



Maxwell Underground Coal Mine Project

State Significant Development Assessment SSD 9526

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Glossary

Abbreviation	Definition
ACHAR	Aboriginal Cultural Heritage Assessment Report
AHD	Australian Height Datum
AIP	Aquifer Interference Policy
BCA	Building Code of Australia
BCD	Biodiversity and Conservation Division within the Department
CIV	Capital Investment Value
CHPP	Coal Handling and Preparation Plant
Crown Lands	Crown Lands Group within the Department
Department	Department of Planning, Industry and Environment
DPIE Water	Water Group within the Department
DPI	Department of Primary Industries
EA Guidelines	NSW Government's <i>Guidelines for the economic assessment of mining and coal seam gas proposals (December 2015)</i>
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
FTE	Full-time Equivalent
GDEs	Groundwater Dependent Ecosystems
GHGEs	Greenhouse Gas Emissions
LEP	Local Environmental Plan

MEG	Mining, Exploration and Geoscience within Regional NSW
Minister	Minister for Planning and Public Spaces
MSC	Muswellbrook Shire Council
RAPs	Registered Aboriginal Parties
SEARs	Planning Secretary's Environmental Assessment Requirements
Secretary	Planning Secretary of the Department of Planning, Industry and Environment
SEPP	State Environmental Planning Policy
SRD SEPP	<i>State Environmental Planning Policy (State and Regional Development) 2011</i>
SSD	State Significant Development
TfNSW	Transport for NSW
UHSC	Upper Hunter Shire Council
VLAMP	Voluntary Land Acquisition and Mitigation Policy

Executive Summary

Maxwell Ventures (Management) Pty Ltd, a wholly-owned subsidiary of Malabar Coal Ltd (Malabar) owns the Maxwell Infrastructure site, located approximately 9 kilometres (km) south of Muswellbrook in the Upper Hunter Valley. The Maxwell Infrastructure site was formerly known as the Drayton Mine, an open cut coal mine which ceased operations in 2016 and is now undergoing rehabilitation.

Malabar has now submitted a State significant development (SSD) application for a new underground coal mine to the southwest of the Maxwell Infrastructure site. Key aspects of the Project include the construction of a new mine entry area (MEA), transport and services corridor and ancillary infrastructure, extraction of up to 8 million tonnes of run-of-mine (ROM) coal per year using longwall and bord and pillar extraction methods, the ongoing use of processing, rail loading and export infrastructure at the existing Maxwell Infrastructure site and the partial realignment of the southern end of Edderton Road.

The Project would facilitate the recovery of 148 million tonnes of ROM coal over a period of 26 years, inject \$509 million in capital investment value (CIV) into the economy and is expected to generate 250 jobs during construction and up to 350 jobs during operation. As an underground mining operation, primarily focused on the production of high quality coking (metallurgical) coal suitable for steel-making, the Project represents a diversification of coal production in the Muswellbrook area.

The Project site is located in a part of the Upper Hunter Valley that forms an interface between the traditional open cut coal mining operations to the north and northeast and some of the State's most valuable agricultural lands to the south and southwest. Previous proposals to expand open cut mining into these areas has generated debate and land use conflicts over recent years, particularly with agricultural industries including the thoroughbred horse breeding and viticulture industries.

The Maxwell Underground site is located north of lands identified as the Upper Hunter Region's Equine and Viticulture Critical Industry Clusters (CICs). Both CICs are identified as Strategic Agricultural Land under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*. Two of the region's major thoroughbred studs, the Coolmore Stud and Godolphin's Woodlands Stud, along with a significant viticulture establishment, Hollydene Estate Wines, are located to south of the proposed underground mining area at Jerrys Plains.

In December 2017, the NSW Government implemented legislative amendments that provided greater certainty for both the mining and agricultural industries by prohibiting open cut mining within the exploration lease previously associated with the Drayton South Coal Project and restricting any future coal mining development within this area to underground mining methods only. The proposed Project complies with these legislative restrictions and has been designed in a manner that addresses the NSW Government's intent of providing a suitable buffer between mining and the CICs to facilitate coexistence.

