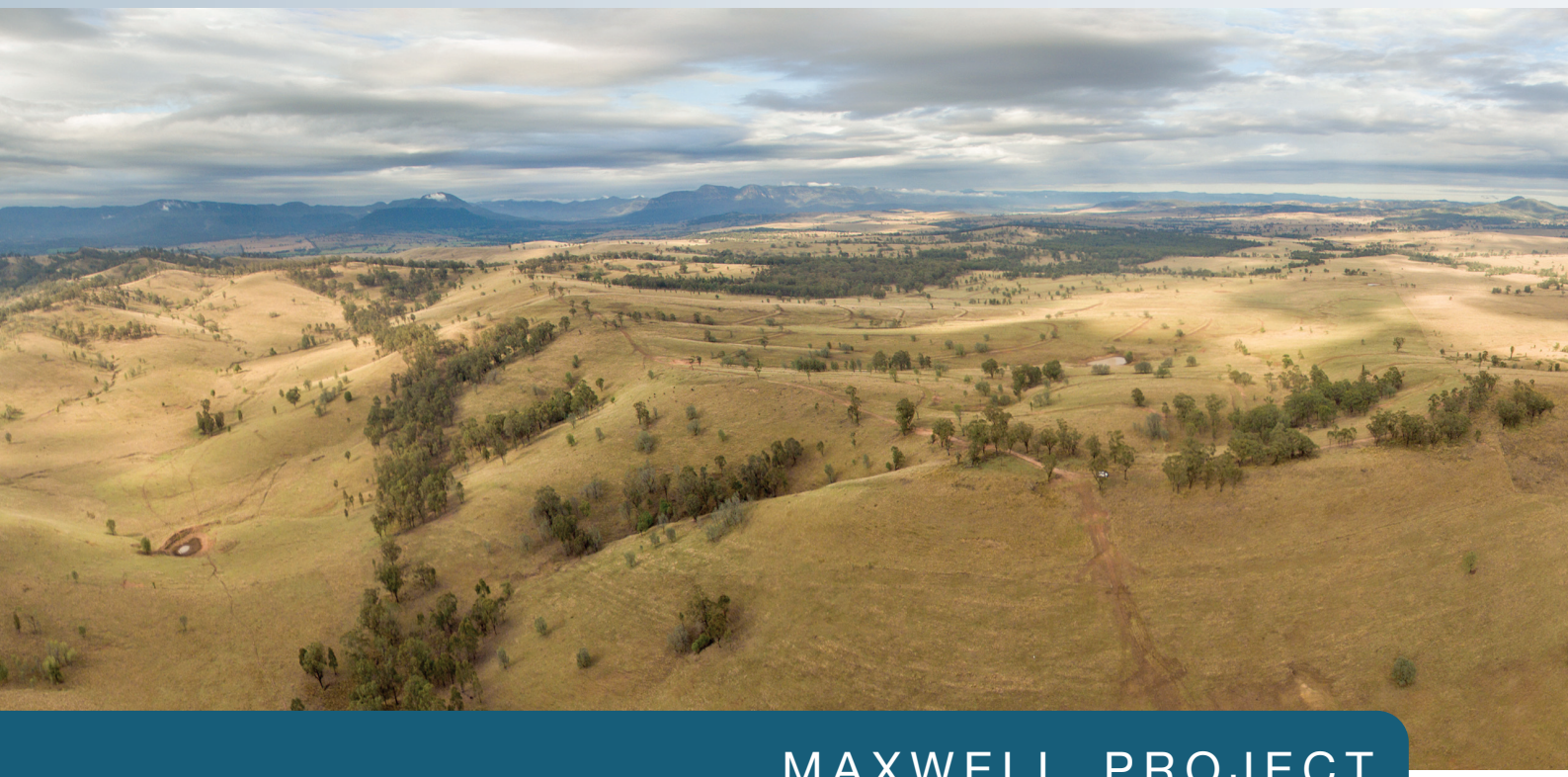
MALABAR COAL



MAXWELL PROJECT

Technical Overview

In Support of an Application for a Gateway Certificate

August 2018

Malabar Coal Limited

Level 26, 259 George Street
Sydney NSW 2000

http://malabarcoal.com.au/

Project Enquiries

Donna McLaughlin
Manager Environment and Community
Phone: (02) 6542 0283
Email: info@malabarcoal.com.au

OVERVIEW

Malabar Coal Limited (Malabar) acquired Exploration Licence (EL) 5460 and existing infrastructure within Coal Lease (CL) 229, Mining Lease (ML) 1531 and CL 395 (known as the "Maxwell Infrastructure") in February 2018.

EL 5460 and the Maxwell Infrastructure are located in the Upper Hunter Valley of New South Wales (NSW), east-southeast of Denman and south-southwest of Muswellbrook.

As part of its acquisition of EL 5460, Malabar committed to develop the resource solely as an underground mining operation.

The Maxwell Project (the Project) would involve an underground mining operation that would produce high quality coals over a period of approximately 26 years.

The Project would include the use of the substantial existing Maxwell Infrastructure, along with the development of some new infrastructure.

Malabar is lodging an application for a Gateway Certificate (Gateway Application) for the Project, as the area includes land mapped as biophysical strategic agricultural land (BSAL).

Freehold land within the Gateway Certificate Application Area is owned by Malabar, with the exception of a small area within the transport corridor in the north, which is owned by AGL.

The land within the Gateway Certificate Application Area is primarily cleared, open paddock grazing land, with some areas of remnant forest and open woodland.

Land use within the Gateway Certificate Application Area consists primarily of cattle grazing, with small areas of opportunistic fodder cropping (under favourable conditions).

No equine or viticulture enterprises are located within the Gateway Certificate Application Area.

Plate ES-1 – Land in EL 5460 – Looking North-west Towards Saddlers Creek

Strategies to Minimise Potential Impacts on Agriculture

Malabar would implement the following strategies to minimise potential impacts on agriculture:

- impacts to amenity, air quality, land and the road and rail network would be minimised through the use of the existing Maxwell Infrastructure (including the site access road, coal handling and preparation plant and Antiene Rail Spur);
- the mine entry would be located away from sensitive receptors, in a natural valley that mitigates and minimises alteration of the visual landscape (particularly from sensitive viewsheds);
- subsidence impacts would be restricted to Malabar-owned agricultural land and would be managed and remediated;
- Malabar would hold appropriate water licences for any water taken directly or incidentally for the Project;
- ongoing groundwater monitoring and groundwater model validation would be undertaken for the Project; and
- areas of land not used for Project surface development would continue to be used for agricultural purposes.

Assessment of Criteria Related to Biophysical Strategic Agricultural Land

The supporting documentation to the Gateway Application considers the potential impacts of the Project on BSAL. The key conclusions of these assessments are:

- With the implementation of the proposed subsidence management measures, there would be no significant impact to the agricultural productivity of the Project area as a result of subsidence impacts on agricultural land.
- There would be no permanent surface disturbance to areas mapped as BSAL. There may be minimal temporary surface disturbance to BSAL (<1 hectare); however, the impact would not be significant.
- The Project is predicted to meet the “Level 1” minimal impact considerations for “highly productive” groundwater sources (HydroSimulations, 2018).

Consideration of Equine and Viticulture Critical Industry Clusters

There are no mapped Equine or Viticulture critical industry cluster (CIC) land or equine or viticulture enterprises within the Gateway Certificate Application Area.

Therefore, consideration of impacts on CICs is not required under the Mining SEPP.

Notwithstanding, Malabar notes that, in contrast to previous applications for open cut mining, the Project is a proposed underground mine. This would significantly reduce or eliminate any potential impacts on surrounding land users associated with air quality, blast noise and scenic values.

The Agricultural Impact Assessment (AIA) prepared by Dr Paul Frazier (2rog Consulting) includes consideration of the potential impacts of the Project on the Equine and Viticulture CICs. The outcomes of the assessment are summarised below:

- the Project does not coincide with any areas of Equine or Viticulture CIC;
- the Project would have no direct or subsidence impacts on agricultural resources or any land used by the Equine or Viticulture CIC;
- the Project would have negligible impact on the quantity and quality of water resources used by nearby Equine or Viticulture enterprises (primarily surface water extraction from the Hunter River);
- the Project would not have a material impact on support services or infrastructure as there would be no property acquisitions or isolation of any Equine or Viticulture CIC-related services or infrastructure;
- the Project would not have a material impact on transport routes as there would be limited overlap between key equine and viticulture transport corridors and Project-related traffic; and
- the Project would not have a material impact on scenic or landscape values due to the scale and location of surface development.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

Maxwell Ventures (Management) Pty Ltd, a wholly owned subsidiary of Malabar Coal Limited (Malabar), is seeking consent to develop an underground coal mining operation, referred to as the Maxwell Project (the Project).

The Project is located in the Upper Hunter Valley of New South Wales (NSW), east-southeast of Denman and south-southwest of Muswellbrook (Figure 1).

This is a Technical Overview of the application for a Gateway Certificate (Gateway Application) pursuant to clause 17F of the NSW *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP).

The Project area includes land mapped as biophysical strategic agricultural land (BSAL) using the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (the Interim Protocol). The Project area does not include Equine or Viticulture critical industry cluster (CIC) land as mapped in the Mining SEPP. Therefore, the Gateway Application focuses on the relevant criteria related to BSAL only.

The Gateway Application demonstrates that the Project can meet the relevant criteria for BSAL.

1.2 SCOPE OF APPLICATION

The Gateway process applies to State significant mining development that requires a new mining lease. The Gateway Certificate Application Area, as described in this document, is shown on Figure 2 and includes the Project underground mining area and associated transport corridor.

The Gateway Application will be assessed by the Mining and Petroleum Gateway Panel (the Gateway Panel) for potential impacts of the Project on strategic agricultural land and its associated water resources. The Gateway Panel undertakes its assessment in accordance with the relevant criteria outlined in clause 17H(4) of the Mining SEPP that, in this case, apply specifically to BSAL (Section 5).

Although not required by the Mining SEPP, this document also includes consideration of the Equine CIC and Viticulture CIC (Section 6).

The Gateway Panel considers projects at a very early stage before a development application and Environmental Impact Statement (EIS) is lodged. Malabar will undertake further consultation, mine planning, detailed design and environmental assessment on aspects that are not relevant to the Gateway Application. The outcomes of additional work and consideration of any Gateway Certificate will be documented in the EIS.

1.3 BACKGROUND

Malabar acquired Exploration Licence (EL) 5460 and existing infrastructure within Coal Lease (CL) 229, Mining Lease (ML) 1531 and CL 395 (known as the “Maxwell Infrastructure”) in February 2018.

The Maxwell Infrastructure includes an existing coal handling and preparation plant (CHPP), rail facilities and other infrastructure and services (including water management infrastructure, administration buildings, workshops and services).

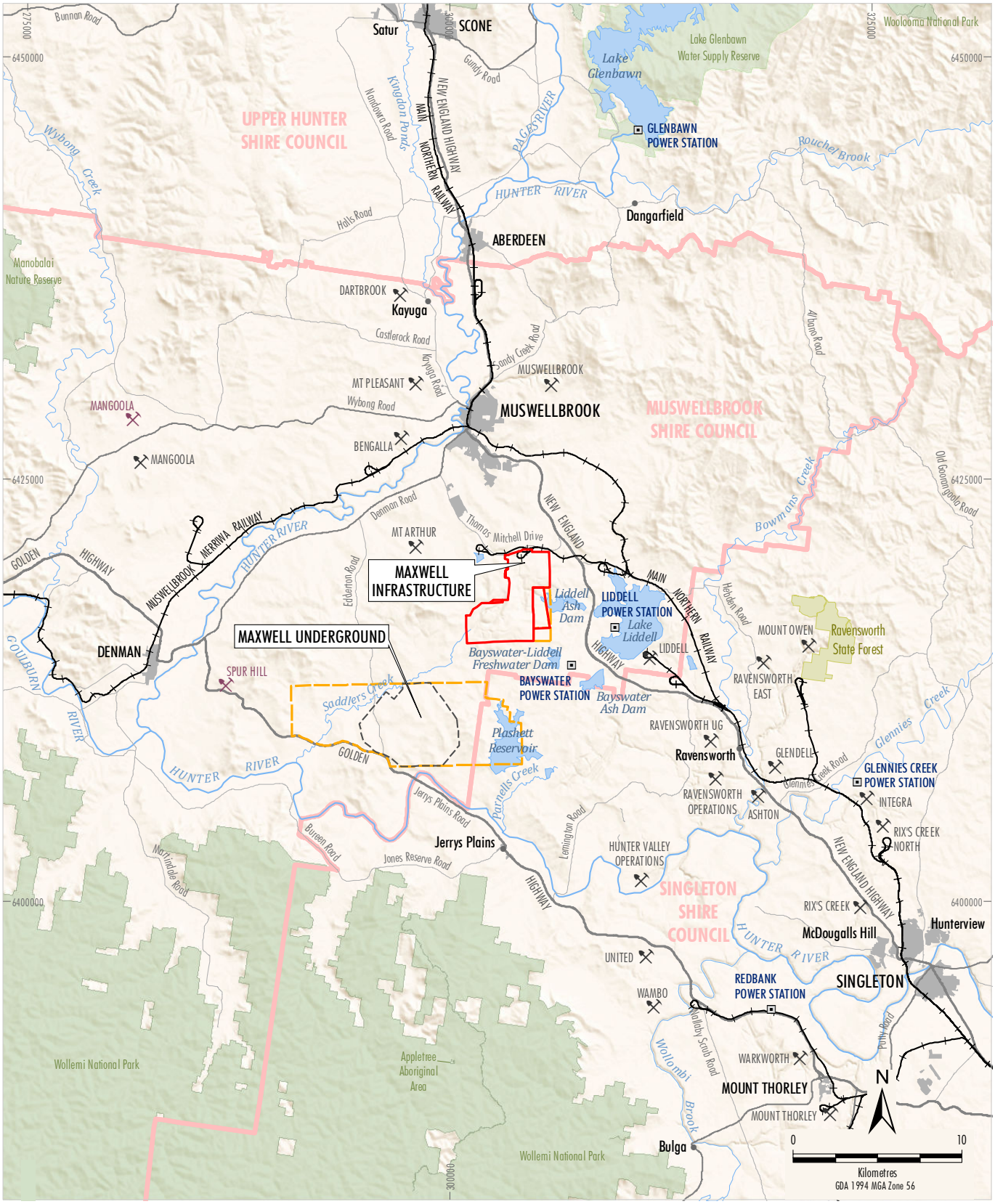
The Project would include the use of the substantial existing Maxwell Infrastructure (Plate 1), along with the development of some new infrastructure.

