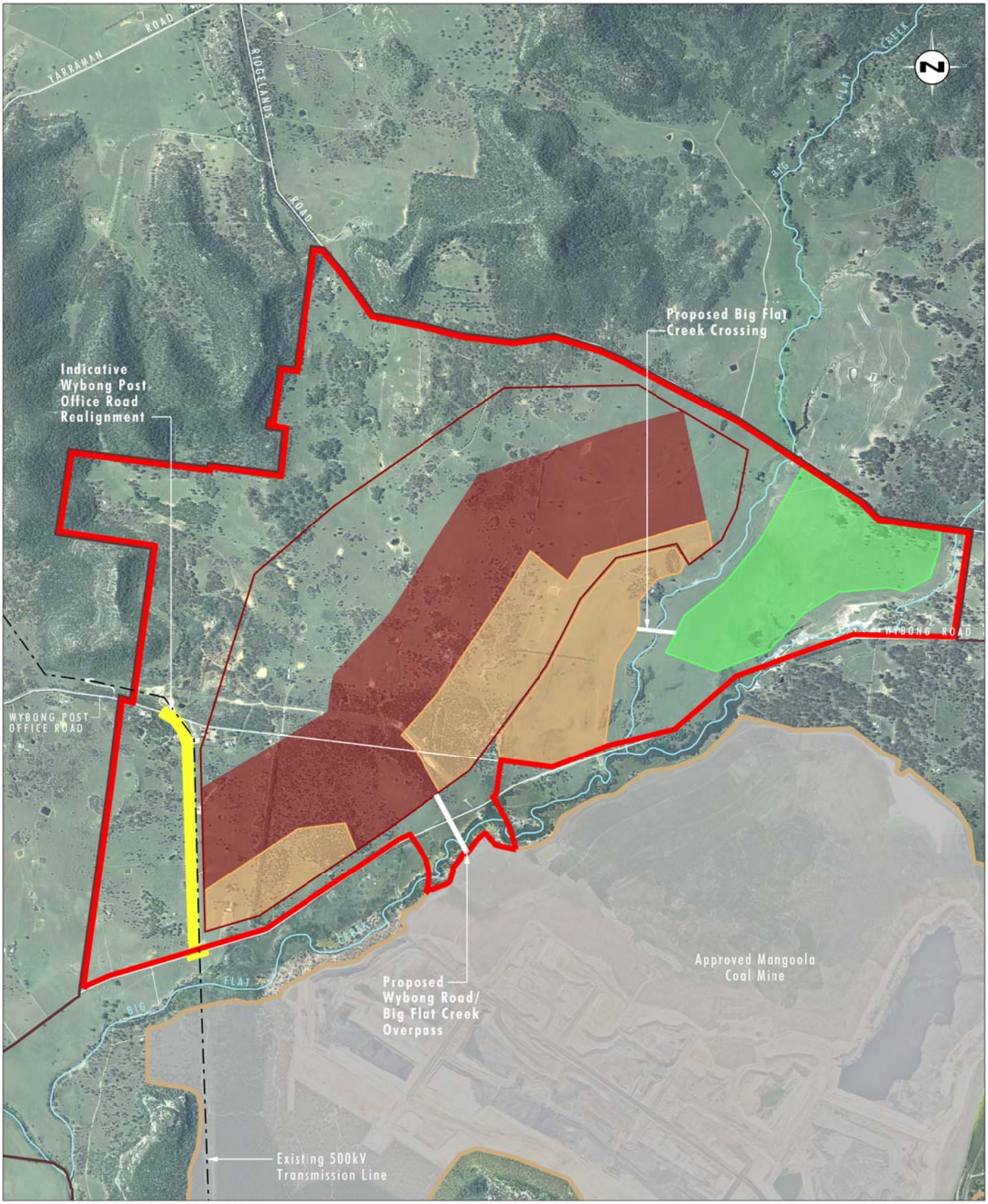

Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)

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1:30 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Approved Mangoola Coal Mine
- Proposed Additional Mining Area
- Active Mining
- Overburden Emplacement
- Rehabilitation
- Indicative Wybong Post Office Road Realignment
- 500kV Transmission Line

FIGURE 3.3

Conceptual Progression of Mining Stage 2

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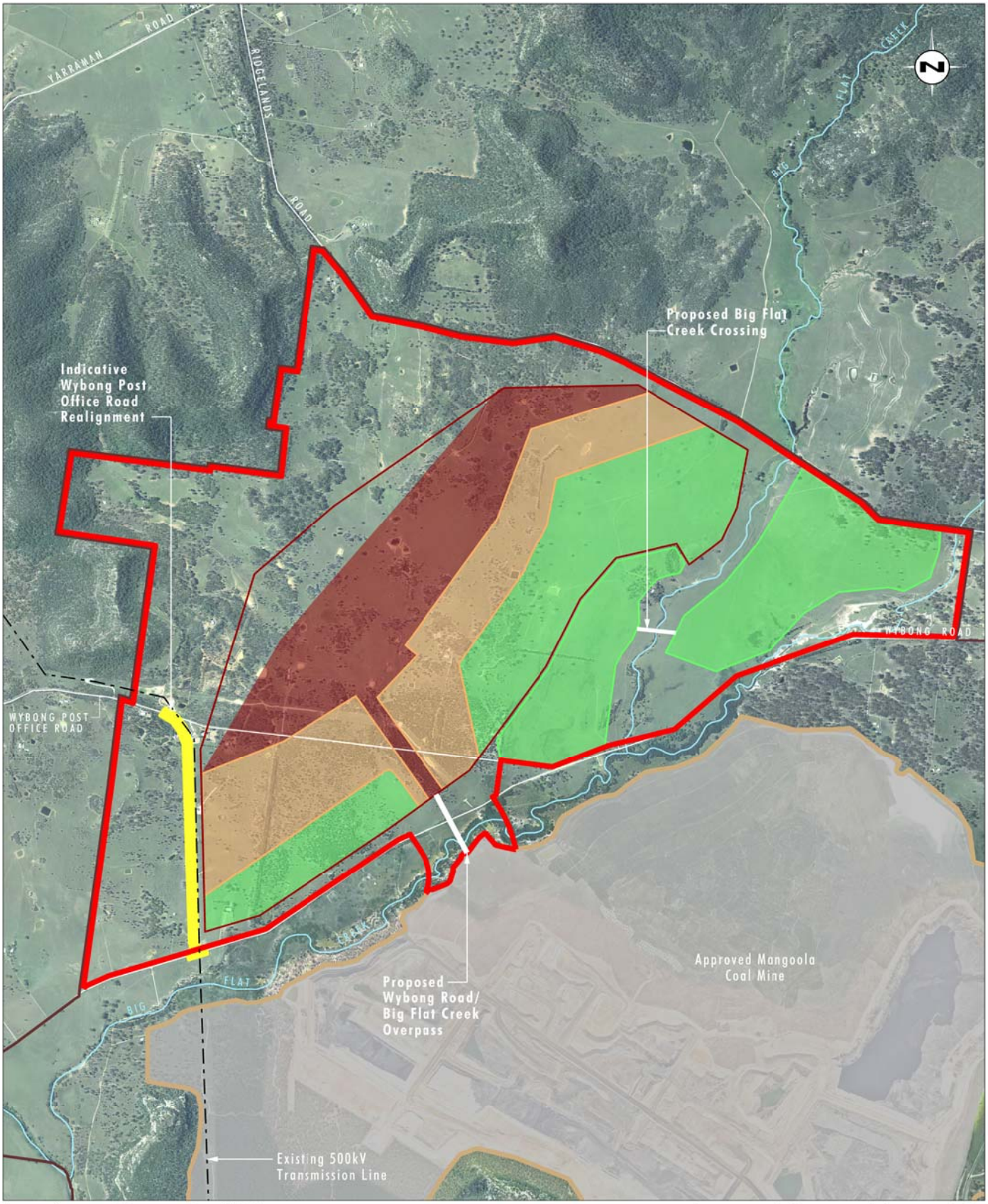

Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)

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1:30 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Approved Mangoola Coal Mine
- Proposed Additional Mining Area
- Active Mining
- Overburden Emplacement
- Rehabilitation
- Indicative Wybong Post Office Road Realignment
- 500kV Transmission Line

FIGURE 3.4

Conceptual Progression of Mining Stage 3

File Name (A4): R03/4004_022.dgn
20170721 10.50

As shown on the conceptual stage plans a haul road overpass of Wybong Road and Big Flat Creek would be constructed, which would then facilitate the transfer of materials required for the initial construction phase as well as the transfer of coal and overburden during operations. Within the MCCO Additional Project Area current planning would see mining commence in the south and proceed in a north-westerly direction. It is anticipated that overburden emplacement areas will be developed in the south-east corner of the MCCO Additional Project Area using material from initial excavations. In this regard a culvert crossing is proposed over Big Flat Creek allowing a haul road to cross the creek (refer to **Figure 1.2**). Overburden will be emplaced within two out-of-pit emplacement areas as well as back into the mining area as the mine progresses. Overburden will also be distributed to and from the existing mining operations.

A section of Wybong Post Office Road is required to be realigned where mining intersects part of this road. This is detailed further in **Section 3.8**. The design will be further refined through development of the EIS.

No major changes are proposed to the existing approved mine extraction area at Mangoola Coal Mine as part of the MCCO Project.

The conceptual mine plan for the MCCO Project will continue to be refined through an iterative process taking into account the findings of the detailed environmental and social impact assessments, and stakeholder feedback.

3.5 Mining Infrastructure

The MCCO Project will utilise the existing Mangoola CHPP and coal handling infrastructure (conveyors, stockpiles and train loading facilities) for the processing and transport of coal. No changes are required to the currently approved operating capacity of the Mangoola CHPP and train loading facility of 13.5 Mtpa ROM coal. The site infrastructure facilities will continue to operate seven days per week and permit loading of up to 10 trains per day. The MCCO Project will also use the existing Mangoola office, workshop and other facilities.

Gravel / fill will be required to construct internal haul roads and the realignment of Wybong Post Office Road and will necessitate the continued operation of approved gravel crushing onsite with additional gravel / fill to be sourced externally as required.

New infrastructure requirements for the MCCO Project include:

- an overpass spanning Wybong Road and Big Flat Creek
- a culvert crossing of Big Flat Creek to access the proposed emplacement area
- clean water diversion drains and water management infrastructure
- upgrades or extension to ancillary infrastructure and services including power, communications, water reticulation systems and water cart fill points
- temporary construction facilities and laydown areas, and
- crib hut or break room and associated facilities within the MCCO Additional Project Area.

Further a range of temporary infrastructure will also be required for the construction period including a construction site office, staging area and temporary diversion road around the Wybong Road and Big Flat Creek overpass construction area.

Further design studies will be completed to confirm the concept details and requirements for ancillary infrastructure that might be required to service the MCCO Project.

3.5.1 Rejects and Tailings Management

The MCCO Project proposes to utilise the existing tailings storage facilities at Mangoola Coal Mine (refer to **Figure 2.1**). The tailings storage facilities established within the Mangoola Coal Mine disturbance footprint have sufficient capacity for the life of the Project.

Coarse rejects from coal preparation will continue to be transported by truck to the open cut overburden emplacement areas for emplacement.

3.6 Final Landform Design and Rehabilitation

Final landform design will be undertaken in line with current design standards at Mangoola Coal Mine including the use of micro-relief with rehabilitation completed using the same industry leading techniques as at the existing mine.

Topsoil and mulched vegetation removed from areas disturbed as a result of the MCCO Project will be immediately used for rehabilitation where practicable or stockpiled for use in rehabilitation, with overburden emplacement areas progressively rehabilitated. Selected stag trees will also be harvested from disturbed areas for use in rehabilitation. Emplacement areas will be designed using natural landform principles consistent with the approach used at the existing operation for establishment of the final landform. Temporary rehabilitation will also be used, as appropriate, in areas that have not yet been shaped to final landform.

As shown on **Figure 3.5** a final void will remain to the north-west of the proposed Additional Mining Area. Further integrated mine planning work is being completed to optimise the final landform and void strategy across the existing Mangoola Coal Mine and MCCO Additional Project Area. As part of this strategy, changes may be made to existing approved final void at Mangoola Coal Mine; however the commitment to reinstate Anvil Creek in the final landform will remain.

Following completion of the relevant assessments a revised conceptual final landform and potential land uses for the site will be identified in the EIS. As part of the community consultation process for the MCCO Project, Mangoola plans to engage with the local community to review and identify potential uses of the land at the end of the Project and obtain feedback on landform principles. The process of determining the final landform and land use for the combined Project Area will also consider sustainability principles including the outcomes of the ecological assessment, social and commercial considerations. Mine closure issues including landform, land use and groundwater/surface water relationships will be assessed in the EIS.

The integration of the MCCO Additional Project Area with the existing Mangoola Coal Mine operations will provide additional flexibility in designing a final landform and address identified constraints where practicable.

3.7 Site Access

Mangoola Coal Mine currently has a single approved site access road established between Wybong Road and the Main Infrastructure Areas (refer to **Figure 1.2**). This access point will remain as the main entrance to the MCCO Project.

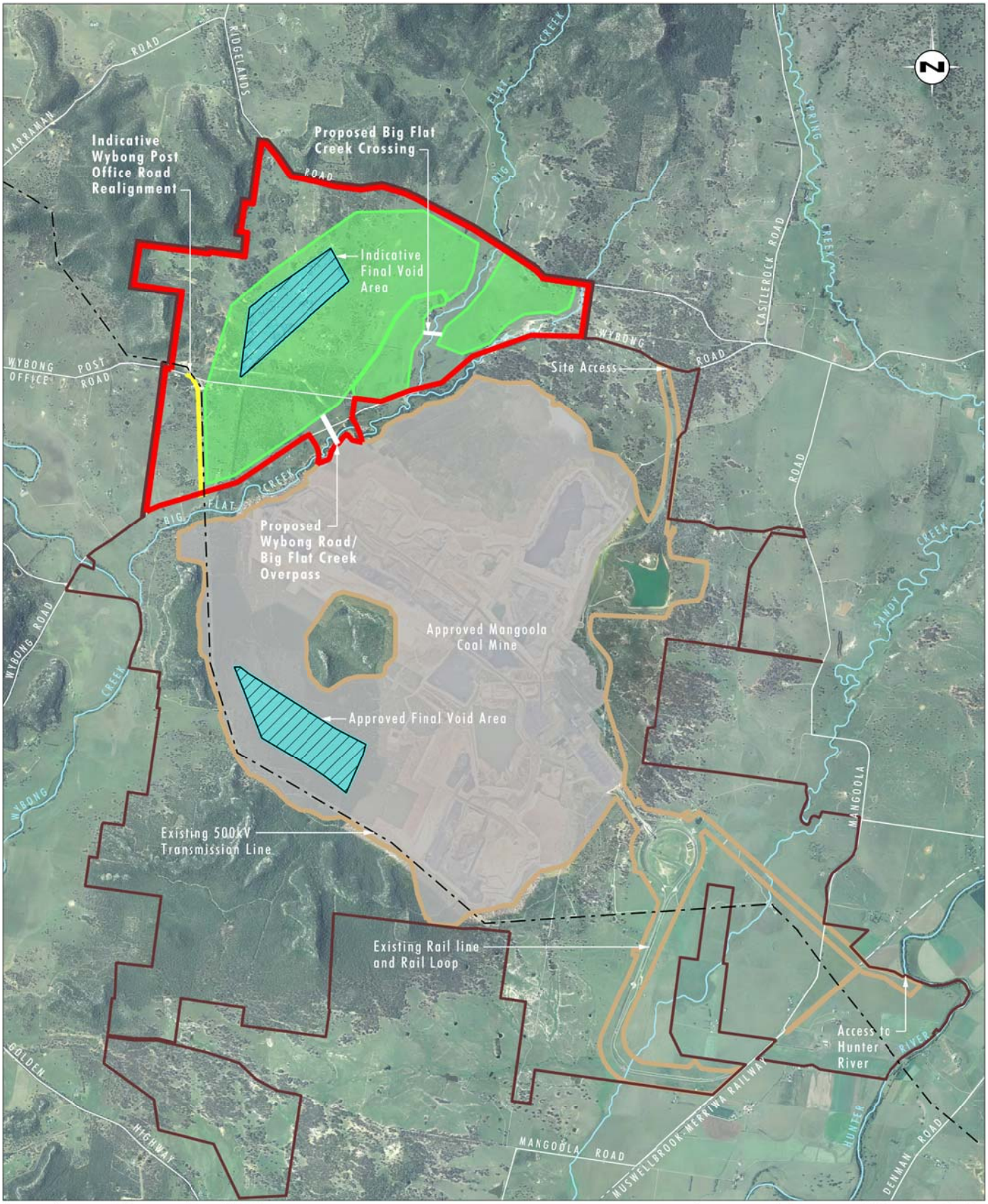


Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)

0 1.0 2.0 3.0km
1:60 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Approved Mangoola Coal Mine
- Rehabilitation
- Area for Refinement of Final Void
- Indicative Wybong Post Office Road Realignment
- 500kV Transmission Line

FIGURE 3.5

Areas of Refinement of Final Landform

Additional access points to the MCCO Additional Project Area may be required along Wybong Road, Wybong Post Office Road and Ridgeland's Road for access, construction, emergency services and ongoing operational environmental monitoring.

3.8 Wybong Post Office Road Realignment

Mining within the MCCO Additional Project Area will necessitate the realignment of a section of Wybong Post Office Road. The realignment is proposed to maximise resource recovery and provide improved mining conditions.

It is proposed that an approximate 2 km section at the eastern end of Wybong Post Office Road will be realigned to the west around the MCCO Additional Project Area (refer to **Figure 1.2**). This would extend the trip distance for some road users travelling on Wybong Post Office Road by approximately 1.5 km however this will be subject to confirmation by the traffic study to be completed for the MCCO Project.

The final design of this realignment will be determined subsequent to further assessment and stakeholder engagement, including liaison with the local community and Muswellbrook Shire Council.

In order to minimise disruptions to traffic, the realigned section of Wybong Post Office Road will be fully constructed prior to decommissioning of the existing section.

3.9 Construction

The MCCO Project has been designed to maximise the use of existing infrastructure, however as outlined in previous sections, some public infrastructure will need to be relocated and some additions are required to existing mining infrastructure. Most changes to infrastructure are required from the commencement of operations in the MCCO Additional Project Area.

The construction workforce onsite at any one time will vary depending on the timing of construction of the various Project components. The construction workforce will likely peak at approximately 120, this includes construction of the connecting haul road overpass over Wybong Road and Big Flat Creek, realignment of Wybong Post Office Road and construction of water management infrastructure.

3.10 Mine Workforce and Hours of Operation

The MCCO Project will provide continued employment opportunities for the existing Mangoola operational workforce of up to approximately 540 persons.

Mining operations will continue to be undertaken 24 hours per day, seven days per week.

3.11 Alternatives and Justification

3.11.1 Project Alternatives

Mangoola has considered a number of alternative mine and infrastructure plans. The primary objective of these studies was to minimise environmental and social impacts related to the MCCO Project whilst maximising efficient resource recovery in order to justify the selected mine plan.

The various project alternatives that were considered during this process included:

- mining of additional coal resources to the west of the existing 500 kV ETL – the cost of gaining access to this additional resource through realignment of the 500 kV ETL to the west was excluded due to uneconomical results based on current market conditions

- mining of additional coal resources to the east of Ridgeland Road – the cost of realigning a segment of Ridgeland Road in order to access this small additional volume of resource was excluded due to uneconomical results based on current market conditions, and

- alternative overburden emplacement designs - this resulted in a less desirable final landform which would not suitably blend with surrounding landscape. It is noted, however, that as discussed in earlier sections there is ongoing work to refine the best outcome from integrating the proposed Additional Mining Area with the existing Mangoola Coal Mine with regards to overburden emplacement.

Mangoola also considered the alternative of not proceeding, however this option is not proposed by Mangoola. Not proceeding would result in significant lost economic benefit, including reduced employment opportunities, taxes and flow on employment and economic benefits as well as the failure to maximise recovery of a significant and economically viable coal resource.

Further detail regarding the alternatives considered as part of MCCO Project development will be provided in the EIS.

3.11.2 Project Justification

The MCCO Project will provide the following key benefits:

- maximising the coal resource recovery from the identified resource adjoining the existing Mangoola Coal Mine operation

- ongoing employment opportunities for the Mangoola workforce for the life of the Project, with resultant flow on effects for the local and regional economy

- recovery of an approximate additional 45 Mt of ROM coal

- an ongoing contribution to local, regional and state economies from an existing and well-established mining operation

- payment of significant royalties to the State Government of NSW, and

- significant export earnings for Australia.

The MCCO Project is a logical transfer and continuation of the existing mining operations at Mangoola Coal Mine. The MCCO Project will extend the life of the operation and provide an opportunity for significant efficiencies to be achieved through the utilisation of existing infrastructure and experienced personnel, allowing for the economic recovery of coal resources. The MCCO Project also provides significant advantages in providing an integrated final landform design across both the existing approved and proposed mining areas through the continued use of the existing tailings emplacement areas and ability to distribute overburden across the two operational areas.

Further detailed justification for the MCCO Project will be provided in the EIS, considering the potential environmental, social and economic impacts and benefits.

4.0 Stakeholder Engagement

4.1 Authority Engagement

The engagement process for the MCCO Project has commenced with initial briefing meetings held with relevant government agencies. These meetings introduced the MCCO Project, discussed the approvals process and sought feedback on relevant issues to be considered in the EIS. The following NSW Government agencies have been briefed on the MCCO Project:

- Department of Planning and Environment (DPE)
- Department of Trade and Investment, Division of Resources and Geosciences (DRG), and
- Muswellbrook Shire Council.