Statutory Context

The Project involves coal mining and is declared to be SSD under clause 8(1)(b) of *State Environmental Planning Policy (State and Regional Development) 2011*. Under section 4.5(a) of the EP&A Act and clause 8A of the SRD SEPP, the Commission is the consent authority for the application, as more than 50 unique submissions in the form of objections were made in respect of the Project.

The Project has also been declared a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is being assessed by the NSW Government, in accordance with the Bilateral Agreement between the NSW and Commonwealth Governments.

On 23 September 2020, the Minister for Planning and Public Spaces directed the Independent Planning Commission of NSW (the Commission) to hold a public hearing prior to its determination of the Project. In making this direction, the Minister requested that the Commission pay particular attention to the Department's Assessment Report and recommended conditions of consent, key issues raised in public submissions during the public hearing and any other relevant information.

Engagement

In recognition of the community interest in this proposal, the Department placed the Project on public exhibition for an extended period of 42 days, from Wednesday 14 August 2019 until Tuesday 24 September 2019. The Department received 231 public submissions on the Project during the exhibition period, comprising 77 percent in support, 22 percent opposed and two submissions by way of comment.

Submissions in support commented on the economic benefits of the Project, including employment generation and the payment of royalties to the NSW Government. These submissions also noted Malabar's track record of supporting local businesses and contributions to community organisations.

Those opposed to the Project were primarily concerned with the potential impacts on water resources and nearby CICs, with a particular focus on the Coolmore and Woodlands thoroughbred horse studs. These submitters also raised concerns with the cumulative impacts of mining in the Upper Hunter Valley, questioned the Project's economic benefits and expressed concerns with the Project's potential impacts on air quality, climate change, noise, blasting and visual amenity. A smaller minority of submissions raised further concerns regarding impacts on Aboriginal cultural heritage, historic heritage, mine rehabilitation, traffic generation, subsidence, biodiversity and property values.

The Department received detailed technical advice on the Project from 14 government agencies and infrastructure providers. While a number of agencies sought additional information or clarity regarding aspects of the Project, they were all satisfied that the Project could be appropriately managed and regulated in accordance with the Department's recommended conditions of consent and other applicable regulatory instruments.

Muswellbrook Shire Council (MSC) did not object to the Project, however the neighbouring Upper Hunter Shire Council objected to the Project due to its potential impacts on the Equine CIC.

Assessment

The Department has completed a rigorous and thorough assessment of the impacts of the Project and considers that the key assessment issues relate to water resources, subsidence, biodiversity, noise, air quality and greenhouse gas emissions, traffic and transport, visual impacts, social and economic impacts, mine rehabilitation and compatibility with surrounding land uses.

Water Resources

The Maxwell Underground site is situated in the Hunter River catchment, draining to Saddlers Creek to the northwest and Saltwater Creek to the southeast. Overall, the Department considers that the Project is unlikely to have a significant impact on the quality or quantity of groundwater within the Hunter River alluvium and is unlikely to substantially alter the flow regimes or water quality within the Hunter River.

The Project is expected to result in depressurisation of the Permian aquifer in the vicinity of the Maxwell Underground site. This drawdown is expected to have limited effect on nearby agricultural operations, as the Permian aquifer in this area contains less productive, highly saline water and has been extensively altered by approved mining operations in the locality. Overall, the Project is predicted to comply with the Level 1 minimal impact criteria under the *NSW Aquifer Interference Policy* for cumulative drawdown at all but one privately-owned stock watering bore to the northwest of the underground mining area and Malabar would be required to provide a compensatory water supply, if necessary, under the recommended conditions.