Plate 1 – Existing Maxwell Infrastructure

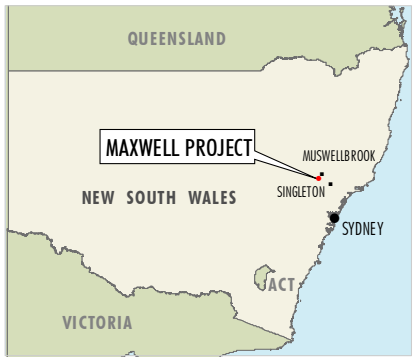
1.4 PROJECT OVERVIEW

The Project would involve an underground mining operation that would produce high quality coals over a period of approximately 26 years.

At least 75% of coal produced would be capable of being used in the making of steel. The balance would be export thermal coals suitable for the new generation High Efficiency, Low Emissions power generators.



SHA-18-03 MG_TO_201A



LEGEND

- Mining Operation
- Proposed Mining Operations (Application Lodged)
- Railway
- Local Government Boundary
- State Forest
- National Parks and Wildlife Service Estate
- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Underground Mining Area

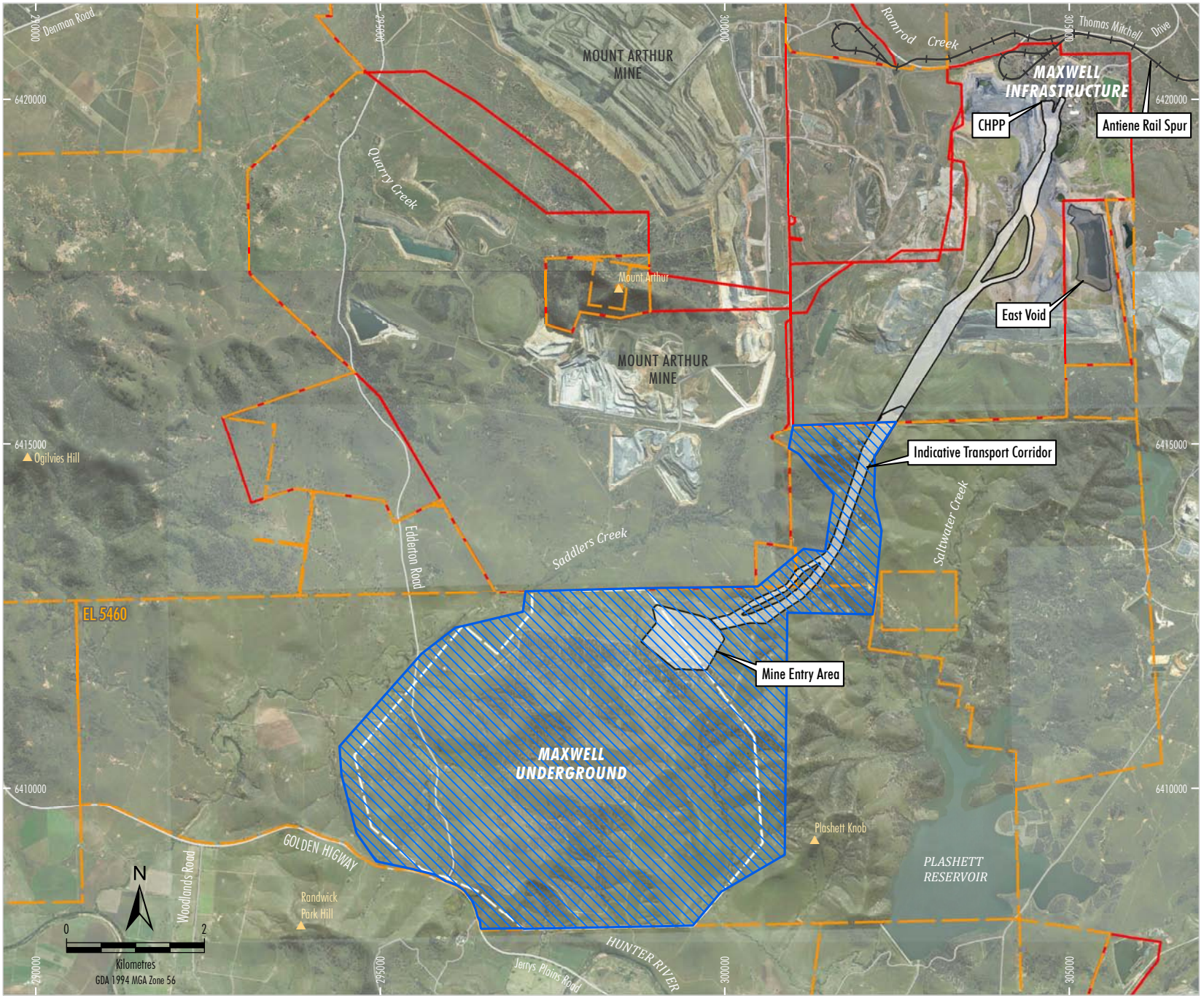
Source: © NSW Department of Finance, Services and Innovation (2018); Office of Environment and Heritage NSW (2018)

MALABAR COAL

MAXWELL PROJECT

Regional Location

Figure 1



LEGEND

- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Railway
- Gateway Certificate Application Area
- Indicative Underground Mining Area
- Proposed Surface Development Area
- East Void-CHPP Reject Emplacement Area

Source: © NSW Department of Finance, Services & Innovation (2018)
Orthophoto: Oct 2016, 2011

The Maxwell Project is an underground mining proposal. While EL 5460 is approximately 5, 580 hectares, the underground activities would pass beneath less than 40% of that land over the 26 years.

MALABAR COAL

MAXWELL PROJECT

General Arrangement of the Project

Figure 2

SHM-18-03 MG_TO_202A

The Project underground mining area is located entirely within EL 5460.

The Project would include the following activities:

- underground bord and pillar mining with pillar extraction in the Whynot Seam;
- underground longwall extraction in the Woodlands Hill Seam, Arrowfield Seam and Bowfield Seam;
- development and use of mine access drifts and underground roadways and shafts to access and service the underground mining areas;
- development and use of a mine entry and associated infrastructure, services and facilities that support underground mining and coal handling activities and provide for personnel and materials access to the underground mine;
- establishment of an internal access road from Thomas Mitchell Drive to the underground mine entry;
- establishment of power transmission infrastructure including power lines and substations;
- establishment of infrastructure associated with mine ventilation and gas management;
- use of the existing water management systems;
- progressive development of dams, sumps, pumps, pipelines, water storages, water treatment and other water management infrastructure;
- production of up to 8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal;
- construction and use of a conveyor system to transport coal from the underground mine entry area to the existing CHPP at the Maxwell Infrastructure for processing;
- transportation of early ROM coal via internal roads from the mine entry area to the existing CHPP;
- handling and processing of coal and loading of coal onto trains at the existing Maxwell Infrastructure;
- transport of product coal via the existing Antiene Rail Spur and Main Northern Railway to market or to the Port of Newcastle for export, or via conveyor to the Bayswater and/or Liddell Power Stations;
- emplacement of coarse rejects and tailings and brine within existing voids in CL 229 and ML 1531;
- continued use of existing facilities and services at the Maxwell Infrastructure, with minor upgrades;
- monitoring, rehabilitation and remediation of subsidence and other mining effects;
- management of subsidence impacts on Edderton Road;
- rehabilitation activities within CL 229, ML 1531 and CL 395, including the rehabilitation of reject and tailings emplacement areas;
- exploration activities within EL 5460 and Authorisation (AUTH) 173; and
- other associated minor infrastructure, plant, equipment and activities.

An indicative Project general arrangement showing the underground mining area and key infrastructure is provided on Figure 2. Additional detail on the Project is provided in Section 3.

1.5 CONSULTATION TO DATE

Malabar has engaged with government agencies, community members and other interested parties regarding the Project, prior to and since taking control of EL 5460 in February 2018.

Consultation undertaken to date in relation to the Project has included:

- Keeping the community informed of key Project milestones and Malabar's intentions through notices in the local media in October 2017 and April 2018.
- Distribution of a community newsletter providing a Project update to local residents and other stakeholders in June 2018 and placement of the newsletter on the Malabar website.
- Conducting a social impact assessment scoping survey across June and July 2018.
- Creation of a dedicated website (www.malabarcoal.com.au) and phone line ([02] 6542 0283) to provide Project information to interested parties.

- Regular meetings with the Maxwell Infrastructure, Spur Hill and Antiene Rail Spur Community Consultative Committees (CCCs) (with meeting minutes provided on the website and emailed to interested parties).
- Active, ongoing consultation with lessees and near neighbours proximal to the Project through meetings, property visits (by arrangement), phone calls and emails.
- Public notification of the intention to lodge an application for a Gateway Certificate in the local media between 30 May and 1 June 2018 and on 22 August 2018.
- Conceptual Project Development Plan meeting with representatives of the Division of Resources and Geoscience (DRG) (within the Department of Planning and Environment [DP&E]) on 23 May 2018.
- A meeting with representatives of the DP&E on 13 June 2018.
- A briefing with representatives of the NSW Resources Regulator on 10 July 2018.
- A meeting with representatives of the NSW Office of Environment and Heritage (OEH) on 17 July 2018.
- A meeting with representatives of the Coolmore Stud on 12 June 2018.
- A meeting with representatives of the Godolphin Woodlands Stud on 28 June 2018.
- Commencement of the Aboriginal Cultural Heritage Assessment consultation process in June 2018.
- Ongoing engagement and briefings with Muswellbrook Shire Council and Singleton Council.
- Ongoing consultation with industry groups and private enterprise within the Hunter region.
- Ongoing consultation with surrounding mining and power generation companies.

Malabar is committed to contributing to the local community.

Over the last five years, Malabar has provided donations, sponsorship or support to the following community organisations:

- Denman Public School;
- St Joseph's Primary School (including the NSWMC EnviroSmart Grant);
- Denman Aged Care;
- Dalswinton Rural Fire Service;
- Upper Hunter Education Fund;
- Upper Hunter Wine and Food Affair;
- Denman's Children's Centre;
- Denman and Sandy Hollow Junior Rugby League Football Club;
- Denman Rugby League Football Club;
- Denman Junior Cricket Club;
- Denman Basketball;
- Denman Men's Shed Association;
- Denman Pony Club;
- Denman & District Development Association;
- Merton Living;
- Upper Hunter Show;
- Lions Club of Denman;
- Wanaruah Local Aboriginal Land Council;
- Upper Hunter Riding for the Disabled; and
- Muswellbrook Public School.

1.6 PROJECT TEAM

The Gateway Application was prepared by Malabar with specialist input provided by the following:

- Malabar project team (*project design, consultation, alternatives and justification*);
- Resource Strategies (*co-ordination of specialist studies for Gateway Application*);
- 2rog Consulting (Dr Paul Frazier) (*agricultural impact assessment*);
- SLR Consulting Australia Pty Ltd (SLR) (Clayton Richards and Murray Fraser) (*verification of BSAL*);
- HydroSimulations (Dr Noel Merrick and Dr Derek Yates) (*preliminary groundwater assessment*);
- Mine Subsidence Engineering Consultants (MSEC) (Dr James Barbato) (*subsidence predictions and impact assessment*); and
- Ashurst (*legal review*).

1.7 DOCUMENT STRUCTURE

The documentation supporting the Gateway Application comprises a Technical Overview (this document) and an Agricultural Impact Assessment (AIA).

The AIA prepared by Dr Paul Frazier (2rog Consulting) is supported by specialist subsidence, soil and groundwater studies (all of which are provided in the supporting documentation for the Gateway Application).