A Conceptual Project Development Plan (CPDP) meeting was held with DRG on 17 July 2017.

The next phase of the consultation process is the lodgement of this PEA with DPE. Following the lodgement for the PEA, DPE will provide Mangoola Coal with the Secretary's Environmental Assessment Requirements (SEARs) for the MCCO Project.

Further key agencies to be consulted for the MCCO Project will include:

- Environmental Protection Agency (EPA)
- Office of Environment and Heritage (OEH), including the Heritage Branch
- Department of Primary Industries - Water (DPI – Water)
- Roads and Maritime Services (RMS)
- Department of Primary Industries, including Agriculture NSW and Fisheries NSW
- Crown Lands, and
- Commonwealth Department of the Environment and Energy (DoEE).

Consultation with each of these key agencies and any others specified in the SEARs will be undertaken throughout the preparation of the EIS.

4.2 Community and Other Stakeholder Engagement

A comprehensive Stakeholder Engagement Strategy has been developed for the MCCO Project. The Strategy identifies the potentially impacted people or groups and other stakeholders relevant to the MCCO Project, the methods of engagement to be used to most effectively engage with these stakeholders, the timing of consultation and the feedback mechanisms required. Methods of engagement used to assist stakeholders to understand the MCCO Project are included within **Appendix 3**.

In engaging with stakeholders, Mangoola aims to:

- be proactive in its engagement with the community

- provide relevant information regarding the MCCO Project and opportunities for stakeholder input throughout the approval process

- be transparent and honest in dealings with the community, and

- utilise a range of engagement methods so that all stakeholder interests are considered and addressed in a timely manner.

The stakeholders relevant to the MCCO Project will continue to evolve as the assessment process progress, with some of the key initial stakeholders to be involved including:

- local residents and landholders – identified for the MCCO Project as those with residences within approximately 4 km from the Proposed Additional Mining Area. The landholders and residents identified are within the Australian Bureau of Statistics (ABS) State Suburbs (SSC 2016 boundaries) of Mangoola, Manobalai, Castle Rock and Wybong, which is also the distribution area for Project related information such as community information sheets and meeting notifications

- internal stakeholders – including employees and suppliers

- Aboriginal groups including Traditional Owner groups and the Local Aboriginal Land Council

- wider community individuals and groups – including tenants on mine owned land, interested residents in the wider community and the Mangoola Community Consultative Committee (MCCC)

- community service providers

- business and industry – including customers, business chambers, other nearby proposed or active major developments such as coal mines, and

- public infrastructure owners (e.g. roads, powerlines etc.).

Further to the above, Mangoola also has a consultation strategy in place for its exploration activities within the AL9 area following DRG guidelines. This strategy has been in place for the duration of the exploration program and has involved keeping land holders up to date on the exploration activities and Mangoola's investigations for future mining potential.

A preliminary social profile in relation to the stakeholders and locality that may potentially be affected in social terms is provided in **Appendix 3**.The engagement process for the MCCO Project will be ongoing throughout the Project, with key stages which align with the key milestones of the environmental assessment process. The key stages of the consultation process for the MCCO Project are outlined below:

- **Stage 1 – PEA Stage**. This stage is complete and involved preliminary contact with the local community via a briefing to the CCC, phone calls and face to face meetings with nearby land owners, and the distribution of a Project Community Information Sheet providing an overview of the MCCO Project. 24 face to face land holder meetings have been held by the MCCO Project team to date. These meetings involved discussing the MCCO Project and asking about key issues to be considered in the assessment process. The Community Information Sheet provided MCCO Project personnel contact details for the community stakeholders interested in holding further discussions with Mangoola. This Community Information Sheet was also distributed to a total of approximately 135 residences within the suburbs of Mangoola, Manobalai, Castle Rock and Wybong.

- **Stage 2 – EIS & SIA Development**. This stage will involve engagement during the refinement of the conceptual mine plan and the preparation of the EIS for the MCCO Project. There are two main purposes of this stage. The first is to continue and build on engagement commenced within Stage 1 as part of a thorough Social Impact and Opportunity Assessment (refer to **Section 7.1**), including face to face meetings with community and agency stakeholders as necessary, meetings / workshops on key issues and provision of updated project information as it is available via mechanisms such as the Mangoola Coal website, additional Community Information Sheets and open days. The second main purpose is to commence engagement with Aboriginal stakeholders and Knowledge Holders as part of the Aboriginal Cultural Heritage Assessment process (refer to **Section 7.9**).

- **Stage 3 - Submission and assessment**. This is the final stage of consultation prior to determination of the development application for the MCCO Project and will involve consultation during the EIS public exhibition phase and subsequent assessment and approval process. The main purpose of this stage of consultation will be to respond to issues raised during the public exhibition phase. Note that if approved, engagement will continue into operations in accordance with current site procedures, taking into consideration any outcomes of the assessment process.

4.3 Social Impact Scoping

Potential social impacts that may arise due to the MCCO Project have been identified through review of relevant literature, including the SIOA undertaken as part of the assessment for Project Approval 06_0014 Mod 6 (Coakes Consulting 2013), consideration of ongoing operational engagement activities and through the direct stakeholder engagement undertaken specifically for the MCCO Project as detailed within **Section 4.2**. Potential social impacts are presented below.

In 2016, DPE released the Social Impact Assessment: Draft guidelines for State significant mining, petroleum production and extractive industry development (draft SIA Guideline DPE, 2016). This draft SIA Guideline has been considered in the completion of the scoping of social impacts for this PEA, including the completion of a preliminary significance assessment of potential social impacts which is included in **Appendix 3**. **Appendix 3** also includes further consideration of mitigation measures as per PEA performance objectives 3 and 4 in the draft SIA Guideline.

Potential social impacts identified in the scoping phase that will be subject to further assessment as part of the SIOA include:

- Noise emissions (including vibration & blasting)
- Air emissions
- Impacts on property values
- Impacts associated with traffic and roadworks
- Population change
- Enhanced community contributions
- Community sustainability and sense of place.
- Cumulative impacts with other mining projects
- Light spill / visual amenity.

5.0 Planning Considerations

5.1 NSW Approval Process

There are a number of legislative instruments in NSW which regulate the environmental impact of development. The primary instrument is the EP&A Act which regulates the environmental assessment and approval process for development in the State.

The MCCO Project will require development consent under Division 4.1 of Part 4 of the EP&A Act. Being development for the purpose of coal mining, the MCCO Project is declared to be a State Significant Development (SSD) under the provisions of the *State Environmental Planning Policy (State and Regional Development) 2011* and the Minister for Planning is the consent authority for the Project, however, the NSW Planning and Assessment Commission (PAC) may determine the Project acting under delegation from the Minister. An EIS will be prepared for the MCCO Project, as part of the SSD requirements, covering the Project described in **Section 3.0**.

5.1.1 Permissibility

Muswellbrook Local Environmental Plan 2009 (LEP) is the relevant local environmental planning instrument which applies to the MCCO Additional Project Area. There are two applicable land use zonings covered by the MCCO Additional Project Area: RU1 Primary Production and E3 Environmental Management. The E3 Environmental Management zone occurs predominantly in the northern and north western portion of the MCCO Additional Project Area along Ridgelands Road and down to Wybong Post Road and is also the zoning which applies to the area occupied by the existing Mangoola Coal Mine under the LEP (refer **Figure 5.1**).

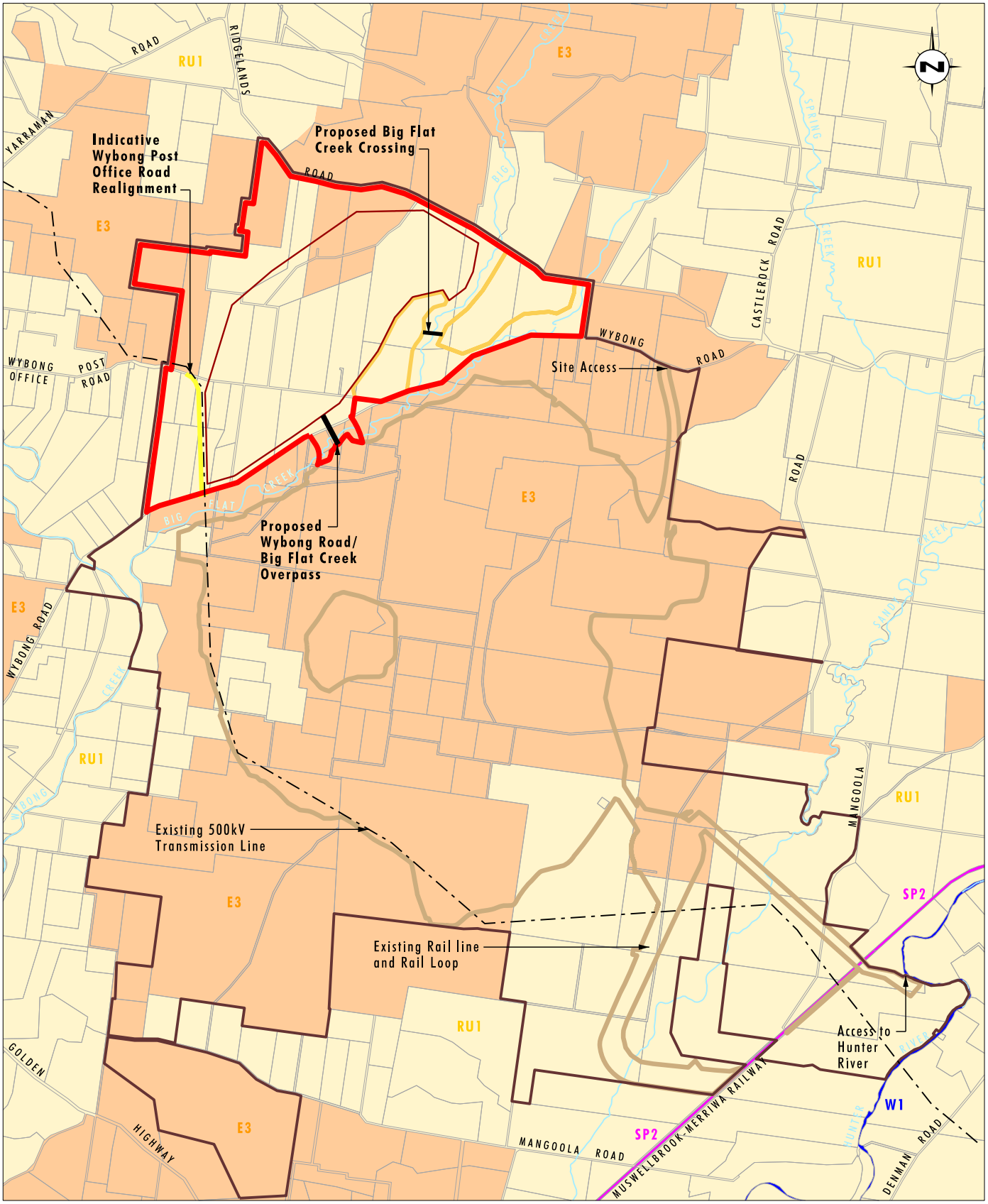
Open cut mining is permitted with consent in the RU1 zone, and is prohibited in the E3 zone. However, clause 7 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP) provides that mining may be carried out, with development consent, on land where development for the purposes of agriculture or industry may be carried out. Agriculture is permissible in both zones. Therefore, the permissibility of the MCCO Project is not affected.

Furthermore, Section 89E(3) of the EP&A Act states that development consent for a project that is SSD may be granted despite the development being partly prohibited by an environmental planning instrument.

5.1.2 Gateway Process

Part 4AA of the Mining SEPP together with Clause 50A of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) provides for the implementation of the NSW Government's Strategic Regional Land Use Plans (SRLUPs). The 'gateway process' applies to Projects located on biophysical strategic agricultural land (BSAL) and critical industry cluster land (CIC land) (as defined by the regional mapping presented in the Mining SEPP) outside of existing mining lease areas. A project that triggers the gateway process must obtain a Gateway Certificate to inform the SEARs.

The MCCO Additional Project Area does not include any land identified by the relevant maps in the Mining SEPP as BSAL or CIC land. Further, the outcomes preliminary investigations indicate the risk of encountering BSAL within the MCCO Additional Project Area is low. However, the presence of BSAL will need to be verified under the Mining SEPP.



Data Source: Glencore (2016), NSW Department of Planning (July 2016)

0 1.0 2.0 3.0km

1:60 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- 500kV Transmission Line
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Indicative Wybong Post Office Road Realignment

Zone:

- E3 - Environmental Management
- RU1 - Primary Production
- SP2 - Infrastructure
- W1 - Natural Waterways

FIGURE 5.1

Land Zoning

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In this regard a site verification process will be undertaken for the MCCO Additional Project Area. If the site verification process identifies presence of BSAL within the MCCO Additional Project Area then the application will be subject to the Gateway process under the Mining SEPP. DPE will be advised of the outcomes of the site verification process when complete.

5.1.3 Other State Approvals

Other primary approvals that will be or are likely to be required for the MCCO Project include:

- a Mining Lease under the *Mining Act 1992* for the MCCO Additional Project Area within AL9 and a Mining Lease for ancillary purposes (for water management infrastructure required outside of AL9 but on land owned by Mangoola)
- an EPL under the *Protection of the Environment Operations Act 1997* (POEO Act) (note that an EPL is already held by Mangoola for the existing mining operation)
- consent under section 138 of the *Roads Act 1993* (Roads Act) for works associated with the overbridge crossing of Wybong Road and the realignment of Wybong Post Office Road and applications under Part 4 of the Roads Act for closure of roads
- Crown Lands Act approval for works and mining in Crown roads within the project assessment footprint
- an approval for aquifer interference under the *Water Management Act 2000* (WM Act), and
- licensing of water allocations under the WM Act (note that licences are already held by Mangoola for the existing mining operation).

5.1.4 Commonwealth Approval Process

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in the environmental assessment of impact, management and protection of areas of national environmental significance and biodiversity conservation. The EPBC Act is administered by the Department of the Environment and Energy (DoEE).

Under the EPBC Act the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance. The matters of national environmental significance are:

- World Heritage property
- National heritage place
- wetlands of international importance (listed under the Ramsar Convention)
- threatened species and communities listed under the EPBC Act
- migratory species listed under the EPBC Act
- nuclear actions
- marine areas or reserves

- a water resource, in relation to coal seam gas development and large coal mining development, and
- Commonwealth land.

The MCCO Project is a coal mining development that will interact with water resources and some listed threatened species and communities are known to occur, with others having the potential to occur, at the site. It is therefore proposed that the MCCO Project will be referred to the DoEE for a decision on whether or not it is a controlled action that requires approval under the EPBC Act.

A Strategic Assessment under Part 10 of the EPBC Act for the MCCO Project is currently progressing as part of the Upper Hunter Strategic Assessment (UHSA). This is a joint Commonwealth and State assessment under Part 10 of the EPBC Act that will fulfil the ecological impact assessment requirements of the MCCO Project should the UHSA be finalised in time to include this Project. It is therefore requested that the SEARs include the ability to use either the *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014) *Framework for Biodiversity Assessment* (FBA) (refer to **Section 7.7**) or the UHSA if it becomes available.

6.0 Preliminary Environmental Assessment

6.1 Environment and Community Context

The MCCO Additional Project Area has been used extensively for agriculture since the 1800s and is comprised of rolling grazing land and patches of native woodland. The land to the immediate south is occupied by the existing Mangoola Coal Mine which is surrounded by Mangoola owned buffer land. To the north and east are further areas of Mangoola owned grazing land and existing ecological offsets. Land to the north-west includes a parcel of forested Crown Land which is surrounded by private grazing properties associated with the community of Manobalai and further west by privately owned properties associated with the community of Wybong. The nearest townships are Muswellbrook and Denman which lie approximately 20 km east and 10 km west of the MCCO Additional Project Area respectively. Further discussion of land use is provided in **Section 6.1.4**.

The following sections provide further detail on the environmental and community context in which the MCCO Project is proposed to be developed. Further discussion of the existing environment is also contained in the discussion of key environment and community issues in **Section 7.0**.

6.1.1 Topography and Drainage

The topography of the MCCO Additional Project Area is characterised by lower slopes, giving way to undulating hills and rocky outcrops to the north and west. Lower topographic areas are associated with drainage lines feeding Big Flat Creek to the south (refer to **Figure 6.1**).

A dominant topographical feature in the surrounding landscape is the series of undulating wooded hills which occur outside and to the north of the MCCO Additional Project Area. These hills rise to a maximum height of approximately 360 mAHD and are elevated approximately 200 metres above the surrounding area.

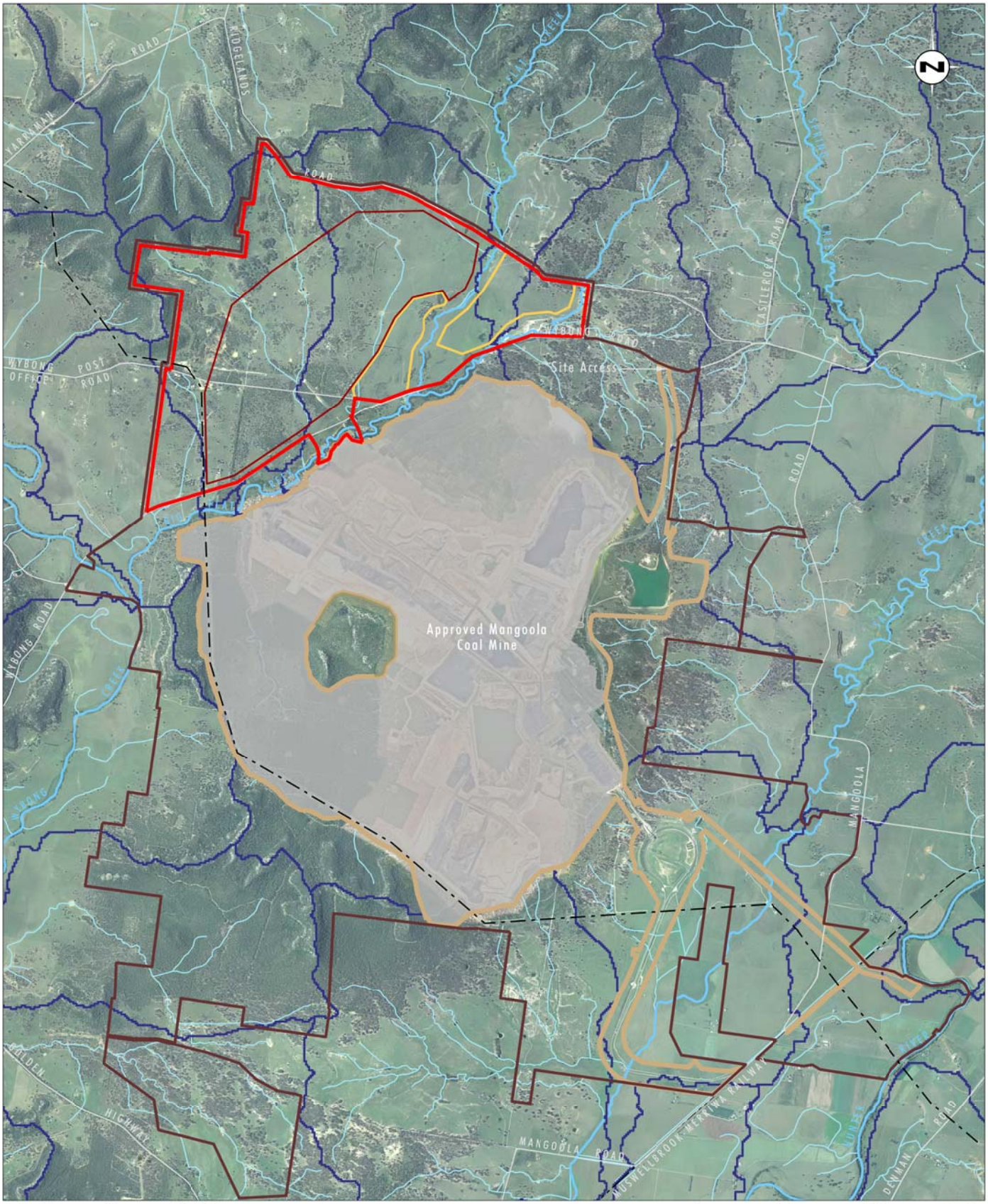
The MCCO Project lies entirely within the catchment of Big Flat Creek, which is part of the upper catchment of the Hunter River. **Section 7.5** provides further details of the surface water environment.

6.1.2 Soils

The soil types occurring within the MCCO Additional Project Area are mapped on the Singleton 1:250,000 Soil Landscapes Map Sheet and described in Kovac and Lawrie (1991). Three soil landscapes occur within the MCCO Additional Project Area. In order of prevalence, these are the Sandy Hollow, Wappinguy and Lees Pinch soil landscapes. The dominant Sandy Hollow soil landscape unit covers the lower rolling hills and grassy flats to Big Flat Creek. **Figure 6.2** represents the soil landscapes that have been mapped within the MCCO Additional Project Area and surrounds. The majority of the MCCO Additional Project Area is covered by soils that have a minor to moderate susceptibility to erosion and poor fertility. Detailed soils assessment for the MCCO Project is proposed as part of the Agricultural Land Assessment as described in **Section 7.8**.

6.1.3 Land Ownership

Land ownership in the MCCO Additional Project Area and surrounds is shown in **Figure 6.3**. With the exception of small sections of public road corridors, Mangoola owns all land within the MCCO Additional Project Area. The land immediately surrounding the MCCO Additional Project Area is also predominantly owned by Mangoola, with some parcels of Crown, private and other mine owned land situated further to the north and west.