The Project is predicted to result in very minor reductions in the upward seepage of groundwater from the less productive Permian aquifer to the overlying alluvium of the Hunter River. Given recharge of this alluvium is primarily driven by rainfall infiltration and regulated releases of flows from upstream dams, the predicted magnitude of groundwater drawdown (which represents less than 0.001% of the median flow rate of the river) is likely to have a negligible impact on the alluvium and would not be expected to have any material effect on the water quality or volume in the Hunter River.

The Project would result in localised drawdown within the Saddlers Creek and Saltwater Creek alluvium, equivalent to around 12 ML/year during mining operations and 25 ML/year in the post-mining recovery period. These levels of drawdown are not predicted to impact any nearby agricultural users or 'high priority' groundwater dependent ecosystems and are considered unlikely to result in material impacts to terrestrial vegetation located along Saddlers Creek, Saltwater Creek and their tributaries.

Overall, the Department considers that Project's impacts would be largely confined within groundwater sources and surface water catchments that have already been substantially altered by existing and approved mining operations in the region. As these water resources do not provide significant water supplies for domestic or agricultural use, the Project is considered unlikely to cause any material effects to water supplies or security for nearby agricultural operations or downstream users, including the thoroughbred horse studs and vineyards.

The Department (including DPIE Water) considers that water-related impacts can be adaptively managed and mitigated under the recommended conditions and a detailed Water Management Plan.

Subsidence

The Project would involve the extraction of four coal seams, with the shallowest seam being extracted using bord and pillar methods and the remaining seams being extracted using longwall methods. All extraction would occur at depths of cover ranging from 40 metres (m) up to 425 m, with longwall panel dimensions comprising an approximate width of 305 m and lengths ranging from 1,300 m to 4,100 m.

The subsidence impacts of the Project would be typical of multi-seam underground mining operations in NSW with similar secondary extraction layouts and would be greatest in those areas where all four seams have been extracted. Altogether, the maximum cumulative vertical subsidence is expected to be up to 5600 millimetres (mm), with tilts of up to 50 mm and strains generally ranging up to 20 mm/m.

With the exception of Edderton Road, all land within the conventional subsidence impact zone is owned by Malabar. The development of minor surface cracks is expected to occur within this area, with a small likelihood of more substantial cracking and localised deformation. These impacts would be remediated using standard techniques including active infilling of larger cracks, regrading and recompacting of affected stream beds and passive management of low risk cracks through the natural infill of sediment.

The subsidence impacts of the Project are not predicted to affect any privately-owned residences, materially impact the Hunter River, Saddlers Creek or Saltwater Creek or compromise the land stability or soil capability of the existing underground mining area or surrounding agricultural lands.

Nonetheless, the Project would directly undermine and subside the southern end of Edderton Road and an associated 11 kV powerline. Malabar has committed to monitor and repair any subsidence impacts to this existing infrastructure, and to realign the southern section of Edderton Road and its intersection with the Golden Highway prior to secondary extraction in the Arrowfield Seam, when the most pronounced subsidence impacts would commence. The Department considers this to be a reasonable and appropriate response to the proposed impacts and has recommended conditions to this effect.

Both the Department and the Resources Regulator are satisfied that the subsidence impacts of the Project can be appropriately managed, and if necessary remediated, under the recommended conditions of consent.

Biodiversity

The Project has been designed to avoid and minimise biodiversity impacts where possible, including by using cleared areas and existing facilities at the Maxwell Infrastructure site and by location the Maxwell Underground MEA in a valley that has been previously cleared for grazing purposes.

Nevertheless, the Project would still require a limited amount of vegetation clearing, comprising 26.6 ha of native woodland and 136 ha of derived native grassland, including two plant community types that conform to Critically Endangered Ecological Communities listed under the EPBC Act. A further 1,784.7 ha of native vegetation is located within the conventional subsidence zone for the Project and may experience relatively minor indirect impacts associated with subsidence and changes in surface water flows.

While the proposed vegetation clearance is predicted to impact known or potential habitat for eleven threatened fauna species, the Project has been assessed as being unlikely to significantly fragment fauna populations or result in a substantial population decline for any of these threatened fauna species.