A summary of the sections in this Technical Overview is presented below:

Section 1	Provides an introduction to the Project and the Gateway Application.
Section 2	Provides an overview of the agricultural resource and activities in the Project area and surrounding localities.
Section 3	Provides a concise description of the Project, indicates the types of activities that would be undertaken, provides a Project justification and describes the alternatives considered.
Section 4	Identifies management, mitigation and remediation strategies that would be implemented to minimise the potential impacts on strategic agricultural land.
Section 5	Provides a summary of the assessment of the Project against the relevant criteria for BSAL.
Section 6	Includes consideration of the Equine CIC and Viticulture CIC.
Section 7	Provides a summary of the key outcomes of the Gateway Application supporting documentation.
Section 8	Lists the documents referred to in Sections 1 to 7 of this Technical Overview.

2 AGRICULTURAL CONTEXT

A brief summary of the agricultural context of the Project area is provided below. Further detail on the agricultural enterprises and individual properties is provided in the AIA (2rog Consulting, 2018).

Topography and Water Resources

The topography of the Project underground mining area consists of undulating foothills to moderately-sloping hills over open paddock grazing land. Surface elevations vary from a low point approximately 110 metres above Australian Height Datum (mAHD) to a high point of approximately 240 mAHD along a north-east to south-east trending ridgeline.

A number of unnamed ephemeral tributaries traverse the Project underground mining area. The Gateway Certificate Application Area is located within the Saddlers Creek and Saltwater Creek catchments and the larger Hunter River catchment.

The Project underground mining area is located to the south-east of Saddlers Creek, which is a tributary of the Hunter River (Figure 2). The Hunter River flows in an easterly direction to the south of the Project underground mining area. The land generally falls towards the Hunter in the south-east of the mining area and towards Saddlers Creek in the north-west.

Surface water is the main water source for stock and domestic use in the Gateway Certificate Application Area.

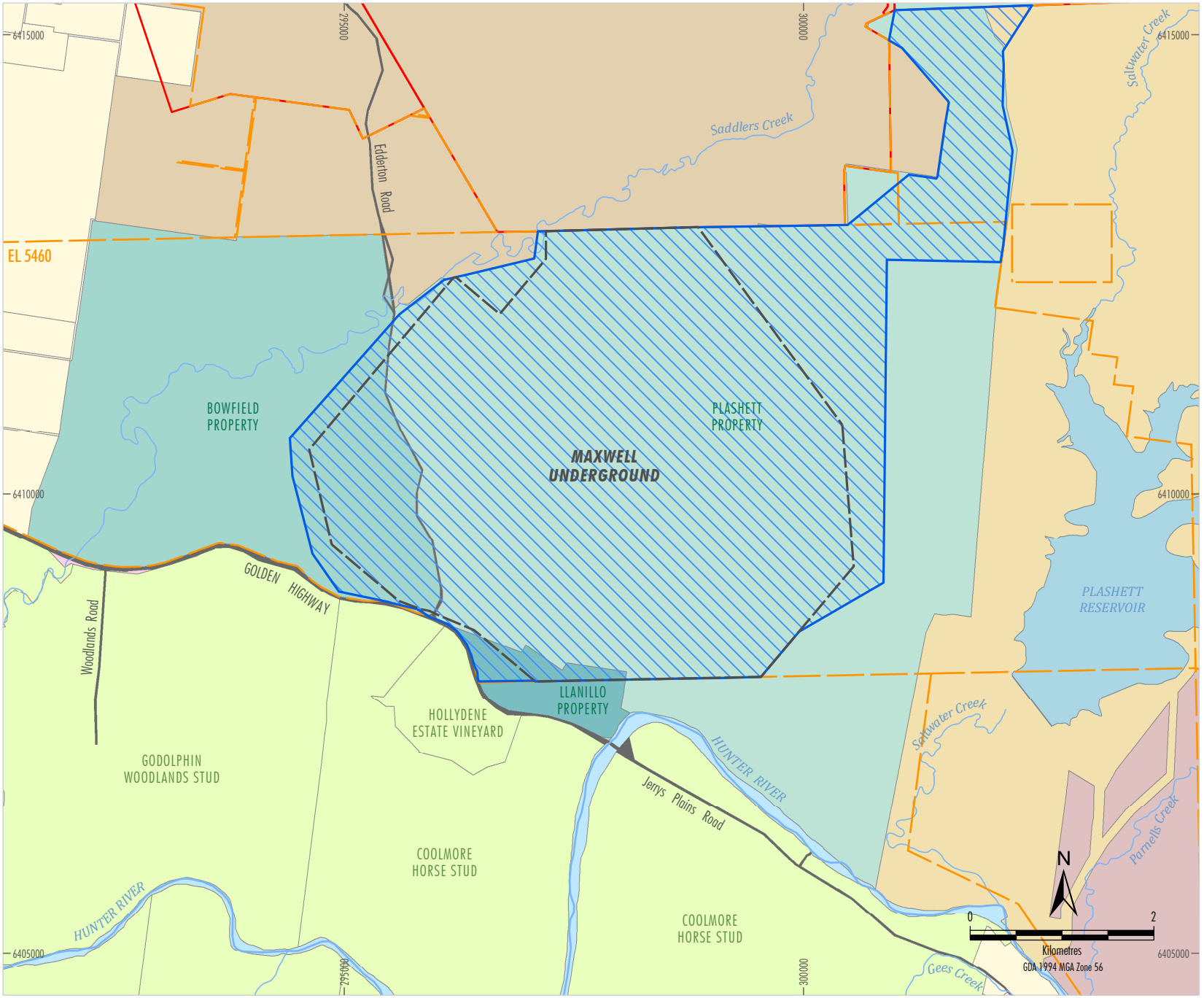
Most of the registered groundwater bores in the vicinity of the Project are within the Hunter River alluvium. Only a few registered bores exist in the Permian porous rock aquifer and Saddlers Creek alluvium, likely due to lower yield and poorer water quality (HydroSimulations, 2018).

The main purposes for the registered groundwater bores within 10 kilometres (km) of the Gateway Certificate Application Area include domestic and stock uses, irrigation and monitoring.

Land Use

The main agricultural industries within the surrounding locality include cattle grazing, horse breeding and viticulture (2rog Consulting, 2018).

Freehold land within the Gateway Certificate Application Area is owned by Malabar, with the exception of a small area within the transport corridor in the north, which is owned by AGL (Figure 3).



LEGEND

- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Underground Mining Area
- Gateway Certificate Application Area

Land Use

- Malabar-owned Land
- Mt Arthur Coal Mine
- Hunter Valley Operations
- AGL-owned Land
- Equine and Viticulture Enterprises
- Other Privately-owned Land
- Crown Land
- Road
- Waterbody

Source: © NSW Department of Finance, Services & Innovation (2018); Chelace (2018)

MALABAR COAL

MAXWELL PROJECT

Properties within the Application Area

Figure 3

SHM-18-03 MG_TO_203A

The land within the Gateway Certificate Application Area is primarily cleared, open paddock grazing land, with some areas of remnant forest and open woodland (Plate 2).

The properties within the Gateway Certificate Application Area have been owned by resource companies, formerly AngloAmerican and now Malabar, for over 15 years.

During that time, the Bowfield and Llanillo properties have been leased to the one family, while the Plashett property has been managed separately. Malabar's Bowfield property extends more than 2 km to the west of the Gateway Certificate Application Area.

Land use within the Gateway Certificate Application Area consists primarily of cattle grazing, with small areas of opportunistic fodder cropping (under favourable conditions).

These agricultural activities are supported by farm dams, unsealed tracks, land contouring, cattle yards and fencing.

Land to the north of the Gateway Certificate Application Area is associated with active or previous open cut coal mining activities (Mt Arthur Mine and Maxwell Infrastructure).

AGL-owned land associated with the Bayswater and Liddell Power Stations is located to the east of the Gateway Certificate Application Area. The Plashett Reservoir, shown on Figure 3, serves as an off-river water storage for the Bayswater Power Station.

Neighbouring equine businesses include the Coolmore Stud and Godolphin Woodlands Stud. These internationally-owned, thoroughbred horse breeding studs are located south of the Gateway Certificate Application Area and south of the Golden Highway (Figure 3). The Hollydene Estate vineyard, winery, restaurant and cellar door is also located south of the Gateway Certificate Application Area and south of the Golden Highway (Figure 3).

No equine or viticulture enterprises are located within the Gateway Certificate Application Area.

Plate 2 – Land in EL 5460 – View Looking South-west

3 DESCRIPTION OF THE DEVELOPMENT

3.1 COAL RESOURCE

The Project would target coal seams within the Wittingham Coal Measures.

The Project would produce high quality coals with at least 75% of coal produced capable of being used in the making of steel (coking coals). The balance would be export thermal coals suitable for the new generation High Efficiency, Low Emissions power generators.

Geology

The Project is located in the Hunter Coalfield in the northern part of the Permo-Triassic Sydney Basin, which forms the southern portion of the Sydney-Gunnedah-Bowen Basin (Department of Mineral Resources, 1988).

The Wittingham Coal Measures occur widely within the Hunter Coalfield and contain many recoverable seams. The Project targets mining of the Whynot, Woodlands Hill, Arrowfield and Bowfield Seams.

The target seams are within the Jerrys Plains Subgroup, forming part of the upper and middle units of the Wittingham Coal Measures (Figure 4).

Above the target seams, the stratigraphy of the area consists of a sequence of sandstone, siltstone and laminate units within the Wittingham Coal Measures (Figure 4).

A summary of the characteristics of the target seams is provided in Table 1.

Table 1
Seam Characteristics of the Underground Mining Area

Seam	Depth of Cover (m)	Working Section Thickness (m)
Whynot Seam*	40 – 180	1.3 – 2.3
Woodlands Hill Seam	125 – 365	1.7 – 3.5
Arrowfield Seam	170 – 415	2.1 – 3.7
Bowfield Seam	215 - 425	2.2 – 3.3

m – metres.

* Secondary extraction would not occur at depths of cover less than 50 m.

Exploration History

Exploration in the Gateway Certificate Application Area commenced in the late 1940s, with exploration occurring in several phases since that time. EL 5460 has been systematically explored since its grant in 1998.

To date, exploration has been focused on the area targeted by Malabar for underground mining. This area is covered by an approximate 250 m x 250 m grid of exploration boreholes.

In total, more than 950 exploration boreholes have been drilled. In addition to this, approximately 75% of the area is covered by 3D seismic survey.

Exploration activities would continue to be undertaken over the life of the Project, as input to detailed mine planning and engineering studies to refine the understanding of geological structures and coal quality.

Coal Resource

The total measured, indicated and inferred coal resource within EL 5460 is approximately 771 million tonnes (Mt).

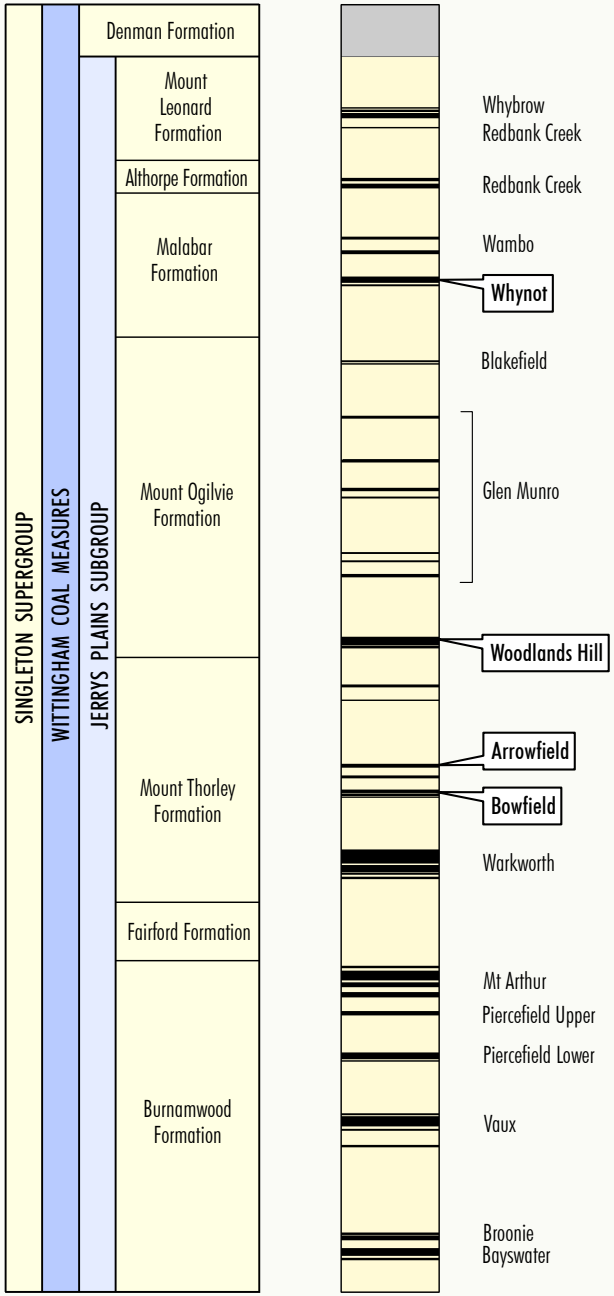
The Project would recover approximately 150 Mt of ROM coal from the target coal seams.