Data Source: Glencore (2016)
Note: Contour Interval 1m

0 1.0 2.0 3.0km
1:60 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Approved Mangoola Coal Mine
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Catchment Boundary
- 500kV Transmission Line
- Drainage Line

FIGURE 6.1

Catchment Areas and Drainage Lines

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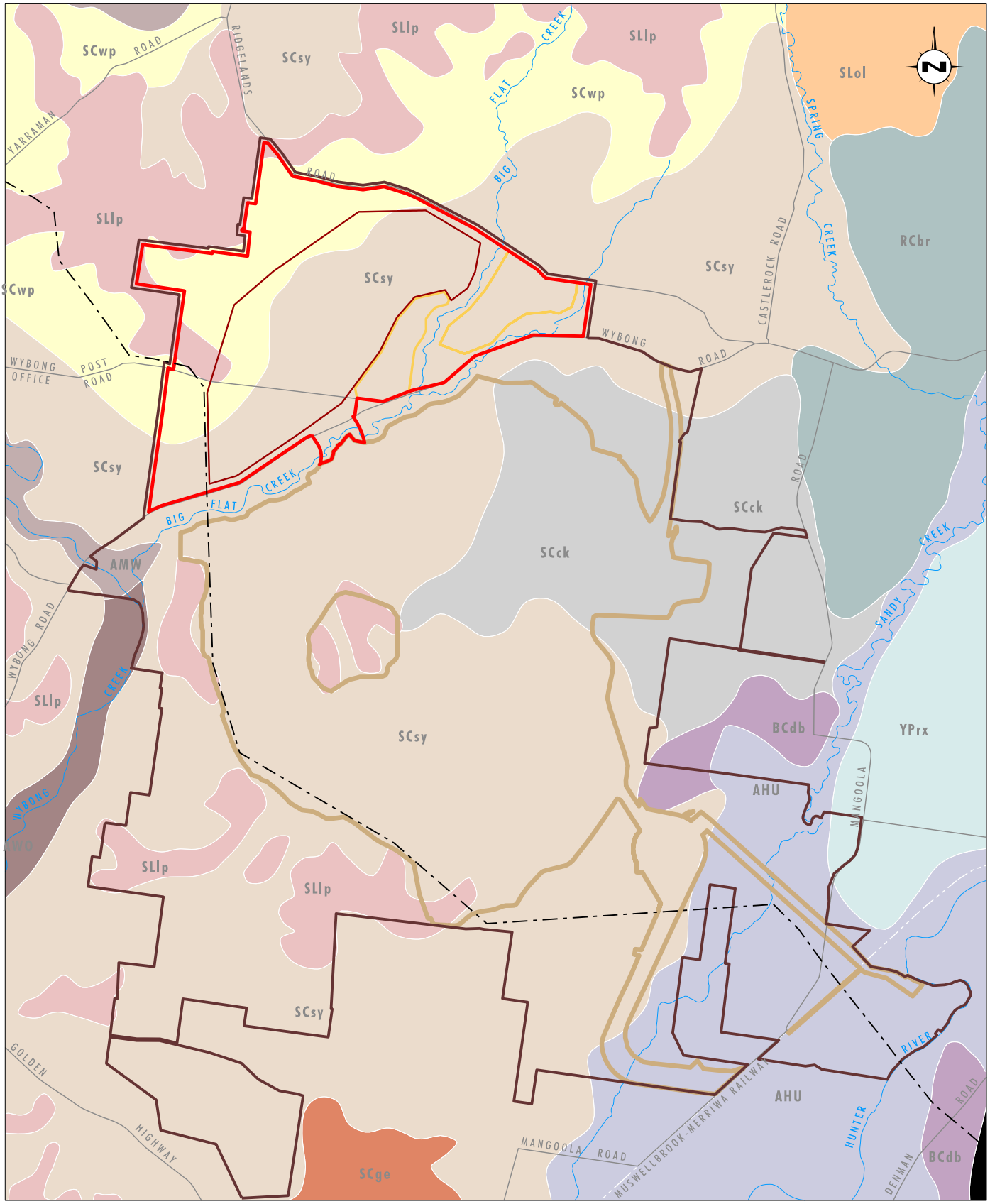

Data Source: Glencore (2016), State of NSW and Office of Environment and Heritage (2017)

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1:60 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Proposed Additional Mining Area
- Proposed Emplacement Area
- 500kV Transmission Line

Soil Landscapes:

- Hunter (AHU)
- Merriwa (AMW)
- Wollombi (AWO)
- Dartbrook (BCdb)
- Brays Hill (RCbr)
- Castle Rock (SCck)
- Growee (SCge)
- Sandy Hollow (SCsy)
- Wappinguy (SCwp)
- Lees Pinch (SLlp)
- Ogilvie (SLol)
- Roxburgh (YPrx)

FIGURE 6.2

Soil Landscape Mapping Units of the Mangoola Coal Continued Operations Project

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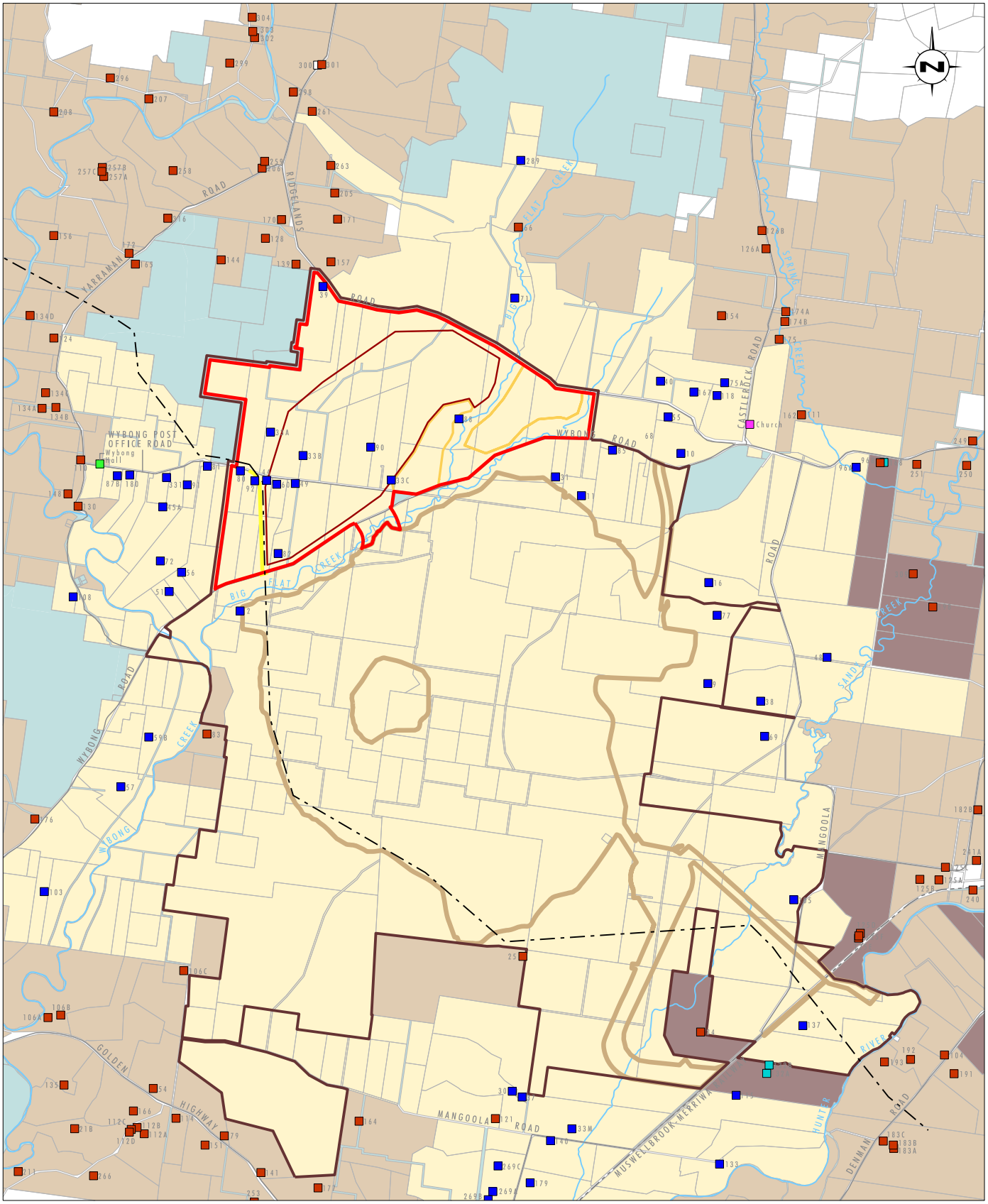

Image Source: Glencore (Apr 2017)
Data Source: Glencore (2016)

0 1.0 2.0 3.0km
1:70 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- Proposed Additional Mining Area
- Proposed Emplacement Area
- 500kV Transmission Line
- Indicative Wybong Post Office Road Realignment
- Crown Land
- Private Landholder
- Mangoola (incl. Glencore)
- Other Mine Owned
- Not Reported
- Private Residence
- Mangoola Owned Residence
- Other Mine Owned Residence
- Not Reported
- Church
- Wybong Hall

FIGURE 6.3

Proposed Mangoola Coal Continued Operations Project Land Ownership

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The localities of Manobolai and Wybong are positioned approximately 3 km to the north and west of the MCCO Additional Project Area respectively.

Although much of the land surrounding the MCCO Additional Project Area is owned by Mangoola, a number of private residences remain within the existing Mangoola Coal Mine acquisition zone. All of which have been notified of acquisition rights in accordance with Mangoola's existing Project Approval.

The Schedule of Lands for the MCCO Project is provided in **Appendix 1**.

6.1.4 Land Use

The MCCO Additional Project Area is bordered to the south by the existing Mangoola Coal Mine. Land parcels situated within and to the west, north and east of the MCCO Additional Project Area are dominated by low intensity grazing and interspersed with rural residential properties or vegetation which is delineated for conservation purposes. Collectively these land uses dominate the area surrounding the MCCO Additional Project Area, with the other land uses discussed below being further from the Project Area.

The predominant land uses within the localities surrounding the MCCO Project include grazing, intensive agriculture, vineyards, olive plantations, rural residential and commercial land uses. Other surrounding land uses include bushland, community uses and Commonwealth Government land use.

A corridor of land containing Strategic Agricultural Land (SAL), parcels of viticulture Critical Industry Cluster (CIC), and equine CIC is mapped approximately 2.5 km north and west of the MCCO Additional Project Area. This broadly follows the path of Wybong Creek from Manobalai through to Denman.

A small parcel of Crown land associated with a Travelling Stock Route (TSR) is located at the corner of Wybong Post Office Road and Wybong Road outside the MCCO Additional Project Area.

Vineyards within the locality are associated with Wybong Creek to the west and north-west and with the floodplain areas of Hunter River approximately 5 km to the south-east of the MCCO Additional Project Area.

The nearest horse stud is located along Denman Road and is approximately 3.5 km south-east of the existing Mangoola Coal Mine. There is also a proposed feedlot located to the west of the MCCO Additional Project Area at the former Yarraman Vineyard site for which SEARs have been obtained.

The Manobalai Nature Reserve is located approximately 4.5 km to the north-west of the MCCO Additional Project Area at its closest boundary. Manobalai Nature Reserve and adjacent Crown Land provide a large expanse of native vegetation connecting Goulburn River National Park to the south-west and Wollemi National Park to the south.

Community uses within the surrounding area include Catholic and Anglican churches which are located 3 km south-west and 3.5 km east of the MCCO Additional Project Area respectively. Both are utilised on occasion for services and functions. A cemetery is located on Yarraman Road, approximately 2 km west of the MCCO Additional Project Area.

Wybong Hall is located on Wybong Post Office Road, approximately 2 km west of the MCCO Additional Project Area. The hall is used generally on a daily basis for a range of activities such as play groups, arts and craft classes, community activities such as meetings and dances, and is also used for weddings and functions.

Located approximately 7 km to the south of the Proposed Additional Mining Area is the Myambat Military installation. This military installation is run by the Commonwealth of Australia and primarily functions as a munitions depot.

6.2 Preliminary Environmental Risk Analysis

To assist in identifying the key environmental and community issues that require detailed assessment as part of the EIS, a preliminary environmental risk analysis has been completed for the MCCO Project (refer to **Appendix 2**). The preliminary environmental risk analysis has been completed consistent with the principles outlined in ISO 31000:2009 – Risk Management Principles and Guidelines. Environmental risks for the MCCO Project have been categorised as low to high.

It is expected that with the completion of further studies and assessment as outlined in **Section 7.0** that the risk rating of most of these risks will be reduced due to the better definition of potential impacts and identification and effective implementation of avoidance and mitigation measures through the project design process.

The potential key environment and community issues identified based on existing understanding and consultation to date, preliminary studies and the risk assessment for the MCCO Project are:

- Social impacts
- Noise
- Blasting
- Air quality
- Water resources
- Ecology
- Agriculture
- Aboriginal cultural heritage and archaeology
- Historic heritage
- Traffic
- Visual amenity
- Greenhouse gas emissions
- Economics, and
- Rehabilitation and mine closure.

The scope of the further assessment to be completed for these issues as part of the EIS is discussed in **Section 7.0**.

7.0 Key Environmental and Social Issues

The key environmental and social issues for the MCCO Project have been identified through the preliminary environmental risk analysis discussed in **Section 6.2** and through the initial stages of the stakeholder engagement program that has been undertaken as part of this PEA (refer to **Section 4.0**). This section discusses each of the key identified issues and includes a description of the proposed assessment methodologies. A detailed assessment of these issues will be included in the EIS that will be prepared for the MCCO Project.

It is important to note that the MCCO Project will allow for the continuation of mining at Mangoola Coal Mine into a new mining area to the immediate north of the existing operation and that the new SSD approval that is being sought will cover the entire Proposed Additional Mining Area (including the currently approved mine and the proposed Additional Mining Area) as shown on **Figure 1.1**. In this regard a cumulative assessment of all proposed mining operations and associated activities for the MCCO Project, in addition to the currently approved operations, will be conducted for the EIS.

7.1 Social Impact and Opportunities Assessment

As noted in **Section 4.3**, a draft SIA Guideline has been developed by DPE to 'provide a clear, consistent and transparent framework and overarching methodology for identifying, assessing and responding to social impacts as part of an integrated environmental impact assessment' (DPE 2016, p.4). Part 2 and Part 3 of the draft SIA Guideline outline requirements and performance objectives at both the pre-lodgement and application stages of project development with respect to social considerations. PEA performance criteria have been considered in the preparation of this PEA and additional detail contained within **Appendix 3**.

A more comprehensive SIOA will further assess and predict the likely consequences and opportunities of the MCCO Project in social terms as part of the EIS with reference to the draft SIA guideline, in particular the EIS performance objectives within Section 3.2 of the draft SIA guideline (DPE 2016), including:

- profile the key communities and establish the baseline (EIS performance objective 1)
- scope and assess the relevant issues and opportunities associated with the Project (EIS performance objectives 2 and 3), and
- develop strategies to address the identified issues and opportunities and monitoring and management through the development of a socio-economic monitoring and evaluation program (EIS performance objectives 4 and 5).

The approach to the SIOA will therefore include:

- **Profiling** so that social context of the Project is well understood – including analysis of post impact/historical studies, relevant stakeholders, social indicators, media releases, secondary data and employee/contractor profiles.
- **Scoping** to identify the issues that need to be assessed – including personal meetings/interviews, stakeholder briefings, project presentations, stakeholder/community information sessions, workshops and planning processes as described in **Section 4.2**.
- **Impact Assessment** to assess the impacts of the Project and identify opportunities for positive outcomes.

- **Strategy Development** including development of appropriate strategies to address the identified issues and the engagement of relevant stakeholders on agreed strategies.

- **Monitoring and Management** - incorporation of strategies into stakeholder engagement plans, environmental management plans and operations methods and development of a socio-economic monitoring and evaluation program.

The SIOA process will focus particularly on potential impacts to residents within the 2016 SSC boundaries of Mangoola, Manobalai, Castle Rock and Wybong, the Muswellbrook local government area and broader Hunter region. Methods of analysis for the EIS as per PEA performance objective 5 in the draft SIA guideline is provided in **Appendix 3**.

7.2 Noise

The impact on amenity as a result of noise from mining operations is a key community concern within the Upper Hunter region generally, and more specifically, in the local area surrounding the MCCO Project. Minimisation of noise impacts has been a key consideration in the design of the concept mine plan, with both the design of the mine and equipment selection, including measures to minimise noise.

Mangoola's existing infrastructure including the CHPP and rail loading facilities will be used for the MCCO Project, requiring trucking of ROM coal from the proposed Additional Mining Area south to these facilities. Overburden from the proposed Additional Mining Area will be transported to the established mining area south of Wybong Road to contribute to the rehabilitation of this area.

Potential noise impacts associated with the MCCO Project include:

- construction noise generation associated with road realignment, overpass construction, drainage works and other construction activities

- increased potential for noise impact to noise sensitive receivers, particularly those located to the north of the existing operation due to establishment of open cut mining north of Wybong Road

- noise generation from open cut mining in existing and proposed operating areas concurrently

- noise generation from CHPP and ancillary activities, and

- cumulative noise impact with surrounding industry and mining operations.

Mangoola operates in accordance with a contemporary noise management plan, which outlines processes for effective management and mitigation of noise impact on the local community. Management and mitigation measures implemented at the existing operations include engineering noise controls (i.e. sound attenuation fitted to conveyors, crushers and mobile equipment), proactive (i.e. targeted use of attenuated and rubber tyred equipment and dig areas during night time operations) and reactive operational noise management (i.e. changing operations in response to noise alarms), and a noise monitoring program consisting of real-time and attended noise monitoring.

Mangoola has been monitoring noise performance since operations commenced and has demonstrated its ability to operate within its noise limits. There have been eight 15 minute monitoring periods in the last five years where elevated noise levels have been recorded during monitoring, however, immediate continued monitoring identified that there were no sustained exceedances. As part of the MCCO Project, Mangoola will continue to implement leading practice management strategies to minimise noise impact from the MCCO Project on the local community.

Utilising a wide ranging data set compiled since operations commenced in 2010, on the existing equipment and infrastructure at Mangoola, a comprehensive noise impact assessment will be undertaken for the EIS in accordance with the INP. The noise impact assessment will include:

- a review of existing background and ambient noise levels in the locality of the MCCO Project
- determination of background and ambient noise levels in the vicinity of the MCCO Project
- determination of Project Specific Noise Levels based on existing intrusive and amenity noise levels
- development of predictive noise models for key stages of the concept mine plan using Environmental Noise Model (ENM) software
- inclusion of reasonable and feasible noise mitigation measures
- presentation of model predictions
- assessment of modifying factors for low frequency noise and tonality, and evaluation of potential for sleep disturbance
- an assessment of potential cumulative noise impacts from the MCCO Project and other relevant industrial and mining operations
- an assessment of construction noise impact associated with the MCCO Project, and
- an assessment of road traffic noise impact associated with the MCCO Project.

7.3 Blasting

To extract the coal resource in the proposed Additional Mining Area blasting will be required to be undertaken for both overburden removal and coal extraction. A comprehensive blast assessment will be undertaken as part of the EIS to assess blasting impacts and confirm the management measures required to be implemented so that relevant criteria are satisfied.

Mangoola currently periodically closes Wybong Road due to blasting as per its approved Road Closure Procedure. For the MCCO Project closures of Wybong Road, Wybong Post Office Road and Ridgelands Road will be required at various stages of the mining operations.

The EPA sets guidelines for blasting based on human comfort levels. The guidelines have been adapted from the Australian and New Zealand Environment and Conservation Council (ANZECC) Guidelines Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC 1990). As the ANZECC guidelines are based on human comfort levels they are more stringent than those based on the potential for damage to structures. The criteria for residences are:

- the maximum overpressure due to blasting should not exceed 115 dB for more than 5 per cent of blasts in any one year, and should not exceed 120 dB for any blast, and
- the maximum peak particle ground velocity (PPV) should not exceed 5 mm/s for more than 5 per cent of blasts in any one year, and should not exceed 10 mm/s for any blast.

Further to the ANZECC guidelines, vibration criteria are also required for infrastructure within the surrounding area so that potential impacts can be managed. The relevant criteria for blasting vibration on infrastructure such as power lines, bridges and roads or significant heritage features such as rock structures will be determined in consultation with relevant agencies and/or the infrastructure owner and by reference to relevant Australian and International Standards.

Utilising a wide ranging data set compiled since operations commenced in 2010, modelling of blasting impacts (vibration and overpressure) will be undertaken to identify any potential impacts on surrounding residences, existing and proposed infrastructure and any sensitive environmental features and heritage items. This modelling will be used to develop site blasting rules to provide for blasting impacts to be appropriately managed over the life of the MCCO Project.

Mangoola has historically operated in accordance with currently approved blasting criteria for ground vibration and blasting overpressure and over the past 5 years operations have maintained compliance with the approved maximum overpressure and ground vibration blasting criteria. This includes managing blasts to meet limits for sensitive features such as Aboriginal sites (e.g. rock shelters) and infrastructure such as the 500 kV ETL that passes adjacent to the mining area. Mangoola will continue to review and update its blasting processes and management strategies to minimise blast related impacts from the MCCO Project on the local community.

7.4 Air Quality

Air quality impacts are anticipated to be a key issue for the MCCO Project and are a key issue of focus by the broader community within the Upper Hunter region. Emissions to air at mine sites such as Mangoola Coal Mine can be from a variety of activities including material handling, material transport, coal processing, wind erosion and blasting. These emissions would mainly comprise of particulate matter (commonly referred to as dust and including total suspended particulates (TSP), PM_{10} and $PM_{2.5}$) although there would be relatively minor emissions from machinery exhausts such as carbon monoxide (CO), oxides of nitrogen (NO_x) and particulate matter.