Based on information obtained during the assessment process, the Department has conservatively assumed the presence of five threatened flora species within the proposed disturbance area and has required biodiversity offsets for these species, which may only be revised following completion of additional surveys or an expert report in accordance with the Biodiversity Assessment Method.

Malabar has identified a potential biodiversity offset area to the northeast of the proposed underground mining area which may be secured in perpetuity under a Biodiversity Stewardship Agreement. Any shortfall in the requisite biodiversity credits for the Project could then be met using one or more of the available offsetting mechanisms, including payment into the Biodiversity Conservation Fund.

On this basis, both the Department and the Biodiversity and Conservation Division consider that the biodiversity impacts of the Project would be acceptable and could be appropriately managed in accordance with the *NSW Biodiversity Offsets Scheme*. The Department has recommended a suite of comprehensive management, mitigation and offset requirements in its recommended conditions to ensure the residual biodiversity impacts of the Project are actively managed and appropriately offset.

Amenity Impacts

The Department has comprehensively considered the amenity impacts of the Project on nearby private landowners and agricultural operations, including noise, air quality, blasting and visual impacts.

Noise and Air Quality

The main noise impacts of the project are predicted to be experienced by residents within the Antiene Rural Residential Estate to the north of the existing CHPP and rail loadout facility at the Maxwell Infrastructure site. While this noise would be similar to the previous Drayton mining operations, the EIS indicates that there would be some noise impacts on local residents in the early years of the Project while construction activities and mining operations are occurring concurrently.

During the first 4 years of the Project, seven receivers to the north of the site would be expected to experience marginal exceedances of between 3 and 5 dB above the project special noise limits and a further eight receivers would experience negligible exceedances of 1 to 2 dB above the project specific noise limits. As the predicted exceedances at these residences would be either negligible in nature or temporary impacts associated with construction activities, mitigation under the *Voluntary Land Acquisition and Mitigation Policy* would only be required for four receivers who are predicted to experience sustained operational noise levels between 3 and 5 dB over the project specific noise limits. The Department notes that all four of these receivers already have mitigation rights under the current Drayton Mine approval due to the noise impacts associated with the former mining operation.

Given the distance and presence of intervening topographic features, the Project is not predicted to exceed any noise criteria for privately-owned receivers to the south. Project noise levels at the Coolmore and Woodlands Studs are predicted to remain at or below 27 dB(A) in Year 1 of operations and at or below 24 dB(A) at all other times during operations, while project noise levels at Arrowfield Estate were predicted to remain at or below 20 dB(A) at all times. These operational noise levels are expected to be inaudible above background noise, including road traffic on the Golden Highway.

With respect to air quality impacts, the Project is predicted to comply with relevant project specific and cumulative air quality assessment criteria at all privately-owned receivers in the locality. The Department notes that this is not unexpected of an underground mining operation, as these operations tend to have relatively minimal impacts on surrounding air quality environments. The Department considers that any air quality impacts associated with the Project can be effectively managed through a combination of proactive and reactive management measures outlined in a comprehensive Air Quality and Greenhouse Gas Management Plan.

The Department and the EPA are satisfied that the noise and air quality impacts of the Project can be managed under the recommended conditions or an EPL for the site, which would both require Malabar to implement best practice noise and air quality management, including real-time monitoring and the application of proactive and reactive measures in response to adverse meteorological conditions.

Blasting

The Project would involve small-scale blasting during the initial construction of the MEA and transport and services corridor, as well as small blasts to improve the slope and stability of final void highwalls at the Maxwell Infrastructure site. These blasts would be considerably smaller than those typically used in open cut mining and are predicted to remain well below ANZEC overpressure and vibration criteria at privately-owned receivers to the north and would be virtually undetectable at the Coolmore and Woodlands Studs, which are located at least 4.5 km to the south of the proposed blast locations.