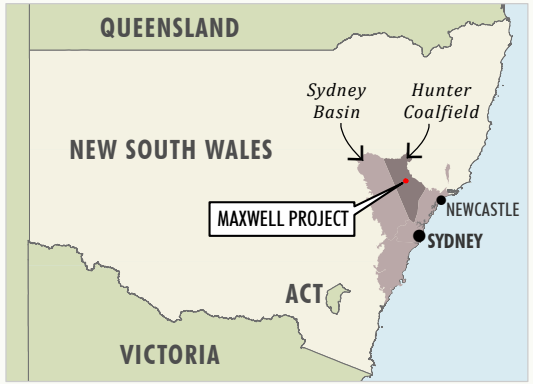
There is the potential to recover additional coal beyond the life of the Project, subject to separate assessments and approvals.

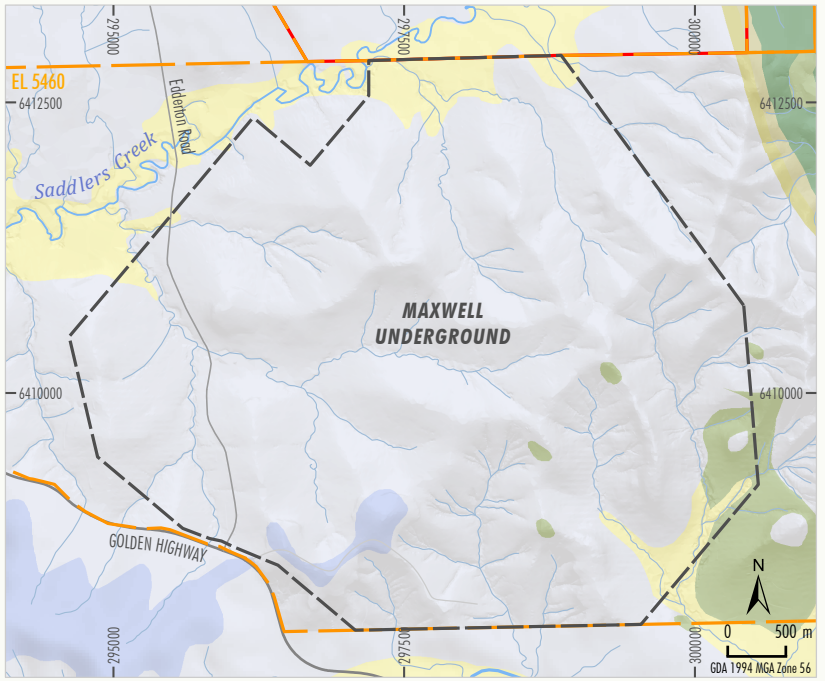
3.2 PROJECT ACTIVITIES

A detailed description of the Project activities, including the construction and the operational phases of the Project, is provided in the AIA.

Table 2 and the subsections below provide a summary of activities associated with the Project.







LEGEND

Exploration Licence Boundary

Mining and Coal Lease Boundary

Indicative Underground Mining Area

Stratigraphic Unit

- Quaternary
- Newcastle Coal Measures
- Wittingham Coal Measures
- Ungrouped Cenozoic Igneous Units
- Mulbring Siltstone

Source: © NSW Department of Planning and Environment (2018); Department of Finance, Services & Innovation (2018); Department of Resources & Energy (2018)

MALABAR COAL

MAXWELL PROJECT

Geology of the Project Area

Figure 4

SHM-18-03 MG_TO_205A

Table 2
Overview of the Maxwell Project

Component	Description
Mining Method	Underground extraction using “bord and pillar” and “longwall” mining methods.
Resource	Coal seams in the Wittingham Coal Measures within EL 5460 (Whynot Seam, Woodlands Hill Seam, Arrowfield Seam and Bowfield Seam).
Annual Production	Up to 8 million tonnes of ROM coal per annum.
Mine Life	26 years of coal extraction.
Total Resource Recovered	Approximately 150 million tonnes of ROM coal.
Coal Handling and Preparation	Transport of coal from underground faces to the mine entry via an underground conveyor network. A coal surge stockpile at the underground mine entry would be used prior to transporting ROM coal to the Maxwell Infrastructure CHPP. Transportation of initial ROM coal via internal roads, while an overland conveyor is constructed and commissioned. Subsequently, ROM coal would be transported via the overland conveyor system. Handling and processing of up to 8 million tonnes of ROM coal per annum.
Management of Reject Material (i.e. Stone-derived Material)	Emplacement of coarse rejects and tailings primarily within the existing “East Void” in ML 1531 at the Maxwell Infrastructure precinct.
General Infrastructure	Use of existing Maxwell Infrastructure with minor upgrades. Development of underground mine entries and associated facilities that support the underground mining activities, provides for personnel and materials access to the underground mine and includes coal handling and sizing facilities. Development of infrastructure for power, ventilation and gas management for the underground mine.
Product Transport	Transport of product coal to market or to the Port of Newcastle for export via the Antiene Rail Spur and Main Northern Railway or via conveyor to the Bayswater and/or Liddell Power Stations.[1] Transport of up to 7 million tonnes of product coal per annum along the rail loop (up to 12 train movements per day).
Water Management	Development of a water management strategy based on a detailed site water balance. Water management may include recycling of water on-site, storage of water on-site (including in voids), licensed water extraction and/or consideration of treatment and beneficial use. Augmentations and extensions to existing water management infrastructure and development of new water management storages, sumps, pumps, pipelines, sediment control, mine dewatering, water treatment and wastewater treatment infrastructure.
Workforce	During operation, the Project would directly employ approximately 350 personnel. Additional employment would be generated by Project construction activities and during operations (e.g. cleaners, security personnel, etc.). This additional employment would be quantified and assessed in the EIS.
Hours of Operation	Operated on a continuous basis, 24 hours per day, seven days per week.

1 Consistent with the current approval for the Antiene Rail Spur (DA 106-04-00), coal may be hauled on public roads under emergency or special situations with the prior written permission of the Secretary of the DP&E, Roads and Maritime Services and Muswellbrook Shire Council.

3.2.1 Project Development and Construction Activities

Construction activities would generally be undertaken 24 hours per day, seven days per week, including surface construction activities.

The initial construction and development phase of the Project would be approximately 12 months and would involve activities, such as:

- establishing site access and site services;
- developing an entry area and drifts to the coal seams at the Maxwell Underground mine entry area;
- establishing infrastructure at the Maxwell Underground mine entry area;
- commencement of underground mining activities (such as roadway development); and
- transport of coal mined during the development stage.

Other development activities would occur over the life of the Project, including maintenance, replacements and upgrades.

3.2.2 Underground Mining Operations

The Project would involve extraction of coal from four seams within the Wittingham Coal Measures using the following underground mining methods:

- bord and pillar with partial pillar extraction in the Whynot Seam; and
- longwall extraction in the Woodlands Hill Seam, Arrowfield Seam and Bowfield Seam.

The Project would produce up to 8 Mtpa of ROM coal. Underground mining activities would be undertaken 24 hours per day, seven days per week.

The conceptual layout for each seam is provided on Figure 5.

During the development of the EIS and over the life of the Project, the mining layout may vary from that shown on Figure 5 to account for factors that include: localised geological features; mine economics; coal market demand; detailed mine design considerations; and adaptive management.

The mining layout would be modified within the Project boundaries where required and would be documented in the relevant Mining Operations Plan and Extraction Plans.

Associated Infrastructure and Activities

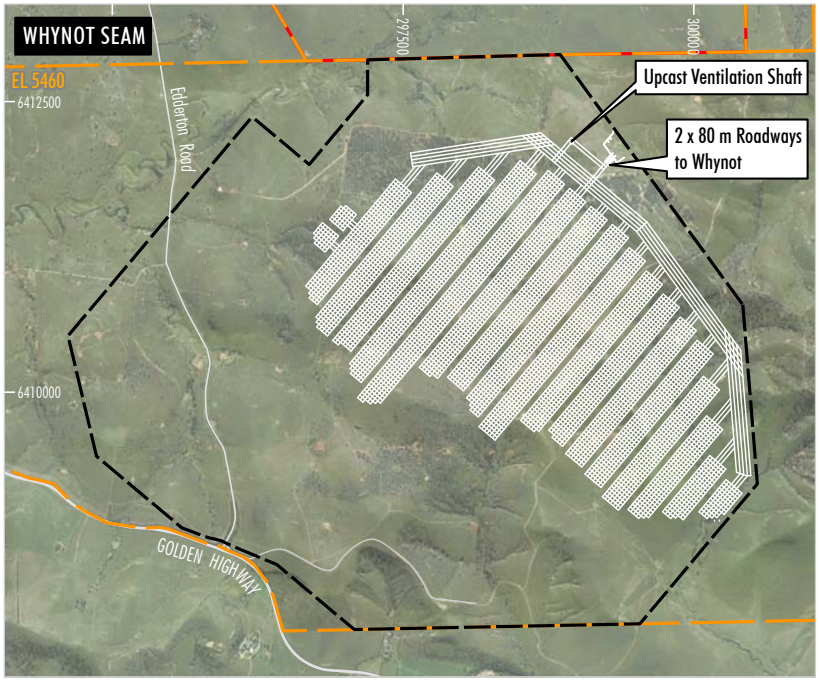
Other associated infrastructure and activities would include:

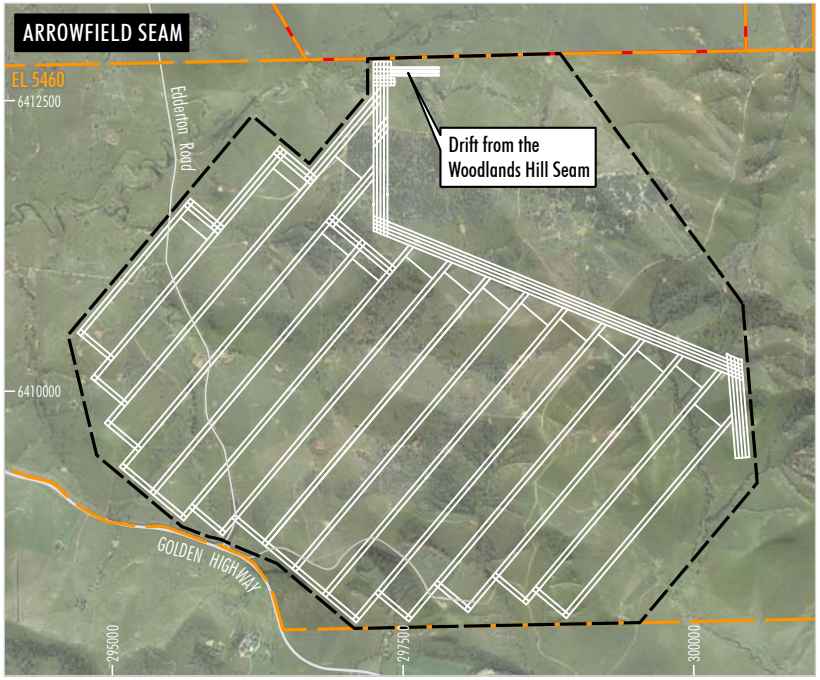
- personnel and materials access via drifts from the underground mine entry area;
- materials handling and transport systems to convey coal from the longwall and development faces to the surface;
- underground equipment (e.g. shearers, continuous miners, conveyors, bins) and mobile fleet (e.g. load haul dump vehicles, drill rigs, shuttle cars, personnel carriers);
- ventilation systems for intake and exhaust air from the underground mining areas;
- gas monitoring systems, and gas management and abatement activities;
- water supply for equipment cooling and dust suppression;
- water management systems to transfer groundwater and process water that accumulates in the underground workings to the surface;
- storage and handling of materials used by underground mining equipment (e.g. hydraulic fluids); and
- monitoring, rehabilitation and remediation of subsidence and other mining effects.

The final location of surface infrastructure would be determined through detailed mine planning, environmental assessment outcomes and consideration of alternatives, and would be documented in the EIS.

3.2.3 Infrastructure and Services

The Project would include the use of the existing Maxwell Infrastructure and the development of new infrastructure.





LEGEND

- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Underground Mining Area
- Indicative Underground Mining Layout

Source: © NSW Department of Planning and Environment (2018); Department of Finance, Services & Innovation (2018)
Orthophoto: June 2011

N

0 2

Kilometres
GDA 1994 MGA Zone 56

MALABAR COAL

MAXWELL PROJECT

Indicative Underground Mining Layout

Figure 5

SHM-18-03 MG_TO_206A

Key existing infrastructure at the Maxwell Infrastructure location includes:

- site access road from Thomas Mitchell Drive;
- CHPP, which includes:
  - ROM coal stockpile and ROM hopper;
  - Coal Preparation Plant (CPP); and
  - product coal stockpiles with mechanical stacking and reclaim;
- train load-out facility and rail loop (connecting to the Antiene Rail Spur);
- administration, employee amenities, training centre, emergency services, workshops, store and carpark facilities;
- electrical distribution infrastructure; and
- site water management infrastructure (including water storages, pumps and pipelines and a wastewater treatment facility).