In summary, the potential air quality issues associated with the MCCO Project would likely be:

- dust (that is, particulate matter in the form of TSP, deposited dust, PM_{10} or $PM_{2.5}$) from the general mining activities
- fume (that is, NO_x emissions) from blasting, and
- emissions of substances from machinery exhausts, that is, diesel exhaust emissions.

The issues identified above will be the focus of an air quality impact assessment. Air quality impacts of the MCCO Project will be assessed as part of the EIS in accordance with current EPA guidelines, including the *Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2016).

Mangoola has been monitoring air quality conditions in the vicinity of the Mangoola Coal Mine since prior to its development. **Table 7.1** provides a summary of the average PM_{10} concentrations measured in the local area using TEOMs over the past five years. These data have been collated in order to examine the historical performance of Mangoola, with respect to compliance against criteria in the PA 06_0014 (as modified). It can be seen from these records that annual average PM_{10} concentrations have not exceeded the Project Approval criterion. One of the objectives of the air quality impact assessment will be to determine the potential change in air quality as a result of the MCCO Project, and to assess against the current EPA criteria. Additional analysis of existing air quality monitoring data will be carried out for the air quality impact assessment.

Table 7.1 Annual Average PM_{10} Concentrations in the Vicinity of Mangoola Coal Mine

Year	Concentrations in µg/m^3					Project Approval Criterion
	DO1-DC (275 Wybong PO Rd)	D02-DC (96 Ridgeland Rd)	D03-DC (830 Mangoola Rd)	D04-DC (22 Bells Lane)	D05-DC (2909 Wybong Rd)	
2012	12	13	14	11	-	30
2013	13	15	15	12	-	
2014	15	12	14	15	-	
2015	12	12	12	10	11	
2016	12	12	14	10	10	

The air quality assessment will utilise the CALMET/CALPUFF suite of models to best represent the complex meteorology across the modelling domain. These models simulate the complex meteorological patterns which exist in a particular region, including taking into account the effects of local topography and changes in land surface characteristics.

The air quality impact assessment will include:

- review and analysis of air quality and meteorological monitoring data collected near Mangoola Coal Mine
- identification of all sources of air pollution (e.g. dust) such as processing, handling, storage of materials, transport operations or rehabilitation and wind erosion sources
- development of a detailed meteorological model (CALMET) using existing meteorological data
- preparation of predictive models (CALPUFF) to reflect the proposed conceptual mine plans and production rates to assess the impact on local and regional ambient air quality, including the level of impact, potential exceedance levels and frequency having regard to standards and limits. This will be undertaken by:
    - preparing dust emissions inventories for each staged mine plan

- CALPUFF computer based dispersion modelling of emissions, using local meteorological data for each staged mine plan
- processing of model results into suitable contour plots and summary tables including frequency of exceedance data
- comparing model results to EPA air quality assessment criteria at nearest sensitive receptors, including consideration of potential cumulative impacts

- determination of the Project specific air quality levels and analysis against existing criteria
- assessment of the potential cumulative air quality impacts of the MCCO Project, including emissions from the Project, other approved Mangoola operations, and other approved surrounding mines and emission sources
- consideration of other potential air quality pollutants including nitrous oxides (NO_x)
- development of appropriate air quality mitigation and management measures
- development of an appropriate air quality monitoring program to determine the effectiveness of mitigation and to verify predictions.

Mangoola operates in accordance with a contemporary air quality management plan, which outlines procedures for effective management and mitigation of air quality impacts on the local community. Management and mitigation measures implemented at the existing operations include proactive and reactive operational air quality management, and an air quality monitoring network that incorporates real-time monitoring units. These existing controls will be applied to the MCCO Project, with an assessment of these controls against leading practice air quality management measures also undertaken as part of the air quality impact assessment.

7.5 Surface Water

Mangoola Coal Mine lies within the catchments of Sandy Creek to the south-east and Big Flat Creek to the north. Sandy Creek drains to the Hunter River, while Big Flat Creek flows generally from north-east to south-west to join Wybong Creek. The MCCO Additional Project Area is principally drained by Big Flat Creek and its tributaries. Wybong Creek is a tributary of the Goulburn River which in turn flows to the Hunter River. These catchments are shown on **Figure 6.1**.

Overall salinity values of Big Flat Creek are considered high for a natural stream, with a long term average electrical conductivity value of more than 13,000 µs/cm^3 upstream of the existing operations.

Mangoola has a licensed extraction point and a licensed discharge point on the Hunter River.

The MCCO Project will likely impact on existing water resources through alterations to existing non-mining catchments mainly through the further development of open cut mining and overburden emplacement areas. The potential surface water impacts that will be considered for the MCCO Project include:

- changes to downstream flow regimes, upstream and downstream flood extents and flood behaviour as a result of the development of mine landforms and the capture of runoff from existing un-mined catchment areas
- impacts on downstream water quality from disturbed areas

- impacts on Big Flat Creek, Wybong Creek and the Hunter River, and
- water management associated with the final open cut void and landform

A detailed surface water assessment will be prepared as part of the EIS and will include the following:

- likely surface water impacts as a result of open cut mining including groundwater and catchment changes and the potential implications of these impacts on mine water management, downstream watercourses, nearby water users and water licensing
- planned surface water control measures, including upslope diversion drains/bunds, mine-affected area collection drains, mine water management systems, flood levees and creek crossings, including how these are to be integrated with the existing approved operations
- potential changes to downstream surface water quality and required erosion and sediment control measures
- an assessment of the potential impacts on downstream water users, the environment and local and downstream watercourse stability
- potential changes to the flooding regime in Big Flat Creek due to the MCCO Project and its water management system
- assessment of post mining surface water impacts
- cumulative surface water impacts
- a review of the MCCO Project against NSW State water policies and regulations, and
- identification and description of monitoring and impact mitigation measures required for the MCCO Project.

As part of the surface water assessment, a detailed mine site water balance will be prepared which will include consideration of any external water supply or discharge requirements. The water balance will:

- identify available water sources including the interception and use of mine-affected runoff
- identify the water demand of the MCCO Project
- assess demand and supply requirements under a range of rainfall/evaporation conditions, incorporating groundwater inflow predictions from the groundwater impact assessment (refer to **Section 7.6**) and planned production
- identify any potential shortfalls in the planned Project water supply and the risk of this occurring
- identify the need for and likely volumes of controlled discharge via the Hunter River Salinity Trading Scheme (HRSTS)
- identify the risk and quantities of any predicted discharge from water storages into the environment
- include a salt balance, and
- include a final void water and salt balance.

7.6 Groundwater

The MCCO Project proposes to continue to mine the same coal seams as the existing Mangoola Coal Mine. These seams lie within the Permian Newcastle Coal Measures. Hydrogeologically the coal measures and overlying sandstones are considered to be porous and fractured rock aquifers. The pre-mining water table is above the base of the proposed Additional Mining Area and it will therefore intercept groundwater. The long term groundwater monitoring program in place around the Mangoola Coal Mine will provide a valuable baseline dataset for assessing potential impacts from the MCCO Project.

Monitoring to date has confirmed that impacts from the operation of the existing Mangoola Coal Mine are within the predictions made by the environmental assessments undertaken for the approved mine.

Within the surrounding areas there are a small number of nearby landholders with licences to extract groundwater from the coal measures. These licences are primarily for low intensity purposes such as stock and domestic use.

The proposed Additional Mining Area and existing approved Mangoola Coal Mine are separated by Big Flat Creek. There is a band of colluvial materials associated with the creek. The colluvial materials discharge to the more productive Wybong Creek alluvium to the south-west of the Proposed Additional Mining Area. The Wybong Creek alluvium lies outside of the Proposed Additional Mining Area.

To assess the impacts of the MCCO Project on groundwater resources, a detailed groundwater impact assessment will be undertaken in accordance with the requirements of the:

- NSW Aquifer Interference Policy
- guidelines released by the Independent Expert Scientific Committee (IESC) on Coal Seam Gas and Large Coal Mining Developments, and
- Australian Groundwater Modeling Guidelines.

The groundwater impact assessment will include the following:

- development of a conceptual hydrogeological model to qualitatively understand the groundwater regime and identify areas of potential environmental impact resulting from the MCCO Project such as:
    - groundwater dependent ecosystems (GDEs)
    - stygofauna habitats
    - quality or quantity changes for local groundwater users, and
    - adverse changes in surface water base flows
- preparation of a numerical groundwater model for the Mangoola Coal Mine to provide a quantitative assessment of:
    - estimates of groundwater inflow to the mining area
    - the area of influence of dewatering and the level and rate of drawdown at specific locations
    - the potential for any impact on the Wybong Creek alluvial aquifer and surface water drainages

- any change in water levels in private water bores surrounding the MCCO Project
- areas of potential risk where groundwater impact mitigation/control measures may be necessary
- cumulative impacts of the MCCO Project (including the proposed Additional Mining Area and existing Mangoola Coal Mine) and other surrounding mining operations (where relevant), and
- identification and assessment of potential post mining groundwater impacts.

The groundwater impact assessment will identify any necessary measures relating to the management of the groundwater resource and groundwater flow.

7.7 Ecology

At the state level there are currently two potential biodiversity assessment pathways available for the MCCO Project, being the existing Framework for Biodiversity Assessment (FBA) and the draft Upper Hunter Strategic Assessment (UHSA). The *NSW Biodiversity Offsets Policy for Major Projects* (OEH 2014), supported by the FBA method, currently applies to all SSD and state significant infrastructure (SSI), collectively referred to as 'major projects'(including modifications to existing SSD approvals), however the draft UHSA process is also likely to be applicable to the project through existing interim policies. As the UHSA process currently remains a draft, it is planned that the biodiversity assessment for the MCCO Project will be undertaken in accordance with the FBA. Should the UHSA be progressed during the assessment process, the UHSA pathway may be followed.

As ecology was identified early in project planning as a key issue, the biodiversity assessment has substantially commenced for the MCCO Project.

It is also noted that the biodiversity assessment process under the new *Biodiversity Conservation Act 2016* is planned to commence later in 2017, however, as the biodiversity assessment has been substantially progressed under the FBA process, it will completed using the FBA.

7.7.1 Survey and Assessment Methodology

Biodiversity was identified a key issue for the MCCO Project during the early phases of project planning and exploration and detailed surveys and a preliminary assessment were undertaken so that biodiversity values could be considered during project design. This survey and preliminary assessment work included:

- ecological database searches and detailed literature review in order the identify the suite of threatened species, endangered populations and threatened ecological communities (TECs) that were previously recorded or considered likely to occur within the MCCO Additional Project Area
- review of the vegetation survey and mapping, including TEC identification completed as part of the Mangoola UHSA project (Umwelt 2015) to determine the extent and composition of ecological communities occurring within the pre-feasibility assessment area
- targeted field surveys undertaken during 2014, 2015, 2016 and 2017 to ensure appropriate seasonal survey coverage of the site in accordance with the requirements of the FBA, with targeted threatened species surveys, vegetation and floristic survey, threatened species polygon mapping refinement in accordance with updated survey and mapping guidelines (particularly the large-footed myotis (OEH 2016)), and aquatic habitat survey

- detailed survey and mapping to determine the extent of Hunter Valley Eucalypt Forest and Woodland critically endangered ecological community (CEEC) and White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the EPBC Act

- preliminary offset analysis using the FBA methodology in order to advise the Glencore MCCO team regarding key ecological impacts that should be avoided and minimised where possible as part of Project design and the likely extent of ecosystem and species-credits required to offset the impacts of the MCCO Project.

A summary of the outcomes of the biodiversity survey and preliminary assessment with regards to the key biodiversity features and values of the MCCO Additional Project Area are presented below and a summary of the flora, vegetation and fauna surveys undertaken for the MCCO Project are shown on **Figures 7.1** and **7.2**.

7.7.2 Biodiversity Features and Values

7.7.2.1 Vegetation Communities

Ten native Plant Community Types (PCTs) have been mapped within the MCCO Additional Project Area. **Table 7.2** outlines the PCTs recorded along with their condition classes and the approximate area of each PCT within the MCCO Additional Project Area. **Figure 7.3** shows preliminary vegetation mapping of the MCCO Additional Project Area (to be finalised following receipt of regional vegetation mapping data from OEH).

7.7.2.2 Threatened Ecological Communities

Four threatened ecological communities (TECs) listed under the TSC Act and two TECs listed under the EPBC Act have been recorded within MCCO Additional Project Area. These are:

TSC Act

- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions Endangered Ecological Community (EEC)
- White Box Yellow Box Blakely's Red Gum Woodland EEC
- Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions EEC, and
- Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion Vulnerable Ecological Community (VEC).

EPBC Act

- White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC), and
- Central Hunter Valley Eucalypt Forest and Woodland CEEC.

Four small patches of weeping myall (*Acacia pendula*) have been recorded in the MCCO Additional Project Area. Preliminary floristic analysis of these areas suggests that these areas don't meet the floristic composition or structural requirements to form the woodland TEC under the TSC Act or EPBC Act. Further analysis will be undertaken as part of the EIS process.

Table 7.2 Area of Plant Community Types Mapped within the MCCO Additional Project Area

Plant Community Type	Condition	Conservation status		Area (ha)
		TSC Act	EPBC Act	
479 Narrow-leaved Ironbark-Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	Moderate to Good	Nil	Potential Central Hunter Valley Eucalypt Forest and Woodland CEEC where this community occurs within 30 metres of woodland patches and is on the Wappinguy soil landscape (Kovac and Lawrie 1991)	0.2
624 Large-fruited Grey Gum - Narrow-leaved Stringybark open forest on sheltered sandstone hillslopes in the Scone region of the upper Hunter Valley	Moderate to Good	Nil	Nil	0.3
1598 Forest Red Gum Grassy Open Forest on Floodplains of the Lower Hunter	Moderate to Good	Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions EEC	Potential White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	44.7
1598 Forest Red Gum Grassy Open Forest on Floodplains of the Lower Hunter	Moderate to Good – Derived Native Grassland	White Box Yellow Box Blakely's Red Gum Woodland EEC	Potential White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	8.4
1602 Spotted Gum - Narrow-leaved Ironbark Shrub - Grass Open Forest of the Central and Lower Hunter	Moderate to Good	Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions EEC	Central Hunter Valley Eucalypt Forest and Woodland CEEC where this community occurs on the Wappinguy soil landscape (Kovac and Lawrie 1991)	19.3
1603 Narrow-leaved Ironbark –	Moderate	Nil	Central Hunter Valley Eucalypt Forest and Woodland CEEC	324.5

Plant Community Type	Condition	Conservation status		Area (ha)
		TSC Act	EPBC Act	
Bull Oak - Grey Box shrub – grass open forest of the central and lower Hunter	to Good Derived Native Grassland		where this community occurs within 30 metres of woodland patches and is on the Wappinguy soil landscape (Kovac and Lawrie 1991)	
1603 Narrow-leaved Ironbark – Bull Oak - Grey Box shrub – grass open forest of the central and lower Hunter	Moderate to Good	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC	Central Hunter Valley Eucalypt Forest and Woodland CEEC where this community occurs on the Wappinguy soil landscape (Kovac and Lawrie 1991)	220.0
1603 Narrow-leaved Ironbark – Bull Oak - Grey Box shrub – grass open forest of the central and lower Hunter	Moderate to Good – Degraded Grassland	Nil	Central Hunter Valley Eucalypt Forest and Woodland CEEC where this community occurs within 30 metres of woodland patches and is on the Wappinguy soil landscape (Kovac and Lawrie 1991)	159.3
1607 Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked Apple shrubby woodland of the upper Hunter	Moderate to Good	White Box Yellow Box Blakely's Red Gum Woodland EEC	White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	7.6
1612 Narrow-leaved Ironbark - Grey Gum - Native Olive woodland of Central Hunter	Moderate to Good	Nil	Nil	8.0
1612 Narrow-leaved Ironbark - Grey Gum - Native Olive woodland of Central Hunter	Moderate to Good – Myall	Nil	Nil	0.8
1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin	Moderate to Good - Derived Native Grassland	Nil	Central Hunter Valley Eucalypt Forest and Woodland CEEC where this community occurs within 30 metres of woodland patches and is on the Wappinguy soil landscape (Kovac and Lawrie 1991)	25.7

Plant Community Type	Condition	Conservation status		Area (ha)
		TSC Act	EPBC Act	
1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin	Moderate to Good	Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion VEC	Potential to meet floristic and other diagnostic criteria of Central Hunter Valley Eucalypt Forest and Woodland CEEC, however occurrences are not on Permian sediments according to the Singleton Soil Landscapes which preclude it (Kovac and Lawrie 1991)	10.6
1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slopes of the upper Hunter and Sydney Basin	Moderate to Good - Degraded Grassland	Nil	Nil	79.3
1692 Bull Oak Grassy Woodland of the Central Hunter Valley	Moderate to Good	Nil	Potential to meet floristic and other diagnostic criteria of Central Hunter Valley Eucalypt Forest and Woodland CEEC, however occurrences are not on Permian Sediments according to the Singleton Soil Landscapes which preclude it (Kovac and Lawrie 1991)	30.8
1692 Bull Oak Grassy Woodland of the Central Hunter Valley	Moderate to Good - Derived Native Grassland	Nil	Potential to be included in the 30 metre buffer surrounding woodland patches of the Central Hunter Valley Eucalypt Forest and Woodland CEEC, however occurrences are not on Permian sediments according to the Singleton Soil Landscapes which preclude it (Kovac and Lawrie 1991)	1.7
1731 Swamp Oak - Weeping Grass Grassy Riparian Forest of the Hunter Valley	Moderate to Good	Nil	Nil	5.9
Total area of native vegetation in the MCCO Additional Project Area				947.2

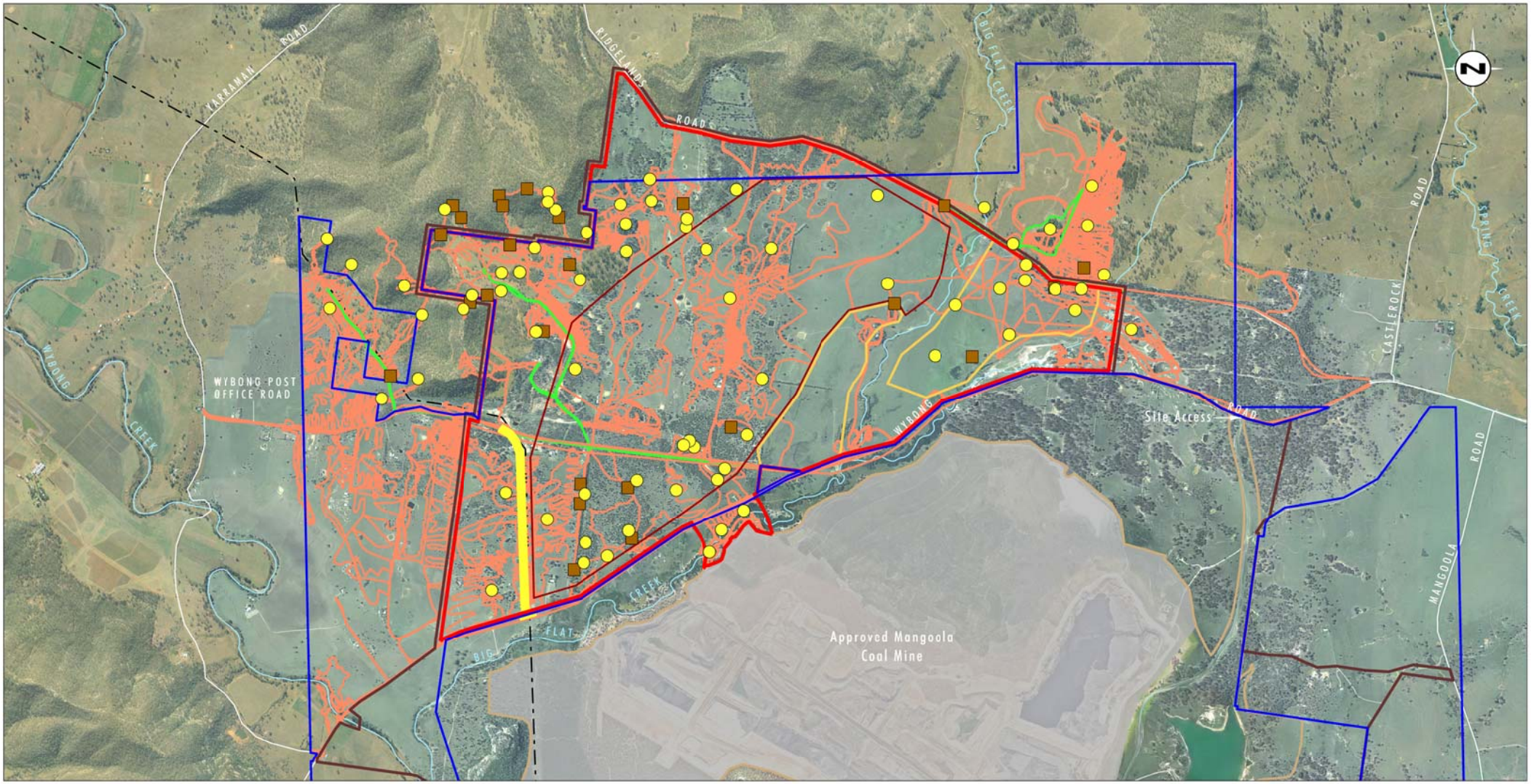

Image Source: Glencore (April 2017)
Data Source: Glencore (2016)