The Department's recommended conditions establish blast performance measures for the Project. These measures set strict overpressure and vibration limits for blasting activities at sensitive receivers, including the Hollydene Estate and residences at the Coolmore or Woodlands Studs. The conditions would also require Malabar to prepare a Blast Management Plan in consultation with Coolmore and Godolphin and establish appropriate notification and complaints systems.

Visual Impacts

In general, the Project's surface infrastructure would not be visible from most sensitive receivers and vantage points in the public domain, including the Golden Highway, Jerrys Plains village or Hollydene Estate. The Project is also unlikely to be visible from the majority of vantage points within the Coolmore and Woodlands thoroughbred studs, as views would be shielded by intervening topography.

However, segments of the transport and services corridor would be visible from the highest available vantage points within both stud properties at distances of approximately 7 km. The visible components of the Project would occupy less than 1 percent of the overall view from these locations and would be virtually indistinguishable from the surrounding landscape. The Department notes that this is a smaller proportion of the viewshed than is already occupied by the existing Mount Arthur coal mine at these locations.

Given that residences and horse paddocks within the Coolmore and Woodlands properties are typically located at lower elevations, light spill from the Project is unlikely to impact the studs. However, the Department has recommended conditions to mitigate potential lighting impacts associated with fixed and mobile plant.

The MEA and transport and services corridor would be visible from one location for traffic travelling along Edderton Road, near the Saddlers Creek crossing, at a distance of approximately 3.8 km. The Department's recommended conditions would require Malabar to establish and maintain suitable tree screens to shield views of the MEA from the Saddlers Creek crossing.

The Department considers that the visual impacts of the Project would be very minor and can be appropriately managed under recommended conditions.

Traffic and Transport

The Maxwell Infrastructure site is currently accessed via an existing access road off Thomas Mitchell Drive, a local road maintained by MSC. All Project-related traffic would enter and exit the site via the existing access point and travel to the underground MEA via a dedicated private road.

Thomas Mitchell Drive forms part of the primary transport routes for several mines in the Muswellbrook area, including the Mt Arthur Coal Complex and the Bengalla, Mount Pleasant and Mangoola Mines. Each mining operation is required to make proportionate contributions to the maintenance of the road and to the upgrade of its intersection with Denman Road (scheduled to be completed in December 2022), in accordance with the Department's *Thomas Mitchell Drive Contributions Study*. Under the Department's recommended conditions, Malabar would also be required to contribute to these works.

As identified above, the Project would subside the southern end of Edderton Road, another local road maintained by MSC. Malabar has committed to comprehensively monitor and repair any subsidence impacts to the road during the initial stages of the Project (including extraction in the first two coal seams) and would realign a 3.2 km long section of the southern end of Edderton Road and its intersection with the Golden Highway to the west, prior to commencing secondary extraction of the Arrowfield Seam.

The new alignment is expected to increase travel time along Edderton Road by around one minute and the existing Edderton Road alignment would remain open until this new alignment is fully constructed.

The Department's recommended conditions would require Malabar to contribute to the ongoing maintenance of Thomas Mitchell Drive and the upgrading of the Denman Road intersection in accordance with the Department's contributions study. Recommended conditions would also require Malabar to prepare a detailed Traffic Management Plan for the Project, including measures to minimise disruption to road users associated with the repair and eventual realignment of Edderton Road. The Department and Transport for NSW consider that traffic impacts associated with the construction and operational phases of the Project can be appropriately managed under the recommended conditions.

Social Impacts

The Project would result in a range of both positive and negative social impacts. Broadly speaking, the positive impacts relate to Malabar's existing support for local businesses and community organisations and increased wellbeing associated with local employment opportunities and investment in the Hunter region, as well as flow-on benefits to the State associated with the payment of \$342 million in net present value mining royalties and \$168 million in net present value taxes attributable to NSW.