The Project would incorporate minor upgrades and additions to existing infrastructure located within existing mining leases.

3.2.4 Coal Processing, Handling and Transport

The Project would include the use of the substantial existing Maxwell Infrastructure for handling, processing and transportation of coal for the life of the Project.

An overland coal conveyor would be constructed and operated to transport sized ROM coal from the mine entry to the existing CHPP at the Maxwell Infrastructure (Figure 2). Some modification to the ROM stockpiling and handling equipment would be required to cater for delivery of coal via conveyor.

ROM coal during the development stage of the Project would be transported via internal roads along a similar route as the proposed overland conveyor. This would cease when the overland conveyor is constructed and commissioned.

ROM coal would be handled at the existing CHPP, and beneficiated through the CPP or bypassed directly to the product coal stockpile.

From the product coal stockpile, product coal would be conveyed to the existing train load-out facility, located over the rail loop, for loading onto trains.

Product coal would be transported via the existing Antiene Rail Spur and Main Northern Railway to domestic market or to the Port of Newcastle for export, or via conveyor to the Bayswater and/or Liddell Power Stations.

Consistent with the current approval for the Antiene Rail Spur (DA 106-04-00), coal may be hauled on public roads under emergency or special situations with the prior written permission of the Secretary of the DP&E, Roads and Maritime Services and Muswellbrook Shire Council.

3.2.5 Management of CHPP Reject Material

Approximately 18 million bank cubic metres of CHPP reject material would be produced over the life of the Project, including coarse rejects and dewatered tailings.

This CHPP reject material would primarily be emplaced within the existing East Void in ML 1531 at the Maxwell Infrastructure.

Malabar is currently investigating the most efficient process to transport and emplace reject material. While the preference is for a “co-disposal” process where all material is pumped to the disposal area, some coarse rejects may be trucked via the currently installed coarse reject system and placed within one of the open cut voids.

At the conclusion of the Project, emplacement areas would be capped and rehabilitation completed, unless consent for continued emplacement is granted.

Malabar will continue to investigate beneficial uses for the voids in CL 229 and ML 1531. This will include CHPP reject material from possible future underground mining activities undertaken by Malabar within EL 5460 and EL 7429 (Spur Hill) and engagement with other mining and industrial facilities in the region (subject to separate assessments and approvals).

3.2.6 Water Management

The Maxwell Infrastructure incorporates water management infrastructure to separate: clean water; oily water; and mine-affected water.

The Project would involve the use of the existing infrastructure with minor augmentations and extensions. New water management infrastructure would also be developed at the underground mine entry and for other Project activities.

The Project would involve the use of a combination of mine water, recycled treated mine water and potable water in underground and surface operations.

Water and brine from water treatment activities would be stored within existing voids in CL 229 and ML 1531.

Final water supply requirements for the Project would be subject to the outcomes of a detailed water balance that would be presented in the EIS.

3.2.7 Other Activities

The Project would include rehabilitation of Project surface development areas, such as the mine entry area, at the cessation of the Project.

The Project would also include the continued rehabilitation of existing mining disturbance areas within CL 229, ML 1531 and CL 395, including overburden emplacement areas, and eventual relinquishment of areas not required to support the Project. A detailed rehabilitation strategy for these areas will be presented in the EIS.

Potential subsidence impacts on Edderton Road would be managed through either road maintenance or realignment of the road around the underground mining area. These options would be evaluated further, and the preferred option would be presented in the EIS.

Other activities that would be conducted as a component of the Project include monitoring, remediation of subsidence impacts, rehabilitation of surface disturbance, and minor associated infrastructure and activities.

3.3 ACTIVITIES WITHIN EXISTING MINING LEASES

The Maxwell Infrastructure, which would be used for this Project, is located within existing mining leases and, therefore, is not the focus of the Gateway Application.

The use of existing mining voids in CL 229 and ML 1531 for the emplacement of coarse rejects and tailings, and the storage of water, would also occur within existing mining leases.

The activities within the existing mining leases would be subject to more detailed assessment as part of the EIS.

3.4 WORKFORCE

During operation, the Project would directly employ approximately 350 personnel.

Additional employment would be generated by Project construction activities and during operations (e.g. cleaners, security personnel, etc.).

3.5 SUMMARY OF PROJECT DISTURBANCE AREAS

Surface development for the Project outside of existing mining leases would be up to approximately 170 hectares (ha). The surface development would comprise the following components:

- Surface development associated with the underground mine entry area and transport corridor (approximately 150 ha).
- Optional realignment of Edderton Road (approximately 10 ha).
- A maximum disturbance of up to approximately 10 ha associated with other works and ancillary infrastructure outside of the defined surface development areas.

Other disturbance works would include, but not be limited to, environmental and subsidence monitoring activities, remediation of subsidence impacts, exploration, development of service boreholes, site maintenance activities and other minor ancillary works. This surface development would be temporary and isolated in nature. The surface development would occur progressively, and areas would be rehabilitated when no longer required.

There would be no surface development located on mapped BSAL. The Project may involve minimal temporary disturbance (<1 ha) to BSAL associated with monitoring, exploration and remediation activities.

3.6 PROJECT JUSTIFICATION OVERVIEW

3.6.1 Project Rationale

The Project would facilitate the underground mining, processing and sale of coal within EL 5460.

Malabar has elected to proceed with the Project as proposed due to:

- Substantial capital savings associated with the use of the existing Maxwell Infrastructure.
- The proximity of the Project underground mining area to the existing Maxwell Infrastructure.
- The extensive geological and geotechnical data available within the target area in EL 5460 (Section 3.1).
- The short development time to first underground coal and full employment.
- Extraction of a significant coal resource that provides an attractive return on investment.

The *Strategic Statement on NSW Coal* (NSW Government, 2014) recognises the value of coal production to the NSW economy, including:

- The long history of coal mining in NSW, and its close ties with communities in the Hunter.
- The potential for coal production to deliver significant economic benefits to local communities, including jobs and investment.
- Coal production's significant contribution to export earnings as the State's biggest single export earner.

The Project would produce the following benefits for the local area, for NSW more broadly and for the national economy:

- **generation of approximately 350 new direct, long-term jobs for the region, along with many more indirect jobs;**
- **annual export sales in the vicinity of $700 million annually;**
- **support for local businesses from the initial capital expenditure and the substantial ongoing operating inputs;**
- **substantial corporate tax contributions;**
- **payment of approximately $1.3 billion in royalties to the NSW Government over the initial 26 years of mining;**
- **certainty around future development within EL 5460;**
- **support for continued rehabilitation activities within CL 229, ML 1531 and CL 395, including reduction in the volume of final voids through emplacement of reject material generated by coal processing activities; and**
- **ongoing financial support for community groups as demonstrated by Malabar for more than five years.**

Full consideration of the Project on social, environmental and economic grounds, including consideration of the principles of ecologically sustainable development, consideration of alternatives and a cost-benefit analysis, would be included in the EIS. This evaluation would consider the *Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Government, 2015).

3.6.2 Alternatives Considered

As part of its acquisition of EL 5460, Malabar committed to develop the Project solely as an underground mining operation.

Open cut mining is prohibited within EL 5460 under the Mining SEPP and the conditions of EL 5460.

The Project would minimise impacts to amenity, air quality, biodiversity, land, heritage and the road and rail network through the use of the existing Maxwell Infrastructure (including the site access road, CHPP and Antiene Rail Spur). This would avoid the development of additional infrastructure required to support an underground mining operation within EL 5460.

The location of the mine entry for the Project (Figure 2) has been selected in consideration of:

- locating the mine entry away from sensitive receptors, in a natural valley that mitigates and minimises alteration of the visual landscape (particularly from sensitive viewsheds); and
- minimising the length of underground roadways required to access the coal seams.

The proposed scale of the Project, if approved, would provide sufficient investment certainty for Malabar. The significant resource definition and exploration drilling conducted in EL 5460 to date indicate that the target coal seams are the optimal seams for an underground mining operation.

Bord and pillar mining methods (with pillar extraction) are proposed in the Whynot Seam to:

- minimise the time to first coal; and
- allow the extraction of a resource with a thinner working section and lower depth of cover compared to the other target seams.

Due to the coal thickness and continuity, and the depths of cover, longwall mining methods are proposed in the Woodlands Hill, Arrowfield and Bowfield seams to maximise coal recovery and efficiency.

The Project mine layout would be designed to avoid direct subsidence impacts on the Hunter River alluvium and Saddlers Creek.

3.6.3 Alternatives to be Considered

Further consideration of alternatives to location, scale, methods and management would be undertaken as a component of comprehensive assessment undertaken for the EIS. These alternatives will include:

- panel layout, panel width and pillar width, in consideration of detailed geology, mine economics, safety, subsidence and environmental aspects;
- measures to avoid, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the Project; and
- options for the emplacement of coarse and fine rejects within existing voids (e.g. co-disposal) (Section 3.2.5).

4 STRATEGIES TO MINIMISE POTENTIAL IMPACTS ON AGRICULTURAL LAND

4.1 SUBSIDENCE MANAGEMENT

4.1.1 Extraction Plan Process

Prior to causing any subsidence, the Project would be required to prepare and submit an Extraction Plan for approval by the DP&E. This is an approval required by standard conditions of development consents for underground coal mines in NSW.

These Extraction Plans would include processes to monitor, manage and remediate subsidence impacts on agricultural land.

4.1.2 Subsidence Management and Remediation

Temporary remedial actions to mitigate the potential subsidence impacts could include the following:

- relocation of stock to areas outside of the areas directly above active underground mining;
- installation of fencing to limit access by livestock or unauthorised personnel to areas of active subsidence;
- ripping, tyning and/or infilling of surface cracks;
- erosion control measures and/or revegetation works in surface drainage lines or other disturbed areas; and
- local regrading or reshaping to reduce areas of localised ponding.

Remediation of grazing land affected by subsidence would be undertaken, as required, during Project operations to minimise hazard to persons, livestock and native fauna and long-term potential environmental impacts.

The requirement and methodology for any subsidence remediation techniques would be determined in consideration of:

- potential impacts of the unmitigated impact, including potential risks to public safety and the potential for self-healing or long-term degradation; and
- potential impacts of the remediation technique, including site accessibility.

Remediation would generally be undertaken using conventional earthmoving equipment (such as backhoe or grader), and would include:

- in-fill of minor surface cracks by cultivation of the ground surface;
- in-fill of larger surface cracks with suitable soil or other material;
- localised regrading or reshaping to limit the potential for water ponding; and/or
- stabilisation of disturbed areas with temporary erosion controls (e.g. silt fences) and long-term measures (e.g. vegetation planting).

Minor cracks (i.e. less than 50 millimetres [mm]) that develop are not expected to require remediation, as geomorphological processes would result in these cracks filling naturally over time.

4.2 MANAGEMENT OF WATER RESOURCES

Management of water resources would include:

- holding appropriate water licences under the *Water Management Act, 2000* for any water taken directly or incidentally for the Project; and
- ongoing groundwater monitoring and validation of the groundwater model throughout the Project life.

These aspects are described further below.

4.2.1 Water Licensing

Under the *Water Management Act, 2000*, all water taken by aquifer interference activities is required to be accounted for within the extraction limits set by any relevant Water Sharing Plans. The Water Sharing Plans relevant to the Project include:

- *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009*;
- *Water Sharing Plan for the Hunter Regulated River Water Source, 2016*; and
- *Water Sharing Plan for the North Coast Fractured and Porous Groundwater Sources, 2016*.

Licensing under the *Water Management Act, 2000* is required to account for any loss of water resulting from the Project to the water sources to which the abovementioned Water Sharing Plans apply.

The predicted annual groundwater volumes required to be licensed over the life of the Project are summarised in Table 3.

A summary of the water access licences currently held by Malabar, under Part 2 of the *Water Management Act, 2000*, is provided in Table 4.

Malabar currently holds adequate licences for "highly productive" water associated with the Hunter Regulated River Alluvial Water Source. Malabar also holds adequate licences in the Hunter Regulated River Source.

Malabar would seek and obtain the appropriate water licences (as required) and/or comply with appropriate trading rules in accordance with the relevant Water Sharing Plans.

4.2.2 Management of Potential Impacts on Groundwater Users

There would be negligible drawdown impacts at privately-owned bores in alluvial aquifers as a result of the Project alone (HydroSimulations, 2018).

Table 3
Preliminary Estimates of Water Licensing Volumes

Water Sharing Plan	Management Zone/ Water Source	Predicted Annual Water Take Requiring Licensing for the Project (ML per annum)	
		During Project Operation	Post-Mine Closure
Hunter Unregulated and Alluvial Water Sources 2009	Hunter Regulated River Alluvial Water Source	Average: 40 Maximum: 73	Average: 79 Maximum: 99
	Jerrys Management Zone of Jerrys Water Source	Negligible	Negligible
North Coast Fractured and Porous Rock Groundwater Sources 2016	Sydney Basin – North Coast Groundwater Source	Average: 1,004 Maximum: 1,347	Nil
	New England Fold Belt Coast Groundwater Source	Negligible	Negligible
Hunter Regulated River Water Source 2016	Hunter Regulated River Water Source	Average: 33 Maximum: 66	Average: 75 Maximum: 95

Source: HydroSimulations (2018).
ML = megalitres.