0 0.5 1.0 2.0km
1:40 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9 Boundary
- Proposed Additional Mining Area
- Proposed Emplacement Area
- 500kV Transmission Line
- Indicative Wybong Post Office Road Realignment
- Flora Plots/Transect
- Semi-quantitative Rapid Sampling Plot
- Driving Track
- Ecological Survey Transect

FIGURE 7.1

Flora Survey Effort

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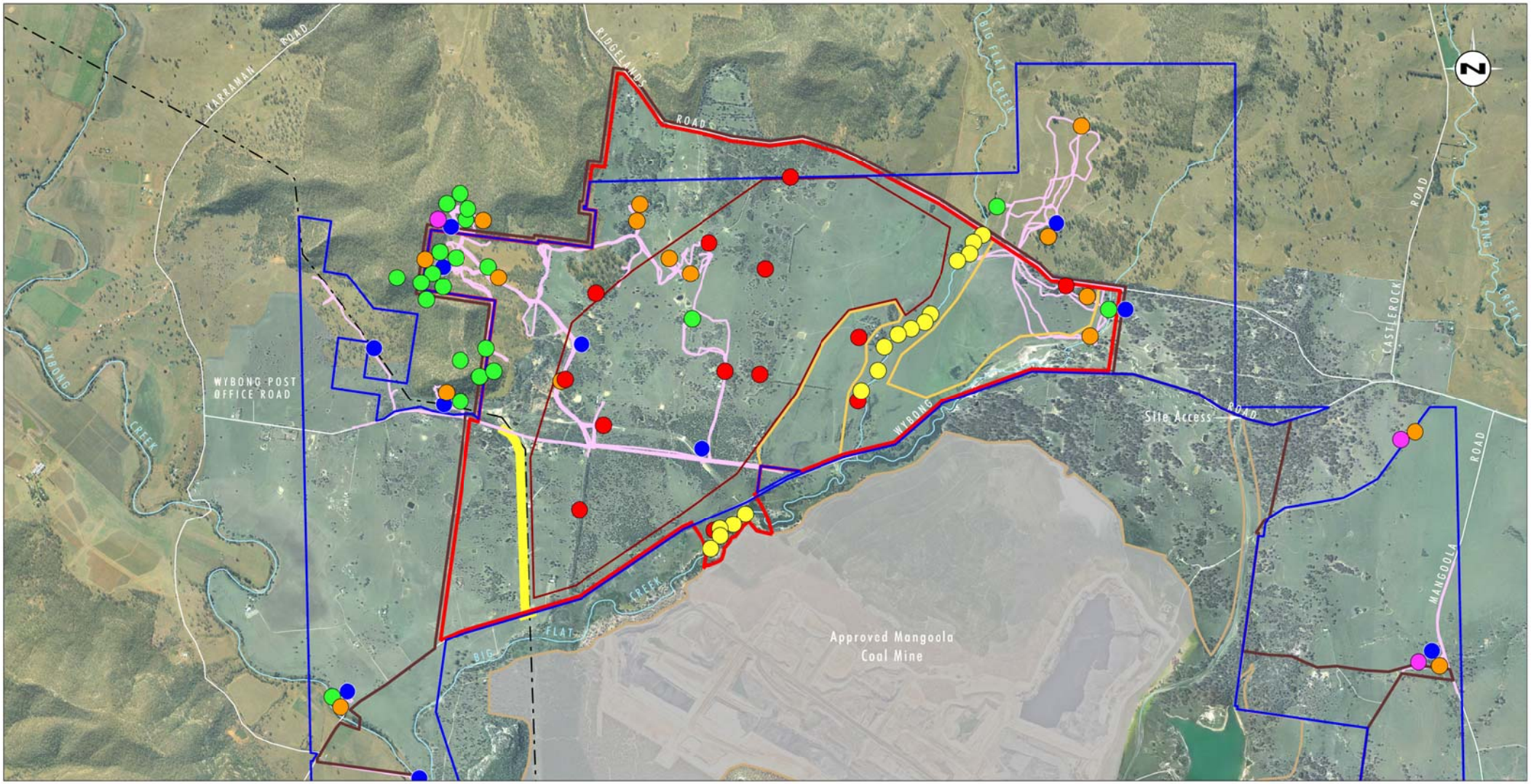

Image Source: Glencore (April 2017)
Data Source: Glencore (2017)

0 0.5 1.0 2.0km
1:40 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9 Boundary
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Winter Bird Survey (2016)
- Anabat Survey
- Remote Camera
- Pink-tailed Worm-lizard Search
- Koala SAT Searches
- Aquatic Survey Points
- Driving Spotlight Transects
- Indicative Wybong Post Office Road Realignment
- 500kV Transmission Line

FIGURE 7.2

Fauna Survey Effort

File Name (A4): R03/4004_034.dgn
20170721 12.01

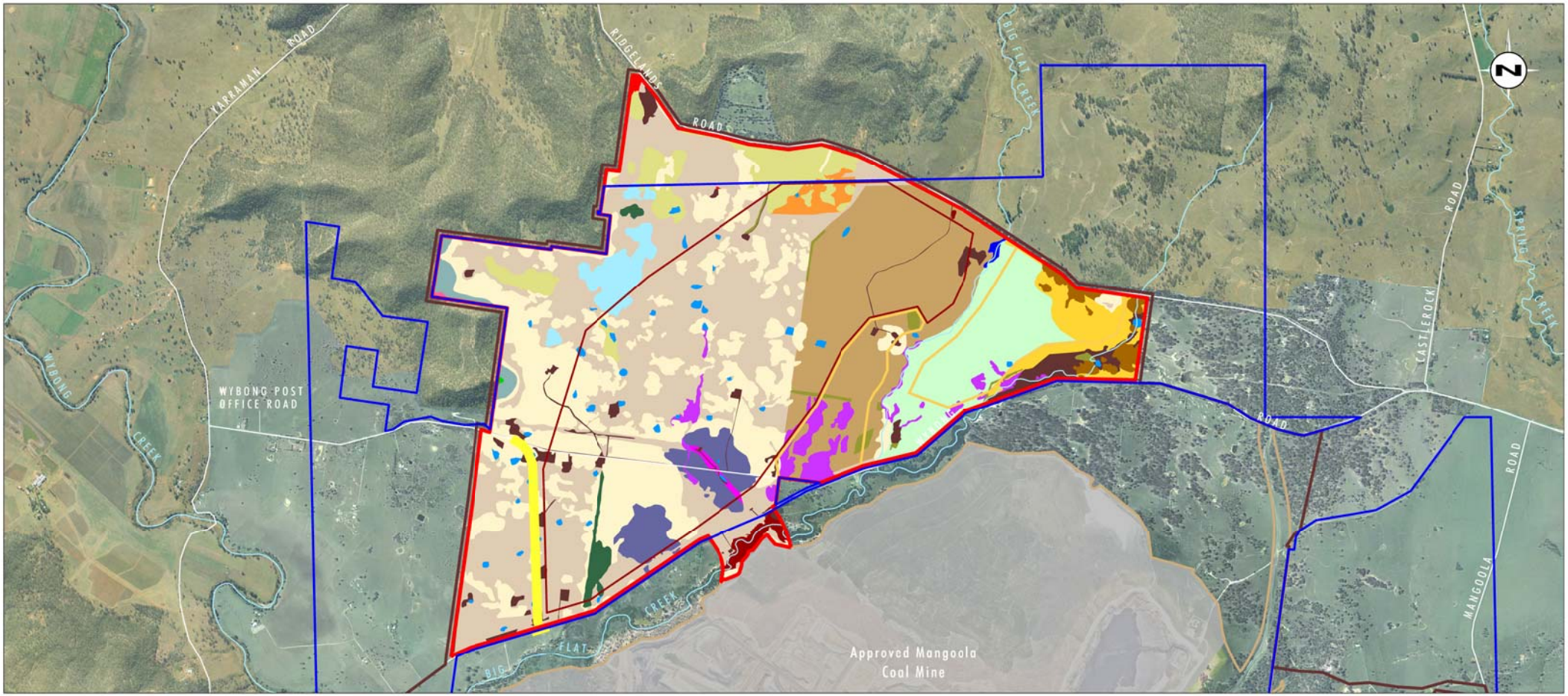

Image Source: Glencore (April 2017) Data Source: Glencore (2017)

0 0.5 1.0 2.0km
1:40 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9 Boundary
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Indicative Wybong Post Office Road Realignment
- Disturbed Land
- Exotic Grassland
- Exotic Rushland
- Mixed Species Revegetation Plantation
- Water Body
- 479 Narrow-leaved Ironbark- Black Cypress Pine - stringybark shrubby open forest -Moderate to Good
- 624 Large-fruited Grey Gum - Narrow-leaved Stringybark open forest - Moderate to Good
- 1598 Forest Red Gum Grassy Open Forest - Moderate to Good
- 1598 - Moderate to Good - Derived Native Grassland
- 1603 Narrow-leaved Ironbark - Grey Box grassy woodland - Moderate to Good
- 1602 Spotted Gum - Narrow-leaved Ironbark Shrub - Grass Open Forest - Moderate to Good
- 1603 - Moderate to Good - Degraded Native Grassland
- 1603 - Moderate to Good - Derived Native Grassland
- 1607 Blakely's Red Gum - Ironbark - Rough-barked Apple shrubby woodland - Moderate to Good
- 1612 Narrow-leaved Ironbark - Grey Gum - Native Olive woodland - Moderate to Good
- 1612 - Moderate to Good - Myall
- 1655 Grey Box - Slaty Box shrub - grass woodland on sandstone slope - Moderate to Good Condition
- 1655 - Moderate to Good - Degraded Native Grassland
- 1655 - Moderate to Good - Derived Native Grassland
- 1692 - Bull Oak Grassy Woodland - Moderate to Good Condition
- 1692 - Moderate to Good - Derived Native Grassland
- 1731 Swamp Oak - Weeping Grass Grassy Riparian Forest - Moderate to Good

FIGURE 7.3

Vegetation Communities

7.7.2.3 State Listed Threatened Flora Species and Endangered Populations

Three threatened flora species and/or endangered populations were recorded in the MCCO Additional Project Area, being:

- pine donkey orchid (*Diuris tricolor*) listed as Vulnerable and Endangered Population under the TSC Act
- Tarengo leek orchid (*Prasophyllum petilum*), listed as Endangered under the TSC Act and the EPBC Act and
- weeping myall (*Acacia pendula*) listed as an Endangered Population under the TSC Act.

All three of these threatened flora species are known from the wider locality with large populations of each extending well beyond the MCCO Additional Project Area in all directions (refer to **Figure 7.4**). No other threatened species or endangered populations are expected to occur within the MCCO Additional Project Area.

In addition, Mangoola Coal has implemented a Translocation Plan for the salvage and relocation of threatened orchid species (i.e. *Diuris tricolor and Prasophyllum petilum*) that are affected by progression of mining activities. Individuals were planted into trial plots within sections of Mangoola Coal Mine rehabilitation as part of a rehabilitation research project.

7.7.2.4 State Listed Threatened Fauna Species and Habitat

Forty-six threatened fauna species were identified from database searches and as an outcome of the literature review as occurring or as having potential to occur within the MCCO Additional Project Area (refer to **Figure 7.5**). Targeted threatened fauna species surveys were subsequently completed across the MCCO Additional Project Area with the following threatened species recorded:

- squirrel glider (*Petaurus norfolcensis*)
- glossy black-cockatoo (*Calyptorhynchus lathami*)
- grey-crowned babbler (*Pomatostomus temporalis temporalis*)
- speckled warbler (*Chthonicola sagittata*)
- varied sittella (*Daphoenositta chrysoptera*)
- eastern bent-wing bat (*Miniopterus schreibersii oceanensis*)
- southern myotis (*Myotis macropus*)
- yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*)
- large-eared pied bat (*Chalinolobus dwyeri*).

Of the threatened fauna species identified above, the southern myotis (*Myotis macropus*) and large-eared pied bat (*Chalinolobus dwyeri*) will generate species-credit requirements for the MCCO Project, based on the preliminary application of the FBA.

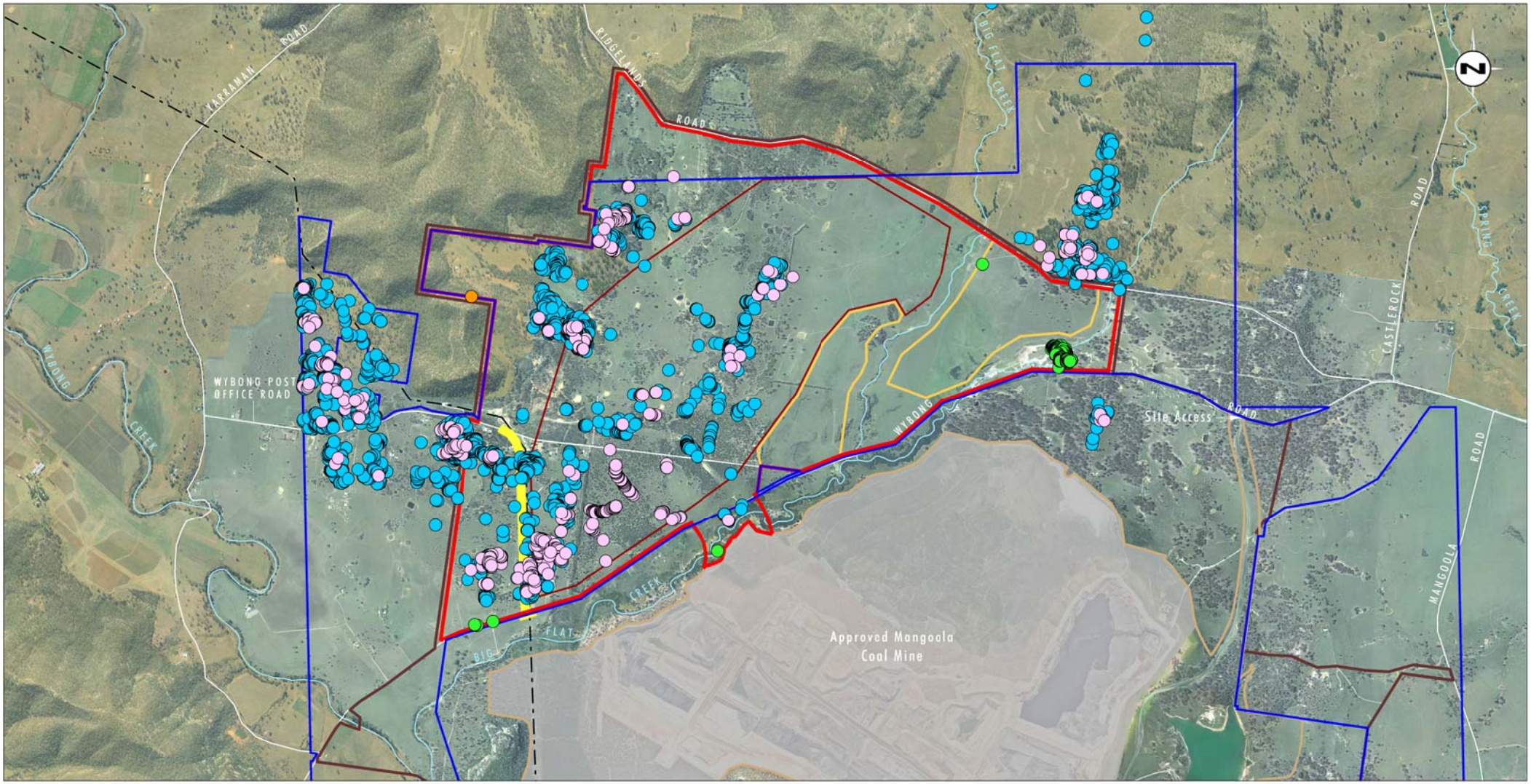

Image Source: Glencore (April 2017)
Data Source: Glencore (2017)

0 0.5 1.0 2.0km
1:40 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Distrurbance Area
- AL9 Boundary
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Existing 500kV Transmission Line
- Indicative Wybong Post Office Road Realignment
- *Acacia pendula*
- *Cymbidium canaliculatum*
- *Diuris tricolor*
- *Prasophyllum petilum*

FIGURE 7.4

Threatened Flora Species Records

File Name (A4): R03/4004_036.dgn
20170721 13.26

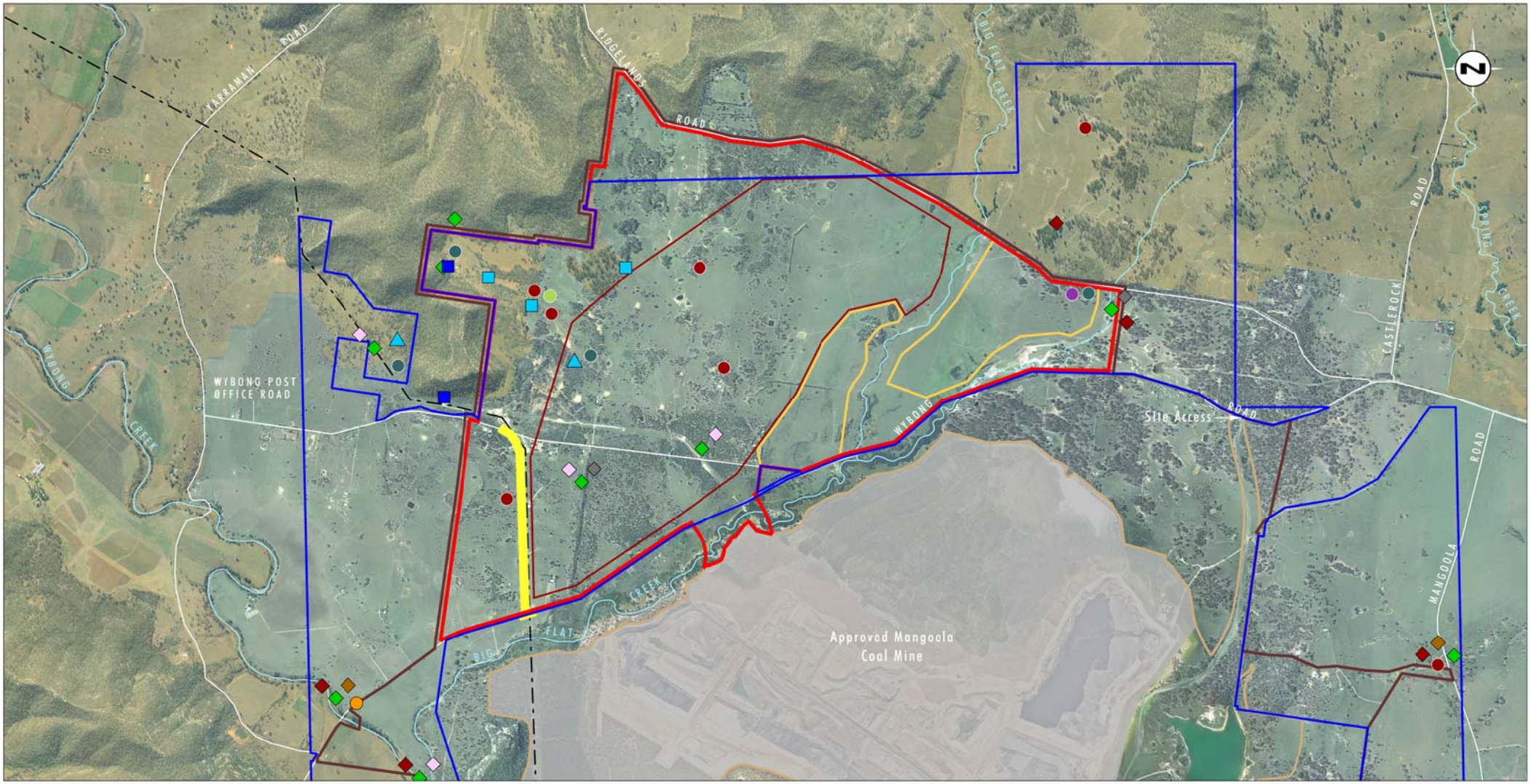

Image Source: Glencore (April 2017)
Data Source: Glencore (2017)

0 0.5 1.0 2.0km
1:40 000

Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Mangoola Coal Mine Disturbance Area
- AL9 Boundary
- Proposed Additional Mining Area
- Proposed Emplacement Area
- Grey-crowned Babbler
- Speckled Warbler
- Spotted Harrier
- Varied Sittella
- Little Eagle
- Eastern Bent-wing Bat Foraging Record
- Eastern Cave Bat Foraging Record
- East Coast Freetail-bat
- Southern Myotis
- Yellow-bellied Sheathtail-bat
- Brush-tailed Rock-wallaby Scat Record
- Squirrel Glider
- Glossy Black-cockatoo
- Indicative Wybong Post Office Road Realignment
- 500kV Transmission Line

FIGURE 7.5

Threatened Fauna Species Records

File Name (A4): R03/4004_037.dgn
20170721 12.13

7.7.2.5 Relevant Matters of National Environmental Significance

As discussed in **Section 5.1.4**, a referral is currently being prepared for the MCCO Project. The following MNES have been recorded and will interact with the MCCO Project:

- Central Hunter Valley Eucalypt Forest and Woodland CEEC
- White Box- Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
- Weeping Myall Woodlands CEEC
- Tarengo leek orchid (Prasophyllum petilum)
- large-eared pied bat (Chalinolobus dwyeri) habitat.

The regent honeyeater (*Anthochaera phrygia*) and the swift parrot (*Lathamus discolor*), both listed as critically endangered under the EPBC Act, have been recorded in the region however they have not been recorded within the MCCO Additional Project Area despite targeted survey over multiple years. The regent honeyeater and swift parrot are considered to have potential to occur in areas of appropriate winter-flowering eucalypt habitat.