Key social impacts identified during the preparation of the EIS and in consultation with the community, included concerns regarding the environmental, health and amenity impacts of the Project, as well as potential for impacts on the nearby Equine CIC. In addition, a potential influx of workers to the region could increase demand for rental housing and place strain on medical services, schools and childcare facilities.

The Project is predicted to comply with applicable assessment criteria, policies and guidelines with respect to water resources, air quality, noise, blasting and visual impacts. Nevertheless, the Department has recommended that Malabar prepare a Social Impact Management Plan in consultation with MSC and key stakeholders, including the Coolmore and Godolphin studs and local Aboriginal community leaders. This plan would encourage communication with the local community and outline adaptive strategies to avoid, minimise and mitigate negative social impacts of the Project, as well as any future negative impacts following mine closure and opportunities to enhance the Project's positive impacts.

Further to this, Malabar has made an offer to enter into a voluntary planning agreement (VPA) with MSC, which equates to approximately \$9.6 million over the life of the Project or 1.89 percent of the capital investment value of the Project. In addition, Malabar has committed to engage up to four apprentices each year over the life of the Project from the Muswellbrook Shire LGA.

The Department considers this to be a reasonable and proportionate offer and has recommended conditions that would require Malabar to enter into a VPA with MSC within six months of commencing construction or pay a Section 7.12 of the EP&A Act contribution to Council in accordance with the provisions of the *Muswellbrook Shire Council Section 94A Development Contributions Plan 2010*.

Land Use Compatibility

Overall, the impacts of the Project would either meet relevant assessment criteria, be appropriately licensed or be managed through offsetting and make good provisions. While some exceedances of operational noise levels are predicted to occur at private residences to the north, these residences have coexisted with the former Drayton Mine over many years and, where appropriate, would be afforded mitigation rights in accordance with the *Voluntary Land Acquisition and Mitigation Policy*.

As an underground mining operation that involves minimal surface infrastructure located primarily within a natural depression behind elevated topographic ridgelines, the Project would be well shielded from surrounding residential and agricultural land uses. Additionally, the Department's assessment indicates that the water supply, transport, noise, air quality, blasting and visual impacts of the Project would be either negligible or imperceptible at the Equine and Viticulture CICs to the south of the Project site.

The Department is of the view that Malabar has demonstrated that the Project would not significantly alter amenity or landscape values in the vicinity of the Equine and Viticulture CICs. Further, the Department considers that the Project is likely to have a negligible impact on equine health or the operation of the broader CIC. The Department also notes that the operators of the only viticulture establishment in the immediate vicinity, Hollydene Estate Wines, has expressed support for the Project.

The Department has recommended stringent conditions requiring best practice management of dust, noise, blasting and visual impacts over the life of the Project. The recommended conditions would also require Malabar to engage with Coolmore and Godolphin through the Project's Community Consultative Committee and during the preparation of key management plans. Subject to the implementation of these conditions, the Department considers that the Project is unlikely to have any demonstrable impact on the reputation and viability of Equine and Viticulture CICs.

Other Issues

In addition to the above matters, the Department has carefully considered the Project's economic impacts, predicted greenhouse gas emissions, proposed rehabilitation and landform outcomes, impacts to Aboriginal cultural heritage and historic heritage items, management of hazardous materials and impacts to agricultural lands, including verified Biophysical Strategic Agricultural Land.

On balance, the Department considers that these impacts have been minimised to the greatest practicable and that residual impacts can be appropriately managed and regulated through the development of a series of management plans and strategies required under the Department's recommended conditions which have been developed in consultation with relevant government agencies.

Evaluation

The Department has undertaken a comprehensive assessment of the Project in accordance with the relevant requirements of the *Environmental Planning and Assessment Act 1979*, with a particular focus on issues raised in public submissions and agency advice.

The Department's assessment has paid particular attention to the Project's potential impacts on the nearby Equine and Viticulture CICs. The Department considers that subject to the implementation of the recommended conditions, the Project is unlikely to have any material impacts on the nearby equine and viticulture operations or the broader Upper Hunter CICs.