Table 4
Water Access Licences Currently Held by Malabar

Water Sharing Plan	Water Source	Licence	Total Entitlement
Hunter Unregulated and Alluvial Water Sources 2009	Hunter Regulated River Alluvial Water Source	WAL 18196 WAL 18201	125 units
	Jerrys Management Zone of Jerrys Water Source	-	Nil
	Muswellbrook Water Source	WAL 30212	207 units
North Coast Fractured and Porous Rock Groundwater Sources 2016	New England Fold Belt Coast Groundwater Source	WAL 41491 WAL 41559	1,387 units
	Sydney Basin – North Coast Groundwater Source	-	Nil
Hunter Regulated River Water Source 2016	Hunter Regulated River Source	WAL 769 WAL 770 WAL 771 WAL 1066 WAL 1143 WAL 1220 WAL 31439 WAL 31440	1,423 units

There would be no appreciable drawdown impacts at privately-owned bores within the “less productive” groundwater due to the Project alone; however, there may be some cumulative drawdown associated with surrounding mining operations.

The modelled drawdown effects on local groundwater aquifers are preliminary results that would be refined for the EIS. During the mine life, Malabar would use the results of a groundwater monitoring programme, and additional geological and hydrogeological information to refine the groundwater model and model predictions.

Malabar would develop and implement a groundwater management plan for the Project. The groundwater management plan would include:

- a compilation of the available information on the construction and use of existing bores and springs in the local area;
- details of an inspection of each bore by a suitably qualified hydrogeologist (where permission from the owner was granted);

- details of the groundwater monitoring programme (location, parameters, frequency and reporting) to be used by Malabar to monitor and detect impacts on local aquifers; and
- details of monitoring triggers and corresponding measures to mitigate potential cumulative impacts on water supply availability.

4.2.3 Groundwater Monitoring and Model Validation

Malabar has an extensive groundwater monitoring network that would be augmented for the Project. The monitoring network established for the Project would be maintained, and regular measurement of groundwater levels within all vibrating wire piezometers and standpipes would be conducted.

Monitoring of groundwater inflow rates and the quality of groundwater inflow would also be conducted once mining commences. The groundwater inflow would be reported on an annual basis to the NSW Natural Resources Access Regulator.

The groundwater model predictions for the Project would be validated following the completion of mining of the first underground longwall panel. Further reviews of the groundwater model would be conducted during the Project life.

Should actual groundwater levels/inflows significantly differ from those predicted, an adaptive management approach would be applied to manage potential impacts.

4.3 MANAGEMENT OF VISUAL AND ACOUSTIC AMENITY IMPACTS

Strategies to manage the potential visual and acoustic amenity impacts of the Project include:

- Development of a Project design that mitigates amenity impacts on surrounding equine and viticulture businesses by locating the Maxwell Underground mine entry area in a natural valley with a ridgeline located between the mine entry area and the Golden Highway (Plate 3).
- Continued use of existing mine infrastructure and locating new mine infrastructure away from sensitive receptors.
- Reasonable and feasible mitigation measures on-site to minimise noise generation during construction and operation.

Plate 3 – EL 5460 Looking to the South from the Proposed Location of the Maxwell Underground Mine Entry

4.4 REHABILITATION

The Project would include the continued rehabilitation of existing mining disturbance areas within CL 229, ML 1531 and CL 395 (Plate 4), including overburden emplacement areas, and eventual relinquishment of areas not required to support the Project.

Minor Project surface disturbance areas that would be progressively rehabilitated include those associated with surface exploration activities, access tracks, environmental monitoring and management activities (e.g. installation of monitoring equipment) and mine subsidence surface impacts. These areas would be rehabilitated to their previous land use (e.g. agricultural use or native vegetation).

Other surface disturbance areas, including the underground mine entry area, would be rehabilitated at the cessation of the Project.

The final land use of the underground mine entry would include areas for agricultural land uses and would be developed through the EIS process.

Other than clearing vegetation, general soil resource management practices would involve the stripping and stockpiling of soil resources prior to any mine-related disturbance.

The objectives of soil resource management for the Project would be to:

- Identify and quantify potential soil resources for rehabilitation.
- Optimise the recovery of useable topsoil and subsoil during stripping operations.
- Manage topsoil and subsoil reserves so they do not degrade whilst stockpiled.
- Establish effective soil amelioration procedures to maximise the availability of soil for future rehabilitation.
- Take into account the need to provide soil conditions that minimise the risk of soil loss via wind and water erosion during and after rehabilitation.

Malabar would develop detailed soil resource management measures during the preparation of the EIS and Rehabilitation Management Plan for the Project.

Plate 4 – Malabar's Rehabilitation Activities in CL 229 (Spreading of Inert Capping Material)

4.6 MANAGEMENT OF MALABAR-OWNED LAND

All freehold land within the Project underground mining area is owned by Malabar (Figure 3).

Malabar-owned land will continue to be leased or licensed to allow similar agricultural activities to continue on the properties.

Malabar will also implement land improvement works, such as fence and track repairs, where possible.

4.7 ONGOING CONSULTATION ACTIVITIES

A community and stakeholder engagement program has been developed for the Project. Key objectives of this program are to:

- engage with Project stakeholders about the progress and nature of the Project;
- recognise and respond to local interests or concerns regarding the Project; and
- continue the ongoing dialogue between Malabar and local landholders and neighbours.

Stakeholder consultation will continue throughout each phase of the Project.

The issues raised and outcomes of the community and stakeholder engagement program would be reported in the EIS.

In summary, engagement mechanisms for the Project may include:

- public availability of key documents (e.g. this Technical Overview and the EIS);
- provision of up-to-date Project information on the Malabar website (www.malabarcoal.com.au);
- ongoing consultation with the local community and landowners, including through relevant CCCs;
- meetings with relevant government agencies and other stakeholders (e.g. near neighbours);
- consultation with the Aboriginal community in consideration of the requirements of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010); and
- community newsletters and mechanisms for the community to obtain further information and provide feedback (e.g. information sessions).

The engagement program would include, but not be limited to, the following government agencies and authorities:

- DP&E;
- Commonwealth Department of the Environment and Energy;
- Muswellbrook Shire Council;
- Singleton Council;
- OEH (including the Heritage Division);
- DRG;
- NSW Environment Protection Authority;
- NSW Resources Regulator;
- NSW Department of Industry – Lands and Water;
- NSW Natural Resources Access Regulator;
- NSW Department of Primary Industries (DPI) (including DPI Lands and Forestry, DPI Agriculture and DPI Fisheries);
- NSW Health;
- Transport for NSW (including Roads and Maritime Services);
- Subsidence Advisory NSW;
- Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development; and
- Hunter Local Land Services.

The stakeholder engagement program also recognises other key stakeholders including:

- Muswellbrook, Denman and Jerrys Plains communities;
- the Aboriginal community;
- other industries and businesses in the area, including the equine industry, viticulture industry, retail and hospitality businesses and mining-related support services;

- neighbouring mining and power generation operations (Mt Arthur Mine and AGL's Liddell and Bayswater Power Stations);
- local, State and Federal elected representatives;
- interested non-Government organisations;
- infrastructure owners (such as Ausgrid and Telstra); and
- potential downstream infrastructure providers (e.g. Australian Rail Track Corporation, coal chain operators, Port Waratah Coal Services).

5 CONSIDERATION OF GATEWAY CRITERIA

5.1 VERIFICATION OF BIOPHYSICAL STRATEGIC AGRICULTURAL LAND

The presence of BSAL within the Gateway Certificate Application Area has been assessed based on surveys completed by SLR in 2015 and 2018 (SLR, 2018). A total of 96 soil test pits and 8 soil cores have been sampled within, and in the immediate vicinity of, the Gateway Certificate Application Area.

Based on the site inspection and soil surveys, SLR has mapped the presence of BSAL within the Gateway Certificate Application Area in accordance with the Interim Protocol (NSW Government, 2013a). The Interim Protocol outlines 12 steps that must be satisfied to meet BSAL characteristics (Figure 6).

Approximately 53% of the Gateway Certificate Application Area was excluded from assessment based on slope (i.e. areas of greater than 10% slope, or areas less than 20 ha within more steeply sloping areas) (Figure 7).

SLR (2018) has mapped 14 different soil landscape units across the Gateway Certificate Application Area. Each soil landscape unit was assessed using the physical and chemical criteria set out in the Interim Protocol to determine BSAL status (Figure 6). Following this assessment, only the Eutrophic Brown Chromosol (Deep) soil landscape unit (Unit 1) was found to satisfy the BSAL criteria (SLR, 2018) (Plate 5).

Plate 5 – Eutrophic Brown Chromosol with BSAL Characteristics

Source: SLR (2015).

The soil landscape unit that meets the BSAL criteria covers approximately 72 ha in the western portion of the Gateway Certificate Application Area and is bisected by Edderton Road (Figure 7).

5.2 CONSIDERATION OF RELEVANT CRITERIA

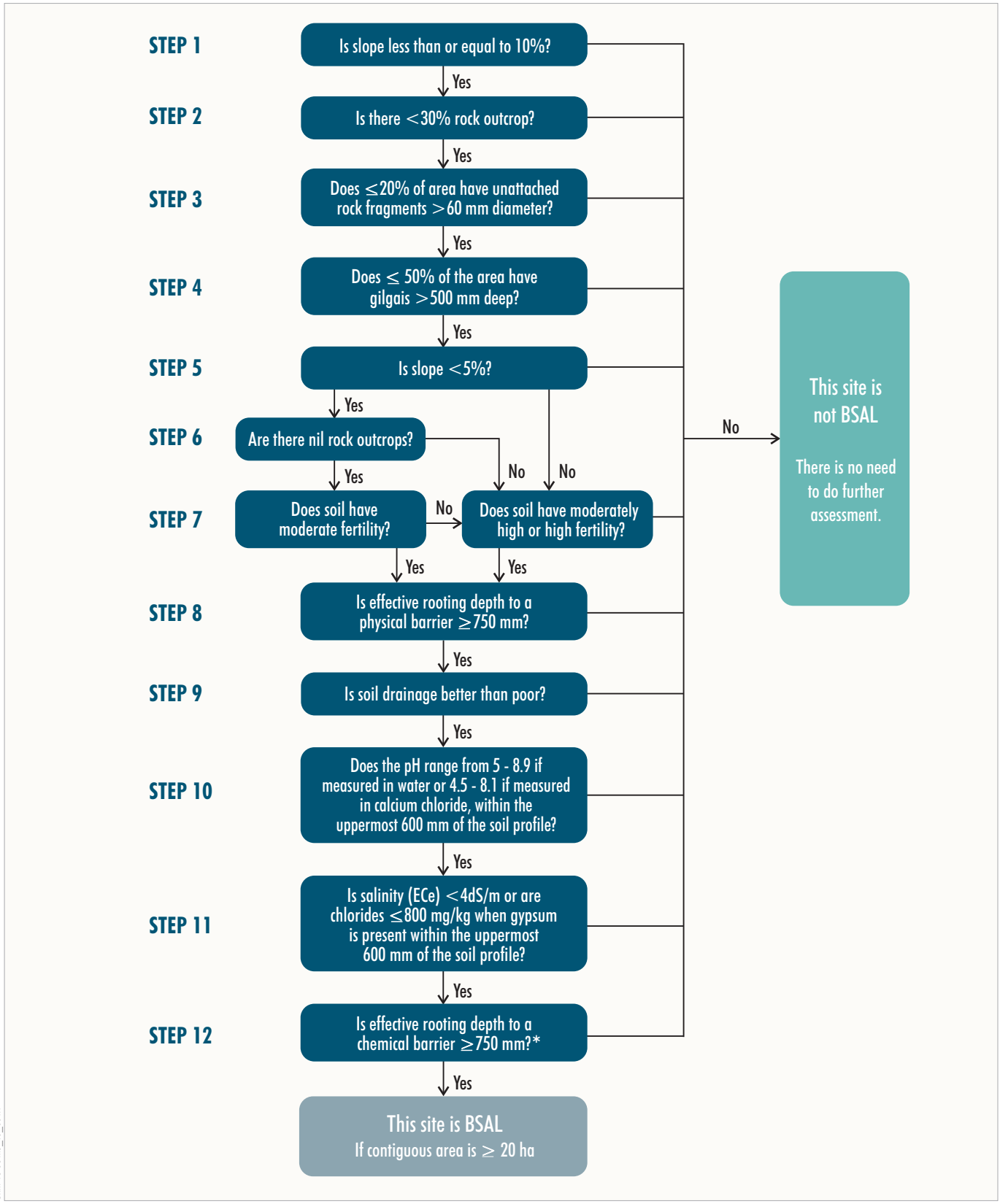
The AIA prepared by 2rog Consulting includes an assessment of the potential impacts of the Project on BSAL, including consideration of the relevant criteria in the Mining SEPP. A summary of this assessment is provided in Table 5.