7.8 Agriculture

An Agricultural Impact Statement (AIS) is required as part of any EIS that is submitted for a mining project that is SSD. The NSW Government has prepared guidelines to facilitate the preparation of an AIS in NSW. These guidelines also assist applicants and others to understand the information required to enable an assessment of the agricultural impacts of mining and other resource extraction proposals.

The land within the MCCO Additional Project Area is owned by Mangoola Coal and is currently used for low intensity grazing and rural residential living. In addition to these land uses, parcels of land surrounding the MCCO Additional Project Area are also used for environmental conservation purposes.

As discussed in **Section 5.1.2** a site verification certificate will be sought for the MCCO Project to confirm the absence of BSAL.

An AIS will be prepared for the MCCO Project to assess the potential interactions of the Project with agricultural land uses and on land with potential agricultural value. The assessment will be prepared following the AIS guidelines and will include:

- identification of potential impacts of the MCCO Project on agricultural resources within the proposed disturbance area and the surrounding locality
- identification of any potential impact to agricultural productivity within the proposed disturbance area and the surrounding locality
- identification of any other risks to agriculture such as water availability, weed management, noise, air quality and socio-economic based on the outcomes of each relevant specialist study
- identification of the total area of land that is to be disturbed as a direct result of the MCCO Project including the identification of the soil and land capability class, agricultural suitability, soil type and carrying/cropping capacity of this land

- identification of opportunities for agricultural land uses as part of the final land use for the Proposed Additional Mining Area

- review of the potential socio-economic impacts, specifically as they may relate to agricultural support services within the locality of the Proposed Additional Mining Area. This will be incorporated into the broader social impact and opportunities assessment and economic assessment for the MCCO Project as relevant (refer to **Sections 7.1** and **7.14** respectively), and

- analysis of potential cumulative impacts to agriculture.

Any required mitigation and management measures will also be identified as part of this assessment process.

7.9 Aboriginal Cultural Heritage and Archaeology

The MCCO Project will result in disturbance of some previously undisturbed areas, including areas known to contain Aboriginal sites due to archaeological survey work undertaken at the site. The proposed additional disturbance areas will be assessed as part of the MCCO Project.

A detailed consultation, engagement and survey process will be undertaken with the Aboriginal community to identify the cultural significance of the MCCO Additional Project Area. This process will be undertaken in accordance with *National Parks and Wildlife Act 1974 (NSW)* and the following guidelines to facilitate the development of an Aboriginal Cultural Heritage Assessment Report (ACHAR):

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010)

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010a)

- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b), and

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

The preparation of the ACHAR will also include an Aboriginal archaeological values assessment for inclusion in the EIS.

The MCCO Project has the potential to impact both known Aboriginal sites and unidentified Aboriginal sites and areas of cultural heritage value. Potential impacts will be identified and addressed as part of the Aboriginal archaeological and cultural heritage assessments, in consultation with the Registered Aboriginal Parties.

As part of the archaeological and cultural heritage study, a comprehensive field survey will completed by archaeologists, including field assistance by Aboriginal stakeholders.

The ACHAR will be compiled with detailed input from all Knowledge Holder groups and in consultation with the Registered Aboriginal Parties. The assessment will outline areas and places of cultural significance in addition to any potential impacts associated with the MCCO Project. The archaeological assessment report will be integrated with the cultural heritage assessment report, both of which will outline mitigation and management measures proposed to be implemented on site, in addition to a consideration of cultural heritage conservation outcomes. Any sensitive information identified by the Knowledge Holders will be provided as separate confidential information with distribution restricted to Mangoola and relevant government agencies.

7.10 Historic Heritage

Historic heritage is commonly used to describe heritage that is not Aboriginal heritage (although many historical heritage places have Aboriginal associations) and can include buildings, structures, archaeological sites/relics, works (roads, bridges etc.), precincts/conservation areas, rural landscapes and movable items.

The potential impacts of the MCCO Project on historical heritage items will be considered as part of the EIS. Based on existing knowledge of the area and the current layout of the MCCO Project, any as yet unidentified potential heritage items that may be present within the MCCO Additional Project Area are likely to be of local significance only and it is unlikely that any significant heritage items will be impacted by the Project.

The historic heritage assessment for the MCCO Project will be prepared in accordance with the relevant professional standards and guidelines, including the *NSW Heritage Manual 1996, Archaeological Assessments and Assessing Heritage Significance* and with consideration of the principles contained in the *Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance*. The assessment will include the following:

- historical research focusing on any areas identified with potential historical heritage or archaeological significance. The research may include archival research in the State Library of NSW, State Records, Regional Libraries, a review of Muswellbrook Council records and maps (if available) and a review of any available air photographs and parish maps
- consultation with local historical societies where appropriate
- targeted historical land title searches to identify any areas of high historical heritage or archaeological potential
- targeted inspection of the proposed disturbance area to identify any potential historical heritage items
- preparation of a detailed historical and archaeological context, in which to assess the significance of any potential historical archaeological resource or heritage item present within the proposed disturbance area
- preparation of an assessment of the significance of any identified sites in the proposed disturbance area, according to established significance assessment criteria outlined by the Heritage Branch, OEH Assessing Heritage Significance guidelines, and
- preparation of a Statement of Heritage Impact indicating the likely effect of proposed works on any potential historical archaeological resource or heritage item identified or previously known within the proposed disturbance area and whether further management/investigation is warranted.

7.11 Traffic and Transport

The local road network within the vicinity of the Proposed Additional Mining Area includes Wybong Road, Yarraman Road, Ridgelands Road, Castlerock Road and Mangoola Road (refer to **Figure 2.1**). Traffic associated with the Mangoola Coal Mine accesses the site via a dedicated access road from Wybong Road, situated approximately 500 metres west of the junction between Wybong and Ridgelands Roads.

Mangoola Coal Mine has previously completed upgrades of the key road used to access the site (Wybong Road). The existing site access restrictions on use of local roads by Mangoola Coal Mine will continue to apply. Restrictions on mine related traffic are currently in place for Mangoola Road, Castle Rock Road,

Ridgelands Road and Reedy Creek Road. Mangoola also makes an annual contribution to the upkeep of Wybong Road to Muswellbrook Shire Council.

As discussed in **Section 3.8**, the MCCO Project includes realignment of an approximately 2 km section of Wybong Post Office Road to accommodate the proposed Additional Mining Area. It is also anticipated that the MCCO Project will require approximately 120 workers during the construction phase which will temporarily increase the traffic movements into the site during the construction phase. The MCCO Project is not planned to change the number of operational employees, however, it will extend the life of the mine.

A traffic impact assessment will be completed as part of the EIS for the MCCO Project to assess the impacts of these changes.

The traffic impact assessment will include:

- a review of existing traffic count data for the nearby or potentially affected road network
- an assessment of the existing road network that will be used in the construction and operation phases. This will include road widths, intersection treatments, compliance with current standards, existing traffic volumes and vehicle classification using the road network
- an assessment of the adequacy of intersections and the general traffic routes to accommodate the proposed increase in vehicle numbers during construction, and
- assessment of the traffic and transport impacts during both the construction and operational phases of the MCCO Project including:
    - level of service on the road network
    - impacts of the MCCO Project on the road network, including the proposed realignment of Wybong Post Office Road
    - physical condition of the roads related to the MCCO Project including capacity of the networks
    - potential road safety issues
    - potential cumulative impacts associated with any other approved mining and/or other projects in the area, and
    - identification of any impact mitigation measures required.

As discussed in **Section 3.5**, the MCCO Project will not result in any changes to the approved capacity of the Mangoola train loading facility or changes to the approved volume of coal moved through this facility. Therefore, no assessment of train movement impacts is planned to be undertaken for the MCCO Project.

7.12 Visual Amenity

The visual character of the Upper Hunter region is typified by contrasting landscapes from the native vegetation areas on the slopes bordering the valley, to cleared grazing land, areas of intensive agriculture along the alluvial river flats, residential areas, major industrial developments and coal mining areas.

The industrial nature of some sections the Upper Hunter is highly apparent from Wybong Road, which contrasts this with views of productive agricultural land and views of the Hunter River. Train loading facilities, mined surfaces and high voltage power lines contribute to the visual environment of the immediate region surrounding the Mangoola Coal Mine.

In general, due to the locality of the Proposed Additional Mining Area, and the surrounding topography, most private residences are expected to have either low or limited visual impact from the MCCO Project, with primarily long distance views. However, elements, such as the proposed Wybong Road / Big Flat Creek overpass, overburden emplacement areas and associated infrastructure will be visible from some viewing locations, including Wybong Road and Ridgelands Road.

The approved project disturbance area of the Mangoola Coal Mine will have ongoing visibility for some residences, with these impacts being previously assessed and approved.

A detailed visual assessment will be undertaken using a combination of digital terrain modelling, view-shed analysis and the preparation of photomontages to determine potential viewing locations and assessment of the potential impacts at these locations as a result of the MCCO Project. The photomontages will include an image of the current view from pre-determined viewing locations and an image representing what the view will be from each viewing location at various stages of the MCCO Project.

Where impacts are identified, visual management and mitigation measures will be identified. Key mitigation measures will include progressive rehabilitation and development of an appropriate landform that incorporates natural design principles.

7.13 Greenhouse Gas Emissions

A Greenhouse Gas and Energy Assessment (GHGEA) will be undertaken as part of the EIS to determine the projected energy consumption and greenhouse gas (GHG) emissions as a direct result of the MCCO Project. The GHGEA will include:

- estimation of scope 1, 2 and 3 emissions associated with the construction of the MCCO Project. Greenhouse gas emissions will be calculated from data relating to the energy and materials required for the proposed construction activities
- estimation of scope 1 and 2 life of mine (LOM) emissions generated by the operations. Emission sources will include fugitive emissions and energy use
- estimation of scope 3 LOM emissions associated with the operation of the MCCO Project. Emission sources will include product transport and product use
- estimation of scope 1, 2 and 3 emissions associated with the decommissioning and closure of the MCCO Project. Emission sources will include the energy required to reshape and rehabilitate the mine footprint at the cessation of mining
- assessing the impact of the MCCO Project's emissions on the environment
- evaluation of the impact of the MCCO Project's emissions on state, national and international greenhouse gas emission targets where appropriate and
- assessment of the relevant reasonable and feasible mitigation measures to reduce the impact of the MCCO Project.

7.14 Economic Impacts

There are a range of potential economic impacts associated with the MCCO Project which will be assessed as part of the EIS. These include an assessment of the economic impacts of the MCCO Project on a local, regional and State scale, including consideration of the benefits and costs associated with the MCCO Project.

From an economic perspective, there are two important aspects of the MCCO Project, being:

- the economic efficiency of the MCCO Project (i.e. consideration of economic costs and benefits), and
- the economic impacts of the MCCO Project (i.e. the economic activity that the MCCO Project would provide to the local, regional and State economies).

A detailed Economic Impact Assessment will be undertaken as part of the EIS, and will include:

- a cost benefit analysis that measures the net benefits of the MCCO Project to the State in accordance with the *Guidelines for the economic assessment of mining and coal seam gas proposals* (2015)
- a Local Effects Analysis that measures the net benefits of the MCCO Project to the local community
- an economic impact assessment of the construction and operation of the MCCO Project, and
- consideration of the environmental and community impacts of the MCCO Project.

7.15 Mine Closure and Rehabilitation

A mine closure assessment will be prepared for the MCCO Project. The assessment will draw together the assessment of soils, land capability, agricultural land use, rehabilitation and decommissioning. The assessment will include:

- development of conceptual closure criteria that will drive rehabilitation and closure outcomes
- continued use of natural landform design methodologies as successfully implemented by Mangoola to develop a conceptual final landform based on stable natural slopes in the local environment applicable to the materials being used in the rehabilitation
- development of a conceptual final land use strategy with consideration given to surrounding land uses, existing agricultural suitability of the Proposed Additional Mining Area and potential future uses of the Proposed Additional Mining Area
- development of a rehabilitation strategy for the mine, including a selection of ecological rehabilitation measures appropriate to the diversity of habitat to be formed by the landform development where appropriate, and
- identification of the measures proposed to manage any identified risks to the successful rehabilitation and closure of the mine.

The final landform will be designed in consideration of the rehabilitation objectives and requirements of the relevant government agencies, in particular the requirements of DRG.

As discussed in **Section 3.0**, the MCCO Project will involve distribution of overburden between the existing mine and the proposed Additional Mining Area in order to optimise the final landform design of the combined operation. The design of the emplacement areas and final landform will be refined throughout the assessment process and will include establishment of a final landform in line with current design standards at Mangoola Coal Mine including use of micro-relief and with height of overburden emplacement up to approximately 240 m RL, consistent with the existing site. A final void will remain in the north-west of the proposed Additional Mining Area with further integrated mine planning work to be completed with the aim to optimise the final landform and void strategy for the combined operations.

The rehabilitation strategy will include the identification of preliminary rehabilitation criteria, land use options and closure objectives. The rehabilitation strategy will be developed as part of the design phase of the MCCO Project, in consideration of the findings of the ecological assessment and of any feedback on this issue from the stakeholder engagement program.

8.0 Project Schedule

Based on current project timing, Mangoola intends to lodge the EIS for the MCCO Project in mid-2018. Approval for the MCCO Project is sought in late 2019 / early 2020 allowing for commencement of the MCCO Project related development in 2020 following establishment of all required post approvals and permitting.

9.0 References

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APPENDIX 1

Schedule of Land – MCCO Project

Schedule of Land – MCCO Project

Lot	DP	Owner
Existing Approved Schedule of Land		
12	842072	Mangoola Coal Operations Pty Ltd
160	750968	Mangoola Coal Operations Pty Ltd
11	842072	Mangoola Coal Operations Pty Ltd
227	750968	Mangoola Coal Operations Pty Ltd
199	750968	Mangoola Coal Operations Pty Ltd
193	750968	Mangoola Coal Operations Pty Ltd
185	750924	Mangoola Coal Operations Pty Ltd
31	735121	Mangoola Coal Operations Pty Ltd
7004	931189	The State of New South Wales
2170	706389	Mangoola Coal Operations Pty Ltd
188	750924	Mangoola Coal Operations Pty Ltd
912	588390	Mangoola Coal Operations Pty Ltd
911	588390	Mangoola Coal Operations Pty Ltd
218	750968	Mangoola Coal Operations Pty Ltd
201	706571	Mangoola Coal Operations Pty Ltd
163	750968	Mangoola Coal Operations Pty Ltd
162	750968	Mangoola Coal Operations Pty Ltd
93	750968	Mangoola Coal Operations Pty Ltd
1	1014899	Mangoola Coal Operations Pty Ltd
62	750968	Mangoola Coal Operations Pty Ltd
46	750968	Mangoola Coal Operations Pty Ltd

Lot	DP	Owner
Existing Approved Schedule of Land		
45	750968	Mangoola Coal Operations Pty Ltd
42	750968	Mangoola Coal Operations Pty Ltd
41	750968	Mangoola Coal Operations Pty Ltd
40	750968	Mangoola Coal Operations Pty Ltd
39	750968	Mangoola Coal Operations Pty Ltd
216	750968	Mangoola Coal Operations Pty Ltd
215	750968	Mangoola Coal Operations Pty Ltd
212	750968	Mangoola Coal Operations Pty Ltd
211	750968	Mangoola Coal Operations Pty Ltd
210	750968	Mangoola Coal Operations Pty Ltd
209	750968	Mangoola Coal Operations Pty Ltd
205	750968	Mangoola Coal Operations Pty Ltd
204	750968	Mangoola Coal Operations Pty Ltd
196	750968	Mangoola Coal Operations Pty Ltd
192	750968	Mangoola Coal Operations Pty Ltd
191	750968	Mangoola Coal Operations Pty Ltd
190	750968	Mangoola Coal Operations Pty Ltd
189	750968	Mangoola Coal Operations Pty Ltd
88	750968	Mangoola Coal Operations Pty Ltd
230	869334	Mangoola Coal Operations Pty Ltd
257	706955	Mangoola Coal Operations Pty Ltd
23	622786	Mangoola Coal Operations Pty Ltd

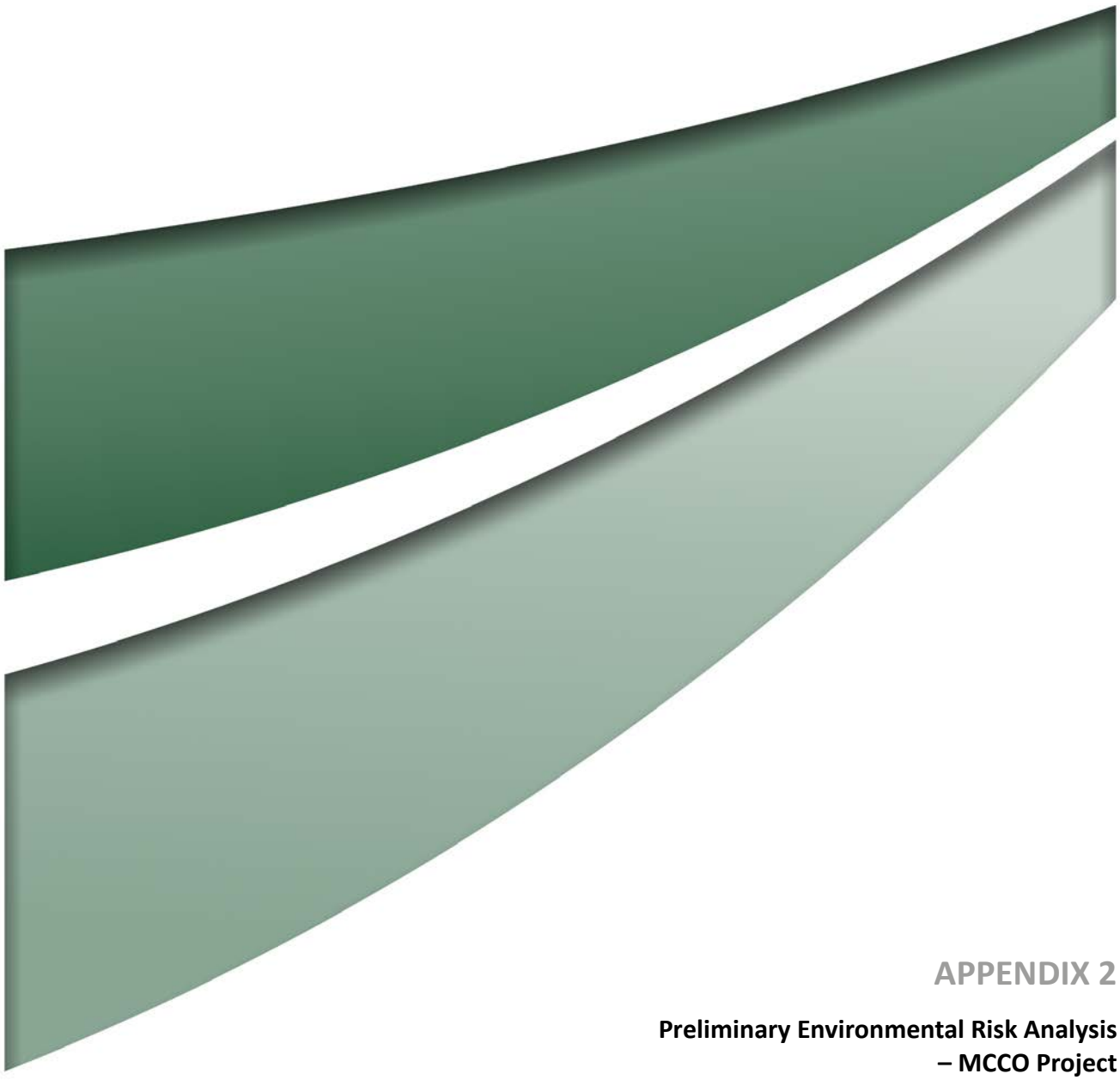
Lot	DP	Owner
Existing Approved Schedule of Land		
155	750968	Mangoola Coal Operations Pty Ltd
195	750968	Mangoola Coal Operations Pty Ltd
194	750968	Mangoola Coal Operations Pty Ltd
2171	706389	Mangoola Coal Operations Pty Ltd
11	112946	Mangoola Coal Operations Pty Ltd
23	8090	Mangoola Coal Operations Pty Ltd
22	8090	Mangoola Coal Operations Pty Ltd
21	8090	Mangoola Coal Operations Pty Ltd
101	805458	Mangoola Coal Operations Pty Ltd
41	805505	Mangoola Coal Operations Pty Ltd
13	842072	Mangoola Coal Operations Pty Ltd
229	726283	The State of New South Wales
173	750968	Mangoola Coal Operations Pty Ltd
41	850807	Mangoola Coal Operations Pty Ltd
12	230283	Mangoola Coal Operations Pty Ltd
112	531273	Mangoola Coal Operations Pty Ltd
111	531273	Mangoola Coal Operations Pty Ltd
100	805458	Mangoola Coal Operations Pty Ltd
22	622786	Mangoola Coal Operations Pty Ltd
21	622786	Mangoola Coal Operations Pty Ltd
32	735121	Mangoola Coal Operations Pty Ltd
42	805505	Mangoola Coal Operations Pty Ltd