The Project would facilitate the recovery of 148 million tonnes of ROM coal, at least 75 percent of which would be coking (metallurgical) coal used in steel-making. As an underground mine, primarily producing coking coal, the Project also represents a diversification of coal production in the Muswellbrook area which primarily comprises open cut thermal coal operations.

The Project represents a logical 'brownfield' extension of the existing Drayton coal mine, enabling not only the economic and beneficial reuse of existing infrastructure, but improved rehabilitation outcomes

and post-mining land uses for the existing mine site. It would also require a substantially smaller disturbance footprint than other equivalent scale open cut mining operations in the locality.

The Project would provide wide-ranging benefits for the local and State economies, including generating approximately 250 jobs during construction and 350 jobs during operations. The Project is also expected to generate net present value benefits to NSW of over \$1 billion, local non-labour expenditure effects in the order of \$43 million per year during operations and includes an offer for a voluntary planning agreement with MSC, to the value of approximately \$9.6 million.

On balance, the Department considers that the Project is in the public interest, and is approvable, subject to strict conditions.

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1 Introduction

Maxwell Ventures (Management) Pty Ltd, a wholly-owned subsidiary of Malabar Coal Ltd (Malabar) owns the Maxwell Infrastructure site, located approximately 9 kilometres (km) south of Muswellbrook in the Upper Hunter Valley (see Figure 1). The site is located within the Muswellbrook Shire local government area (LGA).