2rog Consulting (2018) concluded there would be insignificant impact to the area of BSAL, and subsidence impacts are able to be managed and mitigated through appropriate management and rehabilitation.

There would be no surface development located on mapped BSAL. The Project may involve minimal temporary disturbance (<1 ha) to BSAL associated with monitoring, exploration and remediation activities.

Potential Subsidence Impacts

2rog Consulting (2018) has assessed the potential impacts of subsidence on BSAL supported by a Subsidence Assessment prepared by MSEC (2018).



SHM-18-03 MG_TO_001A

* In accordance with Section 6.10 of the Interim Protocol

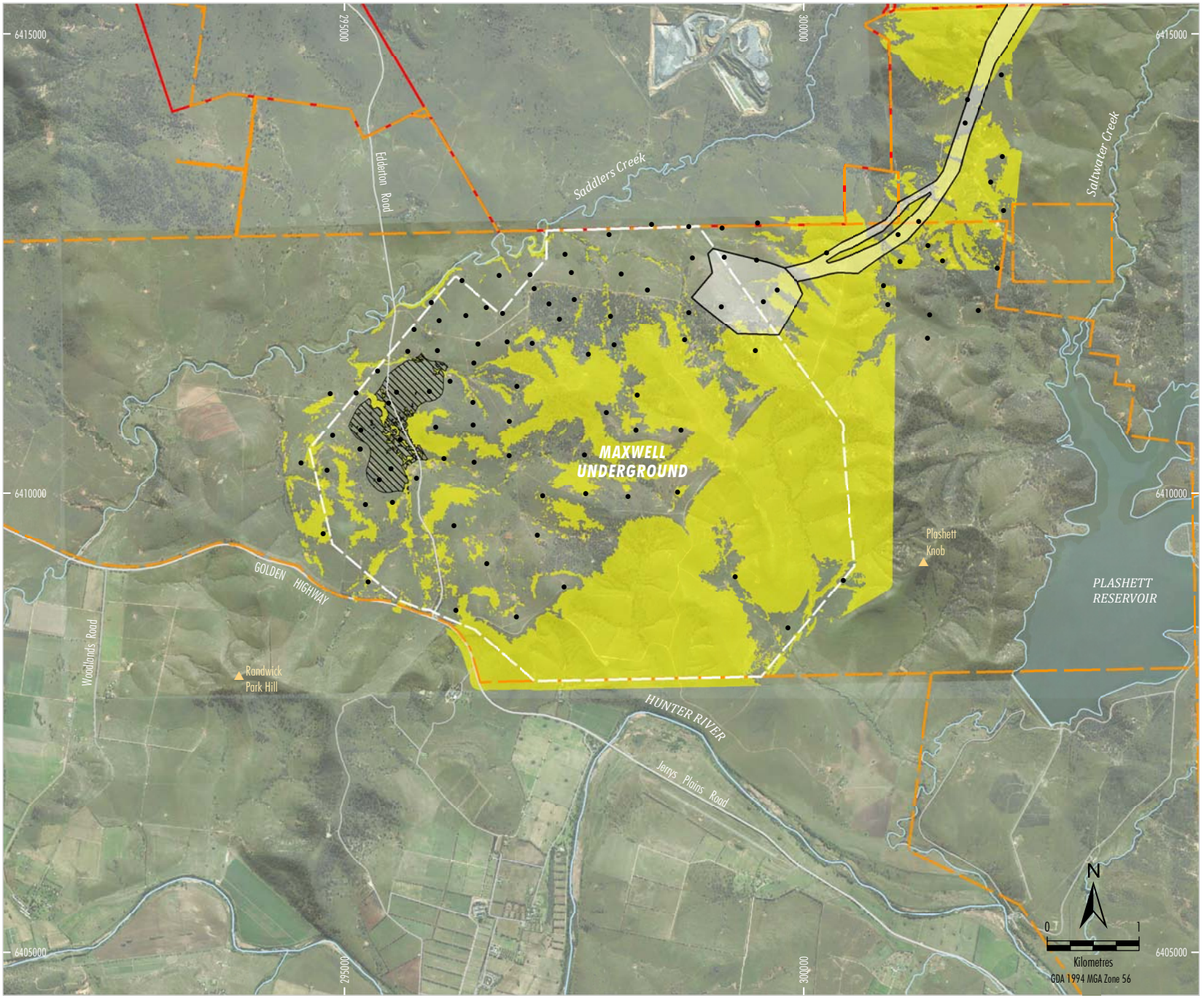
Source: After NSW Government (2013)

MALABAR COAL

MAXWELL PROJECT

Flowchart for Site Verification of Biophysical Strategic Agricultural Land

Figure 6



LEGEND

- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Railway
- Indicative Underground Mining Area
- Proposed Surface Development Area
- Exclusion Zone
- Verified BSAL – Eutrophic Brown Chromosol; Deep
- Sample Location

Source: SLR (2018); © NSW Department of Finance, Services & Innovation (2018)
Orthophoto: Oct 2016, 2011

MALABAR COAL

MAXWELL PROJECT

Verified Biophysical Strategic Agricultural Land

Figure 7

SHM-18-03 MG_TO_207A

Table 5
Summary of Consideration of Relevant Criteria for Biophysical Strategic Agricultural Land

Criteria[1]	Assessment
(i) any impacts on the land through surface area disturbance and subsidence,	There would be no surface development located on mapped BSAL (Figure 7 and Plate 6). The Project may involve minimal temporary disturbance (<1 ha) to BSAL associated with monitoring, exploration and remediation activities. There is approximately 72 ha area of BSAL that would be subject to subsidence movements, with minimal impact on the surface agricultural resources.
(ii) any impacts on soil fertility, effective rooting depth or soil drainage,	Minor changes to landscape topography are likely to result in small areas of ponding along existing watercourses and creek lines. These areas could be locally reshaped or regraded to reinstate the previous drainage patterns or incorporated into the landscape as an environmental or agricultural resource. Evidence from the existing mines within Australia indicates that there will be no significant impact to soil fertility or soil rooting depth.
(iii) increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to pH,	Minor changes to landscape topography are likely to result in localised increases and decreases in land slope. With appropriate management, including maintaining cover and remediating any cracking that may form, these changes are expected to be insignificant.
(iv) any impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy),	The Project meets the "Level 1" minimal impact considerations for highly productive groundwater outlined in the Aquifer Interference Policy.
(v) any fragmentation of agricultural land uses,	Throughout the Project life, the majority of the Gateway Certificate Application Area would be suitable for agricultural production under the current land use intensity. Internal agricultural infrastructure (fences, dams, tracks) would remain functional with appropriate management. Approximately 170 ha of land would be required for surface development for the life of the Project. This land would be rehabilitated to agreed land uses upon mine closure. No areas of BSAL would be used for Project surface development. Therefore, there would be insignificant fragmentation of agricultural land use.
(vi) any reduction in the area of biophysical strategic agricultural land.	The total area of BSAL within the Gateway Certificate Application Area is approximately 72 ha. Changes in the area and productive capacity of BSAL are expected to be nil or negligible. There would be insignificant impact to the area of BSAL within the Gateway Certificate Application Area.

Source: After 2rog Consulting (2018).

1 Clause 17H(4)(a) of the Mining SEPP.

Plate 6 – Soil Landscape Unit 1 – Eutrophic Brown Chromosol (Deep) Mapped as BSAL

Source: SLR (2015).

Subsidence may cause surface cracking and land deformation, changes to water drainage, changes to surface water resources, changes to groundwater resources and impacts to built features that may affect agricultural land use.

As a result of subsidence, cracks in the soil may form on the land surface. Cracks would be typically between 25 mm and 50 mm in width within the area of mapped BSAL. Detailed mapping from the Beltana No. 1 Underground Mine found that surface cracking affected less than 0.02% of the surveyed area (MSEC, 2018).

Management and remediation of subsidence impacts would be undertaken by Malabar as outlined in Section 4.1.2.

Impacts on Highly Productive Groundwater

The alluvial aquifer associated with the Hunter River is a significant source of water for agriculture, due to its capacity to store groundwater, capacity for groundwater flow, water quality and proximity to better farming soils (Short and Thomson, 2013).

The Hunter River alluvium is classified as a "highly productive aquifer" in accordance with the definitions in the Aquifer Interference Policy (NSW Government, 2013b).

A preliminary groundwater assessment has been completed by Dr Noel Merrick and Dr Derek Yates of HydroSimulations (2018).

The preliminary groundwater assessment was based on predictions from a numerical groundwater model developed in consideration of the *Australian Groundwater Modelling Guidelines* (National Water Commission, 2013) and the Murray-Darling Basin Committee *Groundwater Flow Modelling Guideline* (Murray-Darling Basin Committee, 2001).

HydroSimulations (2018) consider the Project model may be classified as Class 2 (effectively "medium confidence") under the *Australian Groundwater Modelling Guidelines*.

The Project is predicted to meet the 'Level 1' minimal impact considerations for the Hunter River alluvium. In particular HydroSimulations (2018) predicts the Project would result in:

- no known risks to "high priority" groundwater dependent ecosystems or "high priority" groundwater-dependent culturally significant sites identified by the NSW Government in relevant Water Sharing Plans;
- less than 1 m of drawdown at any privately-owned bores as a result of Project-related impacts;
- less than 2 m cumulative drawdown at any privately-owned bore within the Hunter River alluvium;
- no measurable impact on water quality in the Hunter River or the Hunter River alluvium;
- no simulated risks of reduced beneficial use categories of the Hunter River alluvium; and
- no predicted increase in the salinity of the Hunter River.

Following determination of the Gateway Application, the results of the preliminary groundwater assessment and its supporting numerical model would be refined for the EIS.

6 CONSIDERATION OF CRITICAL INDUSTRY CLUSTERS

6.1 EQUINE CRITICAL INDUSTRY CLUSTER

There is no Equine CIC land or equine enterprises within the Gateway Certificate Application Area.

The industry focus of the Equine CIC is producing thoroughbred horses for the racing industry. However, the industry also covers horse agistment and breeding horses for other purposes.

The Equine CIC is comprised of a number of stud and broodmare farms supported by specialised veterinary services, stock agents and farriers. The Equine CIC is mapped as two corridors stretching from Jerrys Plains in the south to Scone in the north, and from Bylong Valley in the west connecting near Denman (2rog Consulting, 2018).

Equine enterprises within the vicinity of the Project area are shown on Figure 8.

Godolphin Woodlands Stud and Coolmore Stud are adjacent to the Gateway Certificate Application Area on the southern side of the Golden Highway (Figure 8). These internationally-owned thoroughbred horse breeding studs are considered to play an important role in the Hunter thoroughbred industry (DP&E, 2015).

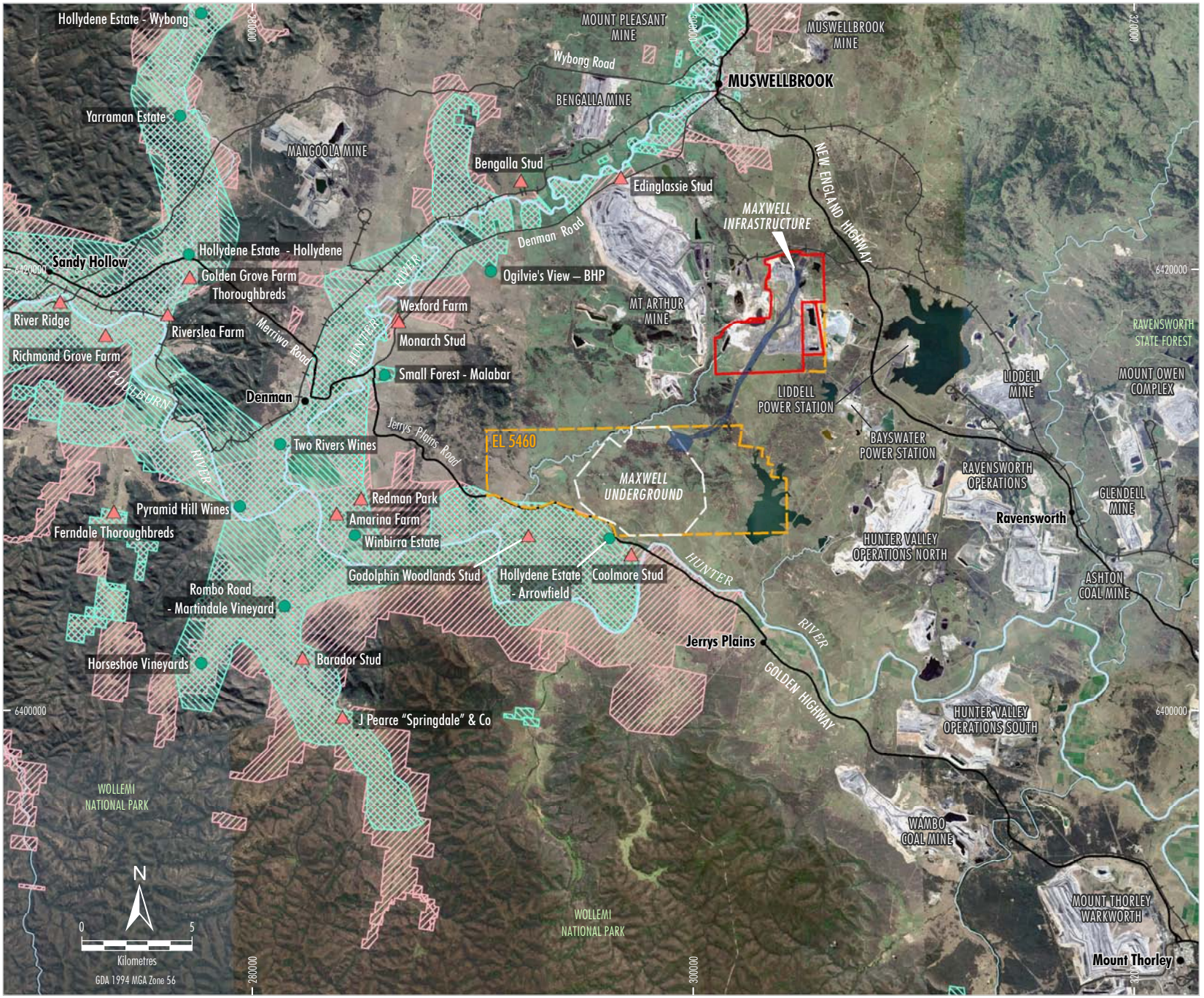
The AIA prepared by 2rog Consulting includes consideration of the potential impacts of the Project on the Equine CIC.