Lot	DP	Owner
Existing Approved Schedule of Land		
1	950763	Mangoola Coal Operations Pty Ltd
634	748470	Mangoola Coal Operations Pty Ltd
633	748470	Mangoola Coal Operations Pty Ltd
32	750968	Mangoola Coal Operations Pty Ltd
156	750968	Mangoola Coal Operations Pty Ltd
4	729944	Mangoola Coal Operations Pty Ltd
62	833005	Mangoola Coal Operations Pty Ltd
47	750968	Mangoola Coal Operations Pty Ltd
177	750968	Mangoola Coal Operations Pty Ltd
1	121350	Mangoola Coal Operations Pty Ltd
1	1003300	Mangoola Coal Operations Pty Ltd
23	1108520	Mangoola Coal Operations Pty Ltd
18	996754	Mangoola Coal Operations Pty Ltd
1	995693	Mangoola Coal Operations Pty Ltd
12	594674	Mangoola Coal Operations Pty Ltd
178	750924	Mangoola Coal Operations Pty Ltd
179	750924	Mangoola Coal Operations Pty Ltd
1	360377	Mangoola Coal Operations Pty Ltd
36	750924	Mangoola Coal Operations Pty Ltd
63	750924	Mangoola Coal Operations Pty Ltd
4	587737	Mangoola Coal Operations Pty Ltd
256	706955	Mangoola Coal Operations Pty Ltd
24	8090	Mangoola Coal Operations Pty Ltd

Lot	DP	Owner
Existing Approved Schedule of Land		
5	260132	Mangoola Coal Operations Pty Ltd
40	850807	Mangoola Coal Operations Pty Ltd
1593	809469	Mangoola Coal Operations Pty Ltd
20	711164	Mangoola Coal Operations Pty Ltd
2	567385	Mangoola Coal Operations Pty Ltd
5	845723	Mangoola Coal Operations Pty Ltd
1	845723	Mangoola Coal Operations Pty Ltd
4	555166	Mangoola Coal Operations Pty Ltd
13	577026	Mangoola Coal Operations Pty Ltd
176	750915	Mangoola Coal Operations Pty Ltd
14	750915	Mangoola Coal Operations Pty Ltd
193	750915	Mangoola Coal Operations Pty Ltd
121	585122	Mangoola Coal Operations Pty Ltd
2	807266	Mangoola Coal Operations Pty Ltd
79	750969	Mangoola Coal Operations Pty Ltd
6	750969	Mangoola Coal Operations Pty Ltd
1	845915	Mangoola Coal Operations Pty Ltd
2	845915	Mangoola Coal Operations Pty Ltd
3	845915	Mangoola Coal Operations Pty Ltd
503	521969	Mangoola Coal Operations Pty Ltd
49	750968	Mangoola Coal Operations Pty Ltd
502	521971	Mangoola Coal Operations Pty Ltd

Lot	DP	Owner
MCCO Additional Project Area Schedule of Land		
20	240086	Mangoola Coal Operations Pty Ltd
21	240086	Mangoola Coal Operations Pty Ltd
22	240086	Mangoola Coal Operations Pty Ltd
14	240086	Mangoola Coal Operations Pty Ltd
15	240086	Mangoola Coal Operations Pty Ltd
16	240086	Mangoola Coal Operations Pty Ltd
21	711164	Mangoola Coal Operations Pty Ltd
654	263080	Mangoola Coal Operations Pty Ltd
655	263080	Mangoola Coal Operations Pty Ltd
198	750968	Mangoola Coal Operations Pty Ltd
62	750968	Mangoola Coal Operations Pty Ltd
18	240086	Mangoola Coal Operations Pty Ltd
17	240086	Mangoola Coal Operations Pty Ltd
41	531030	Mangoola Coal Operations Pty Ltd
3	7590	Mangoola Coal Operations Pty Ltd
658	633417	Mangoola Coal Operations Pty Ltd
1	1014899	Mangoola Coal Operations Pty Ltd
144	750968	Mangoola Coal Operations Pty Ltd
19	240086	Mangoola Coal Operations Pty Ltd
659	633417	Mangoola Coal Operations Pty Ltd
652	263080	Mangoola Coal Operations Pty Ltd
42	531030	Mangoola Coal Operations Pty Ltd
656	633417	Mangoola Coal Operations Pty Ltd

Lot	DP	Owner
1	727239	Mangoola Coal Operations Pty Ltd
1	950763	Mangoola Coal Operations Pty Ltd
653	263080	Mangoola Coal Operations Pty Ltd
657	633417	Mangoola Coal Operations Pty Ltd
22	706943	Mangoola Coal Operations Pty Ltd
21	706943	Mangoola Coal Operations Pty Ltd
651	263080	Mangoola Coal Operations Pty Ltd



APPENDIX 2

Preliminary Environmental Risk Analysis – MCCO Project

Preliminary Environmental Risk Analysis

To assist in identifying the key environment and social issues that require detailed assessment as part of the Environmental Impact Statement (EIS), a preliminary environmental risk analysis has been completed for the Mangoola Coal Continued Operations (MCCO) Project. The preliminary environmental risk analysis has been undertaken in general accordance with the principles outlined in Australian Standard AS/NZS ISO 31000:2009. The environmental and social risks have been categorised with a Risk Ranking of high to low.

Table 1 – Likelihood Criteria and Risk Matrix

Basis of Rating	E - Rare	D - Unlikely	C - Possible	B - Likely	A – Almost Certain
LIFETIME OR PROJECT OR TRIAL OR FIXED TIME PERIOD OR NEW PROCESS / PLANT / R&D	Unlikely to occur during a lifetime OR Very unlikely to occur OR No known occurrences in broader worldwide industry	Could occur about once during a lifetime OR More likely NOT to occur than to occur OR Has occurred at least once in broader worldwide industry	Could occur more than once during a lifetime OR As likely to occur as not to occur OR Has occurred at least once in the mining / commodities trading industries	May occur about once per year OR More likely to occur than not occur OR Has occurred at least once within Glencore	May occur several times per year OR Expected to occur OR Has occurred several times within Glencore
5 Catastrophic	**15 (M)**	**19 (H)**	**22 (H)**	**24 (H)**	**25 (H)**
4 Major	**10 (M)**	**14 (M)**	**18 (H)**	**21 (H)**	**23 (H)**
3 Moderate	**6 (L)**	**9 (M)**	**13 (M)**	**17 (H)**	**20 (H)**
2 Minor	**3 (L)**	**5 (L)**	**8 (M)**	**12 (M)**	**16 (M)**
1 Negligible	**1 (L)**	**2 (L)**	**4 (L)**	**7 (M)**	**11 (M)**

Table 2 – Preliminary Environmental Risk Analysis

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Socio-economic	The MCCO Project has the potential to result in a range of social and economic impacts, both positive and negative.	The MCCO Project will result in additional employment during the construction phase and will require a comparable number of operational employees to existing Mangoola Coal operations. An extensive stakeholder engagement program is being undertaken as part of the MCCO Project. Socio economic impacts will be identified and management measures will be proposed to minimise negative impacts and enhance positive impacts as appropriate.	3	C	13(M)	Yes Refer **Section 7.1** and **7.14** of PEA
Noise generation	Degradation of noise amenity (including cumulative impacts).	Risk that the MCCO Project may result in degradation of noise amenity at surrounding private residences. Controls included as part of the MCCO Project to reduce noise impacts include mine design and fleet management to minimise noise generation.	3	B	17(H)	Yes Refer **Section 7.2** of PEA

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Blasting	Potential visual and health impacts from blast flume. Vibration impacts on structures (such as the existing 500 kV ETL or rock structures) and other sensitive receivers. Potential impacts from overpressure.	Risk that the MCCO Project may impact some sensitive receivers. Controls to be included as part of the MCCO Project includes the use of blast design and monitoring procedures, controlled timing and frequency of blasting and notification of blasting times to surrounding residences.	2	C	8(M)	Yes Refer **Section 7.3** of PEA
Dust generation	Increased dust emissions resulting in degraded air quality and potential impacts on health and amenity, including cumulative impacts.	The MCCO Project may result in degradation of local air quality through exposure and handling of coal and overburden. In addition, cumulative dust impacts associated with the operation of other mines in the Hunter Valley is a key issue. Dust impacts will be controlled through pro-active and adaptive measures that include mine design, haul road management (including watering), progressive rehabilitation, predictive meteorological forecasting for pre-shift planning and restricting or ceasing dust-generating activities during adverse meteorological conditions.	3	B	17(H)	Yes Refer **Section 7.4** of PEA

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Water Resources	Potential impact to surface water quality and quantity, including flooding damage to infrastructure. Interactions and potential impacts on aquifers.	The MCCO Additional Project Area will interact with and potentially impact on surface waters through changes to the mine water management system, water usage and catchment area changes. Mining within the MCCO Additional Project Area will intercept groundwater and may potentially result in impacts to groundwater users and flows. A range of water management measures will be incorporated into the project design and will be discussed as part of the detailed surface and groundwater assessments for the EIS.	3	B	17(H)	Yes Refer **Section 7.5 and 7.6** of PEA

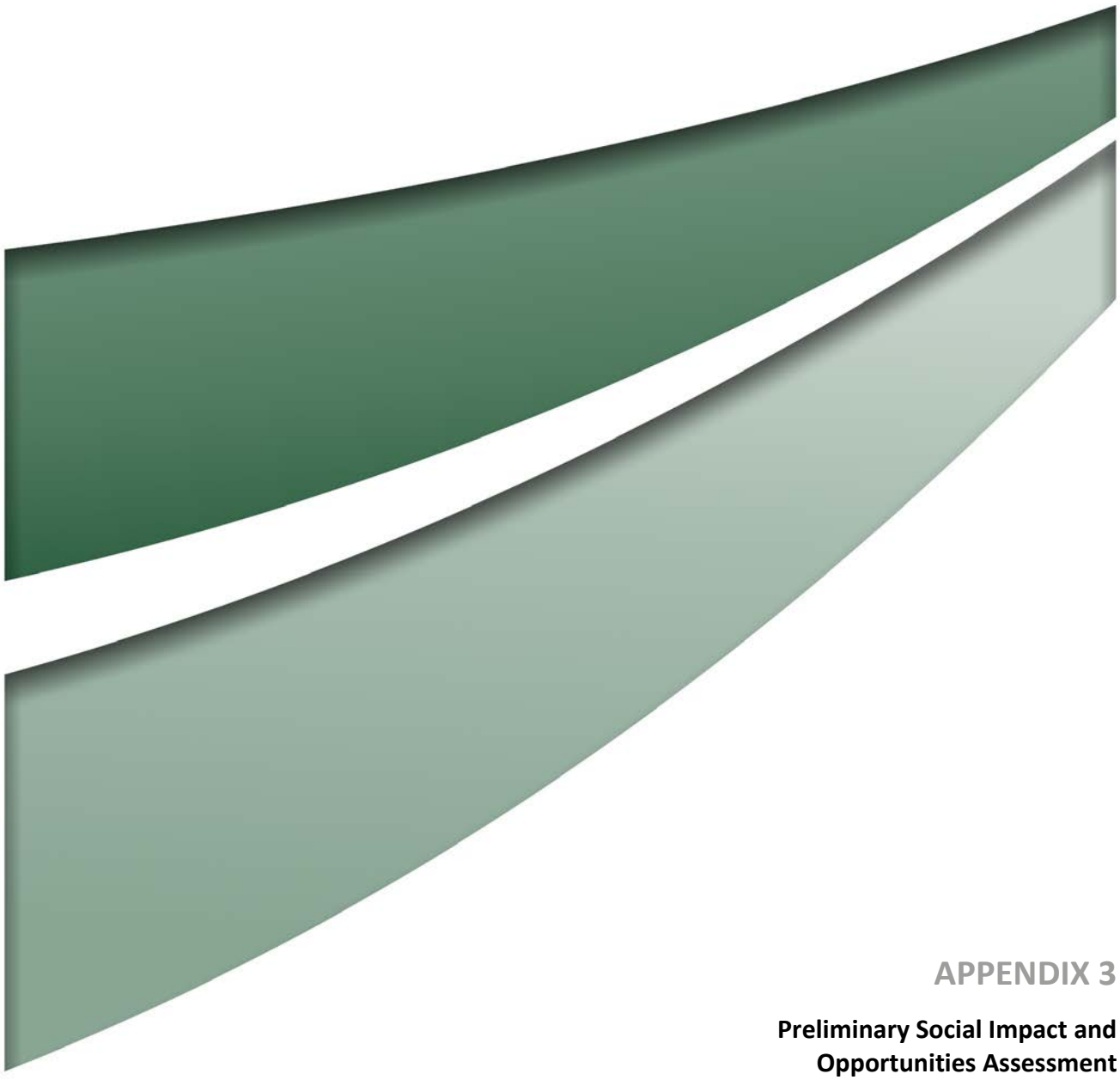
Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Ecology	Impact to flora and fauna including potential impacts on threatened species, communities and populations	The MCCO Additional Project Area will require areas of disturbance which have the potential for some areas of ecological value to be impacted including on threatened species, communities and populations. An ecological survey has been completed within the MCCO Additional Project Area to date focussing on the proposed disturbance footprint. The mining area will be progressively rehabilitated throughout the duration of mining. Detailed consideration of mitigation and offset requirements will be included in the assessment.	4	B	21(H)	Yes Refer **Section 7.7** of PEA
Agricultural Lands	Potential impacts to agricultural land	Disturbance of potential agricultural land. The MCCO Additional Project Area does not include any land identified by the relevant maps in the Mining SEPP as BSAL or CIC land. The presence of BSAL will need to be verified under the Mining SEPP and will be discussed in the agricultural assessment.	2	D	5(L)	Yes Refer **Section 7.8** of PEA

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Aboriginal Archaeology and Cultural Heritage	Potential impact to Aboriginal Heritage sites and Cultural Heritage values.	The MCCO Additional Project Area will require areas of additional disturbance which has the potential for some areas of Aboriginal and Cultural Heritage to be impacted which will require appropriate approvals and establishment of management measures in partnership with the Registered Aboriginal Parties and Knowledge Holder groups.	3	B	17(H)	Yes Refer **Section 7.9** of PEA
Historic heritage	Potential impacts to historical heritage features	The MCCO Additional Project Area will require areas of additional disturbance which has limited potential for areas of local historic heritage value to be impacted. Some items of local significance may occur. Potential for impacts on historic heritage values or sites as a result of blasting. Blast management controls are in place to minimise impacts from blasting.	2	D	5(L)	Yes Refer **Section 7.10** of PEA

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Traffic	Additional traffic associated with the construction phase of the MCCO Project may impact on the road network and other road users. Changes to travel routes due to the realignment of Wybong Post Office Road and diversions required during construction of the Wybong Road overpass may result in minor delays during construction and increased travel times.	The MCCO Project will require the realignment of approximately 2km of the Wybong Post Office Road and the construction of a haul road overpass over Wybong Road. Traffic impacts will be assessed as part of the MCCO Project and management controls for the construction and operational phases of the MCCO Project will be implemented.	2	C	8(M)	Yes Refer **Section 7.11** of PEA
Visual Amenity	Potential impacts to visual amenity as a result of mining operations and associated infrastructure.	Mine design has been undertaken in consideration of visual amenity requirements. Aspects of the MCCO Additional Project Area will be visible from viewing points on both public and private land. Therefore these aspects of the MCCO Project will also be included in the visual assessment. Progressive rehabilitation is proposed to minimise the duration of visual impacts. Mangoola is seeking to design and implement a final landform that will provide natural slopes and features to reduce lasting visual impacts.	2	B	12(M)	Yes Refer **Section 7.12** of PEA

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Greenhouse Gas	Emission of greenhouse gases from the construction and operational phases of the MCCO Project contributing to climate change.	Mining equipment will require use of electricity, diesel and petrol. In addition there will be fugitive emissions from the MCCO Project. Scope 3 emissions as a result of burning product coal are also a source of greenhouse gas emissions. The construction works associated with the MCCO Project will result in energy use and the generation of greenhouse gas emissions. Glencore implements greenhouse gas management measures at all of its sites that identify key greenhouse gas reduction measures.	2	A	16(M)	Yes Refer **Section 7.13** of PEA
Rehabilitation and Mine Closure	Impact on the landscape and future land use from the final landform and rehabilitation.	Mangoola is seeking to design and implement a final landform that will provide stable natural slopes and features and minimise the extent of final voids. A detailed rehabilitation strategy will be prepared for the MCCO Project which seeks integration with existing Mangoola Coal rehabilitation and includes areas of native vegetation.	3	C	13(M)	Yes Refer **Section 7.15** of PEA

Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assess. Required
			C	L	R	
Waste (excluding overburden, rejects and tailings)	Impacts of waste management and disposal on the surrounding environment.	Glencore implements comprehensive waste management strategies at each of its NSW mining operations, including Mangoola. This will continue with the MCCO Project and includes strategies to minimise, reuse and recycle wastes.	2	D	5 (L)	Yes
Hazard	Bushfire hazard associated with mining activities and land management activities. Hazards associated with the use of various materials as part of the mining operation.	Existing bushfire management strategies are in place at Mangoola. This will be updated as part of the MCCO Project. A hazard screening assessment following the requirements of SEPP 33 will be completed for the MCCO Project.	2	D	5 (L)	Yes



APPENDIX 3

Preliminary Social Impact and Opportunities Assessment

Preliminary Social Impact and Opportunities Assessment

In December 2016, the Department of Planning and Environment (DPE) released the *Social Impact Assessment: Draft guidelines for State significant mining, petroleum production and extractive industry development* (the draft SIA Guideline DPE 2016). The Guideline outlines five Preliminary Environmental Assessment (PEA) performance objectives which are:

1. Potentially affected people and groups are assisted to understand the proposed development.
2. Potentially affected people and groups, and the locality likely to be affected in social terms, are clearly identified and understood.
3. Likely social impacts are scoped and clearly identified, including those identified by potentially affected people and groups.
4. Mitigation options for potential significant negative social impacts are identified and discussed.
5. Intended methods of analysis for the Environmental Impact Statement (EIS) are identified and clearly described.

This document outlines the analysis undertaken in consideration of the draft SIA Guideline (DPE 2016) in order to inform the PEA and proposed Social Impact and Opportunities Analysis (SIOA) to be undertaken as part of the integrated MCCO Project assessment.

1. Performance Objective 1 - Engagement

The draft SIA Guideline (DPE 2016) indicates that potentially impacted persons or stakeholders should be assisted to understand the development, with particular regard to the overall approach to engagement as well as the steps taken to implement the approach. For the project:

- **Overall approach:** A comprehensive Stakeholder Engagement Strategy has been developed for the Project, with an overall approach to stakeholder consultation. Further detail on the engagement strategy is provided within the main text of the PEA, and
- **Steps taken**: Early engagement has occurred with key identified stakeholders to help potentially affected people and groups to understand the proposed development and what it could mean for them. Further detail on engagement methodologies is provided within the main text of the PEA.

The Stakeholder Engagement Strategy and early engagement undertaken to date builds on the operational Stakeholder Engagement Strategy for Mangoola Coal, which is in place to build and maintain effective relationships with stakeholders, engage with local communities, invest in local communities, meet the requirements of the Glencore Stakeholder Engagement Protocol (10.01) and maintain Mangoola Coal's social licence to operate. All MCCO Project related engagement is and will be undertaken with additional consideration given to this strategy.

2. Performance Objective 2 – Identification

The draft SIA Guideline (DPE 2016) indicates the need to develop a preliminary understanding of the potentially impacted people and groups, so that the preliminary social impact significance assessment (refer to **Section 3**) can be undertaken. This includes a stakeholder analysis, review of relevant secondary data, identification of processes of social change and developing an understanding of how the current Project may already be understood. For the Project this includes experiences of Mangoola Coal's existing operations as well as exploration activities in the Assessment Lease (AL) 9. This understanding has been validated through primary data collection through face to face meetings with key agency stakeholders and nearby landholders.

- **Stakeholder Analysis**: A stakeholder analysis has been completed. Identified stakeholders have been grouped by their differential interests in the Project and are listed within Section 4.2 of the PEA.

Secondary Data Analysis

- **Locality**: The project is located in or near the State Suburbs (SSC) of Wybong, Manobalai, Castle Rock and Mangoola according to the 2016 Australian Statistical Geography Standard (ASGS). These suburbs are located within the Muswellbrook Local Government Area (LGA). Both suburb and LGA boundaries are shown in **Figure 2 1.**

- **Demography**: Summary data available from the June 2017 release of the 2016 *Australian Census of Population and Housing* (ABS 0216) is provided in **Table 2.1**, in comparison with that of NSW, as representative of the people of NSW as the overarching stakeholder group to the Project.

- **Key local features**: There are several key features in the locality including nearby coal mines (e.g. Bengalla, Mount Pleasant) and agricultural facilities (e.g. Wybong Estate, Yarraman Estate).