2rog Consulting (2018) concluded that the Project would not have a significant impact on the Upper Hunter Equine CIC.

There would no direct or subsidence impacts on agricultural resources used by the Equine CIC as a result of the Project.

The Project would not have any material impact on support services or infrastructure for the Equine CIC, as there would be no property acquisitions or other impacts likely to isolate any CIC property from, or lead to the closure of, a CIC support service such as an equine veterinarian.

Consideration of access to water resources, transport routes and scenic and landscape values is presented in the subsections below.



LEGEND

- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Railway
- Indicative Underground Mining Area
- Proposed Surface Development Area
- Equine Enterprise
- Viticulture Enterprise
- Equine Critical Industry Cluster
- Viticulture Critical Industry Cluster

Source: Short and Thompson (2013); © NSW Department of Finance, Services & Innovation (2018); Office of Environment and Heritage NSW (2018)
Orthophoto: Google Digital Globe (2017)

MALABAR COAL

MAXWELL PROJECT

Equine and Viticulture Enterprises in the Vicinity of the Project

Figure 8

SHM-18-03 MG_TO_204B

6.1.1 Consideration of Potential Impacts on Access to Water Resources

Consultation with Godolphin and Coolmore Australia indicates that the horse studs access water for their extensive irrigated pastures from surface water extracted from the Hunter River.

The Hunter River is a regulated river; that is, its flows are regulated by a major storage or dam (i.e. Glenbawn Dam) to deliver regular water for industry, agricultural and town water supplies.

Access to water within regulated rivers is controlled by the issue of access licences and setting limits on the water for extraction on an average yearly basis (available water determinations). There is a limit on the number of access licences for the Hunter River and extraction of water from the Hunter River can only occur by obtaining an existing access licence.

The water licence register indicates that Godolphin Woodlands has access to approximately 3,764 ML per annum from the Hunter River and Coolmore has access to approximately 5,290 ML per annum from the Hunter River (WaterNSW, 2018). Water access is predominantly via general security, with smaller volumes available via supplementary and domestic and stock categories (WaterNSW, 2018).

The Preliminary Groundwater Assessment for the Gateway Application (HydroSimulations, 2018) concluded:

- the Project would result in negligible impact on regulated flows in the Hunter River; and
- the Project would result in no measurable impact on water quality in the Hunter River.

Based on the preliminary groundwater assessment, Malabar would be required to hold licences to account for approximately 95 ML of indirect water take from the Hunter River per annum (Table 3). Malabar holds adequate licences in the Hunter Regulated River Source for this take (Table 4).

Therefore, the Equine CIC would not have reduced access to, or impacts on, water resources as a result of the Project.

6.1.2 Consideration of Potential Impacts on Transport Routes

Primary access to the Project would be via Thomas Mitchell Drive (Figure 1), which has been used to access the Maxwell Infrastructure (formerly the Drayton Mine) for several decades. Thomas Mitchell Drive is also used by the Mt Arthur Mine and an industrial estate.

Access to the nearby equine and viticulture enterprises is via the Golden Highway. The Coolmore Stud and Godolphin Woodlands Stud also use Edderton Road to access Scone.

Potential subsidence impacts on Edderton Road would be managed to maintain access, either through road maintenance or realignment of the road around the underground mining area.

The Golden Highway is located outside of the “angle of draw” from the extents of the underground mining area (MSEC, 2018) and, therefore, would be expected to experience less than 20 mm of vertical subsidence (which would be unnoticeable).

As there would be limited overlap between Project-related traffic and key transport routes used by equine enterprises, there would be no material reduction in access to transport routes.

6.1.3 Consideration of Potential Impacts on Scenic and Landscape Values

In contrast to previous applications for open cut mining, the Project is a proposed underground mine that would significantly reduce or eliminate any potential impacts on air quality, blast noise and scenic values.

The Project would involve the continued use of the existing Maxwell Infrastructure, including the CHPP, train load-out facility and rail loop, which would minimise the need for new infrastructure. The Maxwell Infrastructure is located approximately 9 km from the Coolmore and Godolphin Woodlands studs.

The Maxwell Underground mine entry location would be situated behind several ridgelines and approximately 5 km away from the Golden Highway (Figure 2 and Plate 7). Therefore, the Project would be largely unnoticeable from the Coolmore and Godolphin Woodlands studs, or anywhere along the Golden Highway.

Detailed modelling and assessment of potential noise, dust and visual impacts would be undertaken as part of the preparation of the EIS to confirm the above conclusions.

6.2 VITICULTURE CRITICAL INDUSTRY CLUSTER

There is no Viticulture CIC land or viticulture enterprises within the Gateway Certificate Application Area.

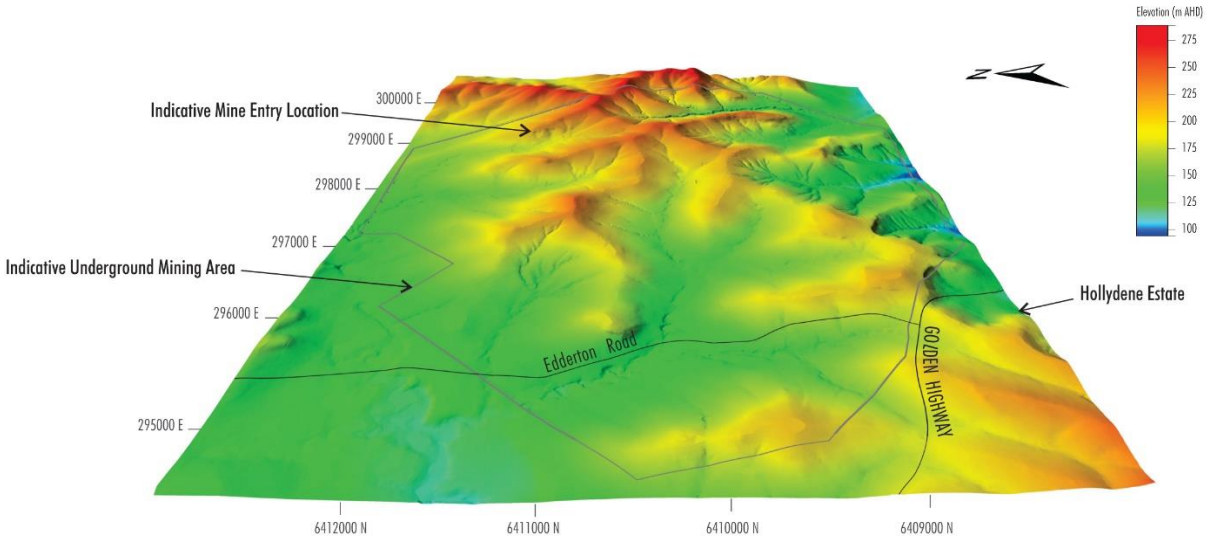


Plate 7 – Location of the Maxwell Underground Mine Entry

Wine production contributes to agricultural production and tourism in the Upper Hunter region, and there are a number of vineyards surrounding the Project (Figure 8). The viticulture and tourism industries within the Hunter Valley cumulatively contribute approximately $1.8 billion per annum to the NSW economy.

Hollydene Estate is located to the south of the Golden Highway and was purchased by Coolmore Australia in 2013. The Hollydene Estate houses a winery, cellar door and restaurant. Most of the vineyards at the estate have been removed to facilitate development of the Coolmore Stud.

The AIA prepared by 2rog Consulting includes consideration of the potential impacts of the Project on the Viticulture CIC. The outcomes of the assessment are summarised below:

- the Project does not coincide with any areas of Viticulture CIC;
- the Project would have no direct or subsidence impacts on agricultural resources or land used by the Viticulture CIC;
- the Project would have negligible impact on the quantity and quality of water resources used by the nearby Viticulture CIC (surface water extraction from the Hunter River);
- the Project would not have a material impact on support services or infrastructure as there would be no property acquisitions or isolation of any Viticulture CIC-related services or infrastructure;
- the Project would not have a material impact on transport routes as there would be limited overlap between key viticulture transport corridors and Project-related traffic; and
- the Project would not have a material impact on scenic or landscape values due to the scale and location of surface development.

2rog Consulting (2018) concluded that the Project would not materially affect any viticulture enterprises or the Upper Hunter Viticulture CIC.

Malabar owns and operates the Merton Vineyard on Denman Road. The cellar door and winery are licensed to the Small Forest label (Figure 8).

Management of the Merton Vineyard is guided by Liz Riley, Australian Society of Viticulture and Oenology (AVSO) 2017 Viticulturist of the Year and implemented by vineyard manager, Rodney Muldoon, and his colleague, David Costello. Merton Vineyard produces grapes of a consistently high quality recognised and purchased by other winemakers in the Hunter Valley. Malabar's Merton Vineyard actively contributes to the Upper Hunter Viticulture CIC.

The Small Forest label sells its wine nationally and internationally, and the cellar door also contributes to the industry cluster within the area.

7 CONCLUSION

The Project is solely an underground mining operation, effectively mitigating local issues, including impacts to visual and acoustic amenity, air quality and agricultural resources.

The supporting documentation to the Gateway Application considers the potential impacts of the Project on BSAL, Equine CIC and Viticulture CIC. The key conclusions of these assessments are:

- With the implementation of the proposed subsidence management measures, there would be no significant impact to the agricultural productivity of the Project area as a result of subsidence impacts on agricultural land.
- There would be no permanent surface disturbance to areas mapped as BSAL.
- The Project is predicted to meet the "Level 1" minimal impact considerations for "highly productive" groundwater sources (HydroSimulations, 2018).
- There are no equine or viticulture enterprises or mapped CIC land within the Gateway Certificate Application Area.

8 REFERENCES

2rog Consulting (2018) *Agricultural Impact Assessment to Support a Gateway Application for the Maxwell Project.*

Department of Mineral Resources (1988) *The Hunter Coalfield Notes to Accompany the 1:100,000 Hunter Coalfield Geological Map.*

Department of Environment, Climate Change and Water (2010) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

Department of Planning and Environment (2015) *State Significant Development Assessment – Drayton South Coal Project.* NSW Department of Planning & Environment.

HydroSimulations (2018) *Maxwell Project: Gateway Application Preliminary Groundwater Assessment*.

Mine Subsidence Engineering Consultants (2018) *Maxwell Project: Gateway Application – Subsidence Assessment.*

Murray Darling Basin Commission (2001) *Groundwater Flow Modelling Guideline*. Prepared by Aquaterra Pty Ltd, November 2000.

National Water Commission (2013) *Australian Groundwater Modelling Guidelines*.

New South Wales Government (2013a) *Interim Protocol for site verification and mapping of biophysical strategic agricultural land*.

New South Wales Government (2013b) *NSW Aquifer Interference Policy – NSW Government Policy for the licensing and assessment of aquifer interference activities*.

New South Wales Government (2014) *Strategic Statement on NSW Coal*.

New South Wales Government (2015) *Guidelines for Economic Assessment of Mining and Coal Seam Gas Proposals*.

Short, T. and Thomson, T. (2013) *Agricultural Impact Assessment to Support a Gateway Application for the Spur Hill Underground Coking Coal Project.* A report prepared for Spur Hill Management Pty Limited by La Tierra Pty Limited, Brisbane, Australia, November 2013.

SLR Consulting Australia Pty Ltd (2015) *BSAL Site Verification Assessment: Drayton South Coal Project*. Revision 2. Appendix F of the Drayton South Coal Project Response to Submissions, July 2015.

SLR Consulting Australia Pty Ltd (2018) *Maxwell Project: Biophysical Strategic Agricultural Land Verification Assessment*.

WaterNSW (2018) NSW Water Register. Website: https://waterregister.waternsw.com.au/water-register-frame. Date accessed: May 2018.

MALABAR COAL