Table 2.1 Demographic Summary of Nearby Suburbs, Muswellbrook and NSW (ABS, 2016)

	Mangoola (SSC)	Castle Rock (SSC)	Wybong (SSC)	Manobalai (SSC)	Muswellbrook (LGA)	NSW
Population	49	117	127	69	16,080	7,480,231
Aboriginal and/or Torres Strait Islander	0%	4%	6%	13%	8%	3%
Volunteers	25%	20%	21%	40%	18%	18%
Unemployment (March 2017)	-	-	-	-	7.2	5.1
Total Dwellings	24	55	40	32	5,764	2,604,314
Owned Outright	13%	33%	30%	53%	26%	32%
Owned Mortgage	13%	16%	8%	13%	31%	32%
Rented	50%	38%	55%	28%	39%	32%

	Mangoola (SSC)	Castle Rock (SSC)	Wybong (SSC)	Manobalai (SSC)	Muswellbrook (LGA)	NSW
Median mortgage repayment ($/monthly)	-	2,041	2,167	-	1,733	1,986
Median rent ($/weekly)	180	230	210	250	250	380
Median age of persons	45	43	30	51	35	38
Median total household income ($/weekly)	762	1,781	1,291	1,125	1,346	1,486
Average household size	2	2.7	2.8	2.7	2.5	2.6

- **Strategic planning documentation**: Strategic planning documentation has been reviewed to determine needs, issues and aspirations of the community relevant to the Project. Planning documents reviewed included the Muswellbrook Shire Council Community Strategic Plan 2017-2027, Local Environmental Plan 2009, Muswellbrook Town Centre Strategy, Muswellbrook 2020: Online and phone survey with residents, the Upper Hunter Strategic Land Use Plan 2012, Upper Hunter Mining Dialogue 2011, and local, regional and state media, This review of secondary data identified the following needs, issues and aspirations of the community:
    - Job growth and economic diversification (including creative economy, small business, tourism, agriculture, retail, health services, etc.)
    - Access to education
    - Development of Muswellbrook as a regional centre
    - Affordable and social housing
    - Social and community service provision
    - Infrastructure development
    - Aged care and child care provisions
    - Social inequality and inclusion
    - Conservation of heritage and environment
- **Social Change**: Processes of social change were considered in the analysis of planning documentation above. Additional consideration has been made of other State Significant Development and activities in the locality which may have impacts that interrelate with those of the Project. They include:
    - other current or proposed coal mines including Bengalla, Dartbrook, Mount Pleasant, Drayton, Mt Arthur Coal, Muswellbrook Coal, Liddell and Spur Hill
    - Ridgelands and West Muswellbrook exploration projects

- Dolwendee Quarry (approved), and
- Yarraman Feedlot (undergoing assessment)

- **Project experience to date**: How the project has been experienced to date has been accessed through understandings of the existing Mangoola Coal operations and experiences during exploration within the AL 9 exploration lease area. More detail on the AL 9 exploration lease is provided in the main text of the PEA. Understandings of the existing Mangoola Coal operations were analysed through review of site complaints data 2013-2017, and data relating to consultation undertaken as part of operations at Mangoola Coal.
    - Significant experience to date was gained through review of the SIA undertaken as part of the Mangoola Coal's Modification 6 Environmental Assessment, undertaken by Coakes Consulting (2013). This SIA was undertaken prior to the development of the draft SIA guidelines (DPE 2016) due to the previous and ongoing regard given to the proper consideration of social impacts by Glencore. The SIA included a socioeconomic profile which included consideration of the issues, values and aspirations of stakeholders across the region, a Town Resource Cluster (TRC) analysis to determine economic impacts in the region due to employment and supplier spending, detailed consideration of perceived issues and opportunities with the presence of Mangoola Coal and the proposed modification, assessment of the risk and likely impact of a wide range of social impacts and development of management, mitigation, monitoring and evaluation measures.
    - Neighbouring landholders who are near the AL 9 exploration lease area did not have significant concern with regard to exploration activities beyond the identification of the Project. Members of the Mangoola Coal Community Consultative Committee (CCC) have been kept regularly informed of outcomes of exploration and identification of the current Project.

Primary Data Analysis

The analysis of the secondary data above was validated as relevant through direct engagement with nearby landholders, government agencies and the CCC. The engagement process included:

- Identifying potentially affected residences (those within 4km of the project disturbance boundary)
- Contacting landholders by phone to organise meetings, undertaken by Mangoola Coal
- A total of 24 face to face meetings with landholders, 12 with representatives from Mangoola Coal and Umwelt and 12 with representatives from Mangoola Coal only. Note that further engagement for additional data collection is proposed as part of the SIOA.
- Face to face meetings were also held with the CCC, relevant government agencies and Muswellbrook Shire Council as noted in Section 4 of the PEA.

Key issues raised during engagement are listed in **Table 2.2**

Table 2.2 Preliminary Issues Raised by Landholders

Issue theme	Details
Noise	Commonly noted, especially due to the project moving closer to residences to the north of the existing mine. A number of landholders had previously been or are currently being impacted by noise as part of current operations. Some landholders noted that Mangoola has responded quickly to prior noise complaints. One stated that they 'have been very well looked after by Mangoola, excellent actually'
Dust (amenity & health concern)	Also commonly noted as an impact of current operations, concerned this might increase with Project. Some noted that they can see dust at times
Proximity to Project site / loss of buffer zone	Concern about increased impacts due to proximity to the Project boundary, especially as some landholders are already experiencing impacts under existing operations
Night lighting spill	Noted as a previous impact of current operations, concern this might increase with Project
Blasting (vibration)	Noted as an impact of current operations, concerned this might increase with Project
Sense of Community – Lifestyle change	Concern about impact of the Project on rural lifestyle
Sense of community – population decline	People have moved away as a result of increased mining activities and property acquisition in the area, notably due to current operations
Property Acquisitions	Whether or not properties will be in acquisition zones was regularly discussed, with some landholders seeking acquisition, while others would prefer to remain in their current residences
Impacts to Wybong Post Office Road	Access via the Wybong Post Office Road will be cut and trip time extended. Minor concern. Traffic and road interruptions during upgrades. Ensuring correct signage
Pest management	Especially with regard to Kangaroos
Property values	Notable concern, especially if property were to be assessed as being within the management zone Concerned that proximity to current operations has impacted property values and ability to sell, and how this may (or may not) change with the project
Cumulative impacts	For example, the adjoining Ridgelands Exploration Licence and Idemitsu West Muswellbrook Exploration Licence

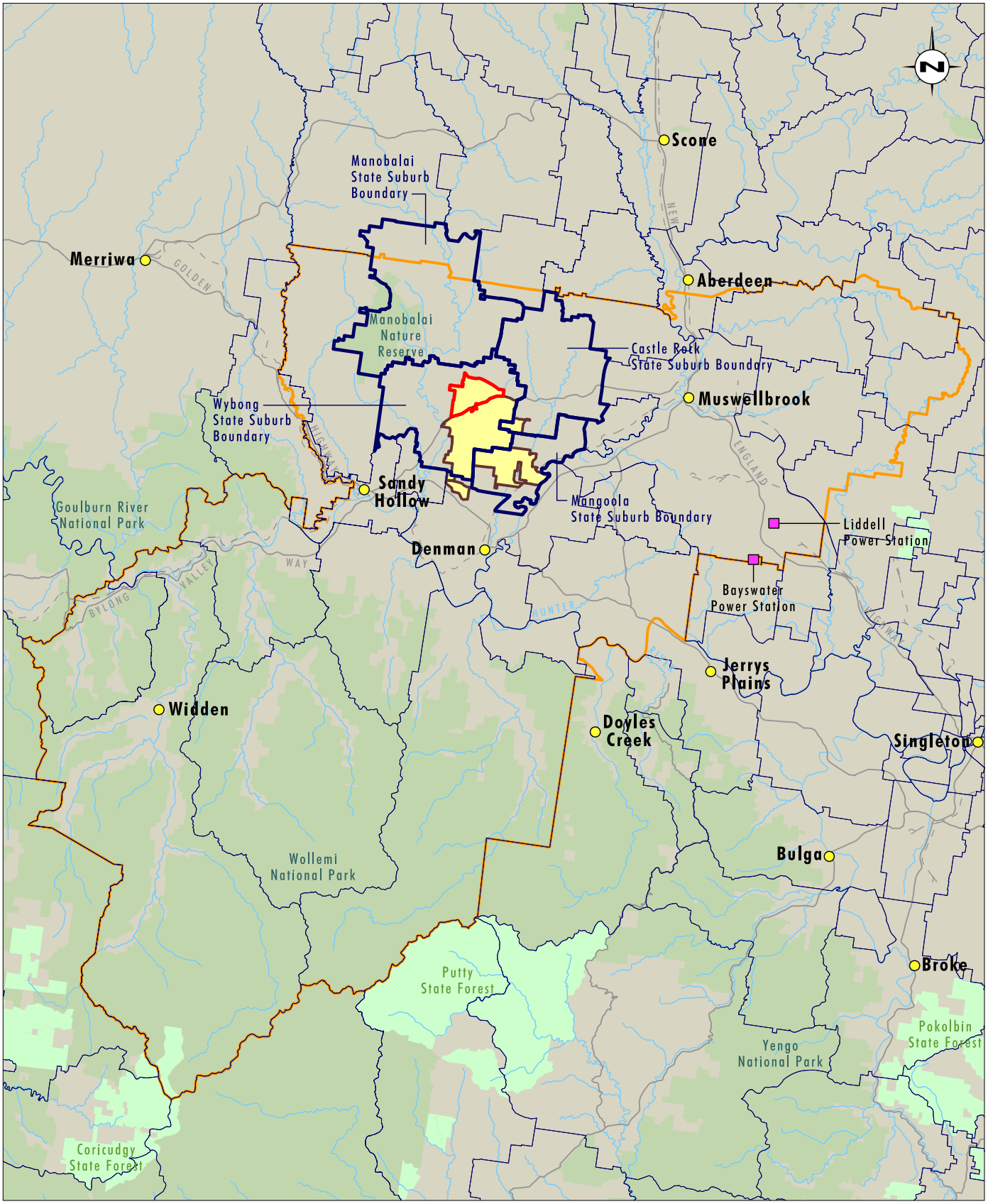


Image Source: Google Earth/Landsat/Copernicus (Dec 2016)
Data Source: LPI (2016), Glencore (2016)

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Legend

- MCCO Project Area
- MCCO Additional Project Area
- Approved Project Area
- Muswellbrook LGA Boundary
- State Suburb Boundary
- National Park and Nature Reserve
- State Forest
- Road
- Rail
- Creek

FIGURE 2.1

Neighbouring Suburbs and Muswellbrook LGA

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3. Performance Objective 3 – Impact Scoping

A preliminary social impact significance assessment has been undertaken for the Project with the outcomes provided in **Table 3.1** This preliminary assessment has been undertaken following the format and approach provided in the draft SIA Guideline (DPE 2016).

Table 3.1 Preliminary Assessment Summary

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Way of Life							
Cumulative impacts associated with multiple mining operations in the area	Likely Cumulative impacts such as those on air quality are already recognised at a regional level and several studies have sought to explore and address the measurement and mitigation of cumulative impacts. Noise is a key issue locally.	Yes – ongoing	Yes - broad / regional	Yes - due to number of existing neighbouring operations and current exploration licences	Yes – regional levels of concern regarding cumulative impacts are already high	Yes	Yes, cumulative impacts are one of the most commonly identified impacts with regard to the current operations During 2013 SIOA undertaken for Modification 6 neighbours spoke of the cumulative impacts as a result of the presence of multiple mining operations nearby Concerns have been flagged again during current engagement activities particularly with reference to due to the current Ridgelands Exploration Licence

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Project boundary moving closer to residences to the north	Likely Reduction in existing buffer zone has potential to enhance existing amenity impacts and cause stress to residents	Yes – for life of the project	Yes – on all residences to the north of the project	Yes – key issue raised during engagement	Yes – due to existing proximity and impacts being experienced	Yes	Yes – has been highlighted as a concern during current engagement activities for the Project
Potential traffic impacts due to road diversion activities	Likely Anticipated that traffic and road interruptions will occur during Project construction activities and diverted road will be longer	No – short term of construction Yes – long term for distance change for relocated road	No – local road only	Yes – noted during engagement	Unknown – Pending further studies	Unknown – pending further studies	Yes – noted during engagement
Property acquisitions	Likely Potential that some properties may be afforded voluntary acquisition rights due noise and /or air quality impacts from the Project	Yes - ongoing for acquired properties	Unknown – impact assessment yet to be completed and unknown extent	Yes – significant change for any residents affected	Unknown – Pending further studies	Yes	Yes – frequently identified as an issue in meetings with landholders.

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Culture, Community & Political Systems							
Enhanced community contribution through social investment	Likely Glencore and Mangoola historically seen as making a considerable contribution to the community by funding services, projects, or infrastructure that otherwise would not be funded	Yes - Ongoing – construction and operation	Yes - Positive / opportunity enhancement	Yes - This positive contribution already valued in the community	Unknown	Yes	Yes – positive Glencore and Mangoola historically has been seen as making a considerable contribution to the community by funding services, projects, or infrastructure that otherwise would not be funded
Enhanced community contribution through local employment during construction activities	Likely Construction workforce of approx. 120 persons Ongoing employment opportunities for existing Mangoola workforce	Yes -During construction and additional years of operation	Yes - Approximately 120 positions during construction and ongoing employment opportunities for existing workforce	Unknown	No	Yes – Positive. Continued enhancement of existing opportunities	Yes – positive Local job security has been identified in regional engagement programs

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Impact of Project on existing rural lifestyle	Likely Changes have already occurred due to historic activities and may occur due to the Project	Yes - ongoing	Yes - Localised impacts on rural lifestyle have already occurred due to previous activities	No - Anticipated that resilience to this potential impact will be high due to history of mining in the area	Unknown	Yes	Existing concern regarding this impact
Decline in local population near mining area due to increased mining activities and property acquisition surrounding the Project area	Unknown It is noted that the land affected is owned by Mangoola Coal. Will depend on the number of acquisitions required if any.	Yes – Ongoing	Unknown numbers of properties	No - resilience anticipated to be high due to history of mining in the area	Unknown	Yes	Existing concern regarding this impact. Unknown if acquisition will be required and if so, where a corresponding loss of local community members will eventuate.
Potential for population impacts associated with construction workforce	Unlikely Anticipated high levels of locally available construction labour and skills	No – construction only	No – labour/ skills available within the region	No – labour/ skills available within the region	No – labour/ skills available within the region	No	No concern raised in engagement

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Environment							
Noise emissions from operations and blasting impacting on quality of life of landholders in proximity to Project boundaries	Likely Noise complaints have consistently been the most frequent type of complaint received to date.	Yes - Ongoing during construction and operation	Unknown – to be determined during technical assessments during EIS	Yes – potential for increase / decrease in some areas compared to current levels as new mining area further north	Unknown – to be assessed during technical modelling	Yes	Noise a predominant issue raised by local community stakeholders to date in reference to the current operations Noise complaints have consistently been by far the most frequent type of complaint received, although the total number of complaints has decreased significantly since 2013
Impact on amenity associated with dust emissions and associated impacts on daily routines	Likely Dust impacts common and well understood with mining projects	Yes - Ongoing during operation	Unknown – to be determined during technical assessments during EIS	Yes – potential for increase / decrease in some areas compared to current levels as new mining area further north	Unknown – to be assessed during technical modelling	Yes	Air quality has been one of the predominant issues of complaint associated with the current operations

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Visual impacts (including light spill at night)	Likely Has been identified as an issue associated with current operations	Unknown – timely management of night lighting was noted during engagement. Unknown with regard to the Project	Unknown – to be determined during technical assessments during EIS	No - Not anticipated to be a significant increase compared to current conditions	Unknown – to be assessed during technical assessment	Yes	Has been noted as an impact of current operations, concerned this might increase with Project
Vibration from blasting	Likely Has been identified as an issue associated with current operations	Yes - Ongoing during construction and operation	Yes - Localised To be determined during technical assessments during EIS	Yes - Potential for changes with change in mining area	Unknown – to be assessed during technical modelling	Yes	Yes. Blasting has been one of the issues of complaint associated with the current operations Noted as an impact of current operations, concerned this might increase with Project
Pest Management	Unlikely but raised as an issue in community consultation for the Project. Managed by site operational procedures that would continue for the project	Yes – ongoing for construction and operation	No – site specific	No – Existing and common issue	No – low impact	No	Low. Pest management and overpopulation of Kangaroos and presence of wild dogs in the locality has been raised

What is the Social Impact?		How Significant is the Social Impact Likely to be Without Mitigation?					What do Potentially Affected People or Groups Think and/or Feel?
Unmitigated impact description	How likely is the impact, without mitigation? Why?	Is it likely to be significant with regard to?				Significant Overall?	
		Duration	Extent	Sensitivity	Severity		
Health and Well being							
Concerns regarding local community health and wellbeing due to dust emissions	Likely Regional significance of dust impacts through Upper Hunter Mining Dialogue	Yes - Ongoing during construction and operation	Unknown – to be determined during technical assessments during EIS	Yes – Likely concern for many stakeholders	Unknown – to be assessed during technical modelling	Yes	Yes – Regionally significant issue
Personal and property rights							
Impact on property values	Unknown Extent of zone of any acquisition zone for the Project is not yet known	Yes – ongoing for construction and operation	Unknown - Extent of zone of any acquisition not yet known	Unknown - Extent of zone of any acquisition not yet known	Unknown - Extent of zone of any acquisition not yet known	Yes	Notable concern, especially if property was assessed as being within the current or future management zone for Mangoola Coal Mine

4. Performance Objective 4 - Mitigation

Management strategies are processes, programs or plans designed to address the perceived impacts/issues raised by stakeholders and project affected parties during a social assessment process. Such strategies can go some way in ensuring that perceived impacts raised are addressed or offset in an appropriate manner. There are a range of mitigation measures in place at the existing Mangoola Coal Mine and these have been refined over the life of the operations to seek to achieve continual improvement in environmental and social performance. These existing measures along with additional measured identified during the assessment process will be applied to the Project.

Table 4.1 summarises conceptual mitigation strategies currently considered for each of the issues raised by the community. Note that these strategies may not be considered appropriate as studies are completed, and additional strategies may be identified through the assessment process.

Table 4.1 Potential Mitigation Measures

Issue	Potential Measures
Cumulative impacts	Implement controls to mitigate the impacts from the Project to reduce contribution to cumulative impacts Continue to engage with neighbouring mining operations in addressing cumulative impacts
Noise emissions	Noise modelling to be undertaken as a part of the EIS with modifications to be made to the Project and mitigation measures to minimise impacts where practicable Should the studies identify that any residences will be significantly affected by noise, develop a property acquisition strategy following the guidance provided in DPE's Voluntary Land Acquisition Policy (2014) Maintenance of real time noise monitoring and a dedicated phone line for residents to report any noise complaints related to construction and operations activities Ongoing implementation of noise mitigation measures including property treatments for those within the active noise management zone for the Project
Blasting (vibration)	Provision of notice regarding blast timing via text and/or phone, minimising blast impacts through blast design, other current operational management measures

Issue	Potential Measures
Air emissions	Glencore already an active member of the Upper Hunter Air Quality Monitoring Network and participates in the Air Quality working group of the Upper Hunter Mining Dialogue Maintenance of dedicated phone line for residents to report any air quality complaints related to construction and operations activities Continue to present air quality updates to CCC and community members as required Further air quality modelling to be undertaken as a part of the EIS with modifications to be made to the Project and mitigation measures to minimise impacts where practicable Implementation of air quality mitigation and management measures following current best practice
Light spill / visual amenity	Modelling of potential visual impacts associated with the proposed Project in the EIS and identification of appropriate mitigation measures
Lifestyle changes	Further SIA to be undertaken through the assessment phase to determine context specific significance of any potential changes, should they occur, and development of locality and/or residence specific mitigations if/as necessary
Population decline	Further SIA to be undertaken through the assessment phase to determine context specific significance of any potential changes, should they occur, and development of locality and/or residence specific mitigations if/as necessary
Impacts on property values	Further SIA to be undertaken through the assessment phase to determine context specific significance of any potential changes, should they occur
Impacts associated with traffic and road changes	Further traffic/road impact assessment to be undertaken as part of the EIS to assesses the actual impact of the Project's changes the local road network

5. Performance Objective 5 – SIA Methods

A range of engagement activities are planned to be undertaken concurrent to the above studies to ensure adherence to the following engagement principles:

- Target key project stakeholders: a focus on local stakeholders and near neighbours to understand, and where possible address local issues; while involving other potentially impacted stakeholders
- Proactive face to face and informal engagement processes: proactive visible local presence and use of methods that facilitate stakeholder involvement, to further build long term personal relationships between the company and community
- Leverage: incorporation of past Mangoola operations and project learnings and leverage off the way that previous issues raised in the community have been addressed through the Project design

- Transparency and openness: open and transparent communication about the MCCO Project and environmental and social assessment process, and

- Integration: use of consultation outcomes to inform project assessments and project planning and design.

In line with the consultation stages outlined in Section 4.2 of the PEA, **Table 5.1** presents an anticipated works program for SIOA and EIS development. It is anticipated that an integrated approach to SIA will be undertaken with the suite of other technical studies being undertaken.

Table 5.1 Forward Works Program – SIOA / EIS Development

Applicable Stages in Development Approvals Process	Action / Engagement Strategies
Stage 2 Project application, including assessment and prediction of social impacts and opportunities	• Collation and further analysis of the information collected in at PEA stage • Continue consultation with Project Stakeholders • Focus Workshops to provide input on key issues • Aboriginal Cultural Heritage Assessment Processes in consultation with registered Stakeholders and Knowledge Holders • Provision of an update to stakeholders on the Project, further detail on key assessment issues to inform issue mitigation, management and enhancement (for example through newsletters, face to face interviews or via a dedicated Community Open Day) • Ongoing government agency consultation • Consolidating information collected as part of the assessment program to develop ongoing management measures consistent with current practice and in consideration oft the draft SIA guideline (DPE 2016) • Further landholder consultation to share the outcomes of the relevant assessment studies with those landholders that are directly affected • Opportunities for the general public to learn about the Project, such as through community open days, other information events and/or via the website • Newsletters/Information Sheets on SIOA/EIS results and key mitigation strategies
Stage 3 – Submission and assessment	• Public Exhibition of SIOA/EIS and Development Application • Formal response to submissions

umwelt

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

Perth

PO Box 783
West Perth WA 6872
First Floor
9 Havelock Street
West Perth WA 6005

Ph. 08 6260 0700

Canberra

PO Box 6135
56 Bluebell Street
O'Connor ACT 2602

Ph. 02 6262 9484

Sydney

50 York Street
Sydney NSW 2000

Ph. 1300 793 267

Brisbane

Level 11
500 Queen Street
Brisbane QLD 4000

Ph. 1300 793 267

www.umwelt.com.au