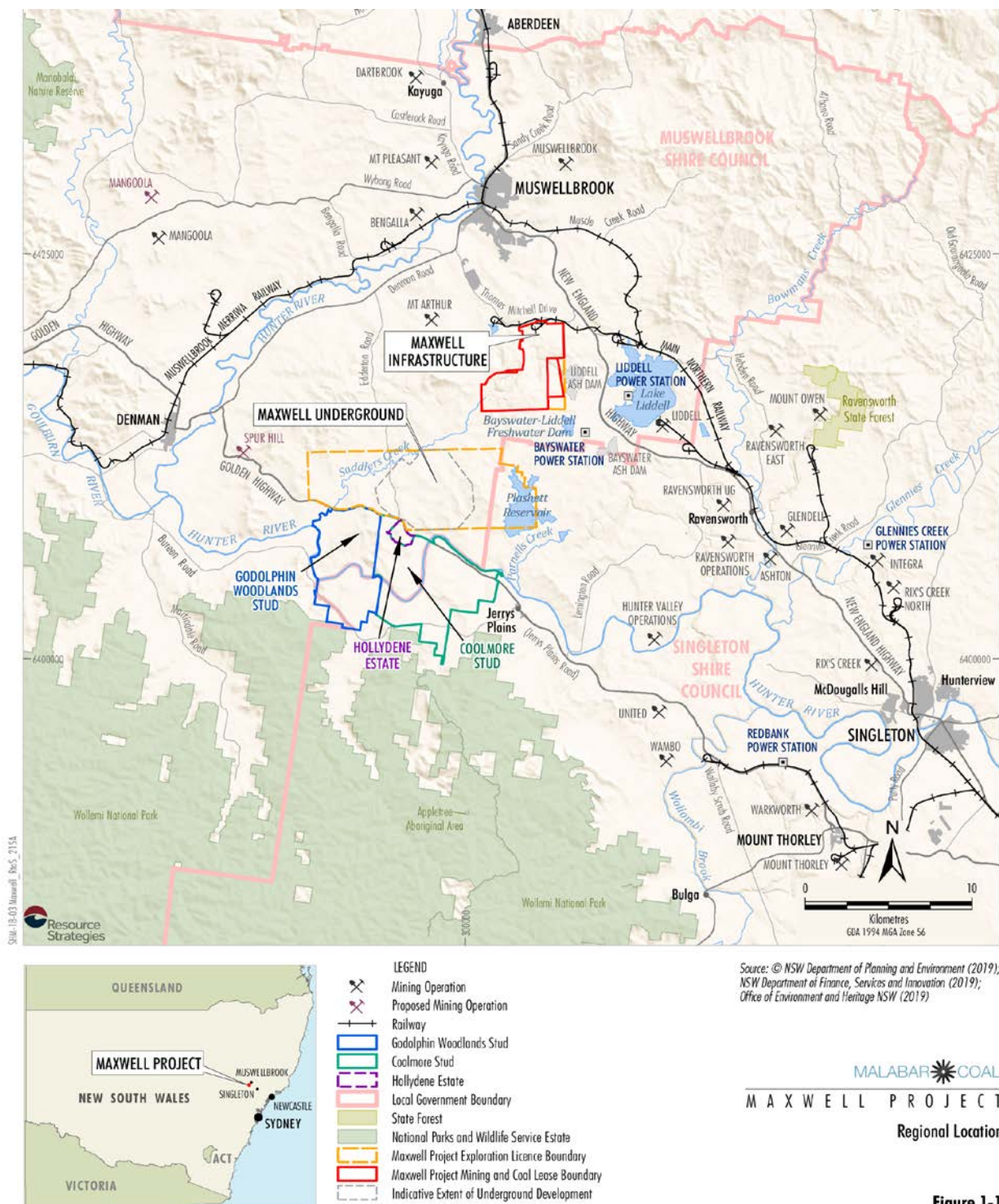


Figure 1-1

Figure 1 | Regional context

- 1.1.1 The Maxwell Infrastructure site contains the former Drayton Mine, an open cut coal mine which has ceased operations and is now undergoing rehabilitation.
- 1.1.2 Malabar proposes to establish a new underground mining operation known as the Maxwell Underground Coal Mine (Maxwell Underground) (see **Figure 1**). This new underground operation would be located to the southwest of the Maxwell Infrastructure site and utilise the existing Maxwell Infrastructure to support operations. The Maxwell Underground and Maxwell Infrastructure sites, and the proposed infrastructure corridor which would link the two sites, are collectively referred to in this Report as the Project Area.
- 1.1.3 As illustrated in **Figure 1**, the site is located along the southwestern extent of existing mining operations in the Hunter Valley and central to a major corridor of coal mining operations that align in a southeast to northwest direction along the floor of the Hunter Valley coalfield.
- 1.1.4 The Project Area is located to the north of the Golden Highway and Hunter River, and situated behind a series of ridgelines that separates the Jerrys Plains and floodplains of the Hunter River from the grazing lands and mining areas of the northeast.
- 1.1.5 Local topography is typical of the Upper Hunter Valley and consists largely of flat plains suitable for grazing, interspersed with hills, ridges and crests. The surrounding locality comprises a mixture of land uses, most notably coal mining, energy generation, thoroughbred breeding, viticulture and agriculture (including cattle grazing and dairy farming).

1.2 History of the Site

Drayton Mine

- 1.2.1 Prior to Malabar's acquisition of the Drayton Mine in 2018, the mine was owned and operated by Anglo American Metallurgical Coal Pty Ltd (Anglo American). Open cut coal mining operations commenced at the Drayton Mine in 1983 and, until 2008, the mine operated under a series of eight separate development consents.
- 1.2.2 On 1 February 2008, the then Minister for Planning granted approval for the Drayton Mine Extension Project (MP 06_0202) under the former Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).¹ The development consent was subsequently modified on two occasions and permitted:
- open cut mining operations in the North, East and South Pits until 31 December 2017;
 - extraction and processing of up to 8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal;
 - transporting product coal via rail to the Port of Newcastle and/or overland conveyor to the nearby Bayswater and Liddell Power Stations; and
 - establishment of the existing final landform and rehabilitation outcomes for the site.

¹ On 23 November 2018, MP 06_0202 was transitioned to State Significant Development under clause 6 of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*.

Following the determination of MP 06_0202, all prior development consents for mining operations on the site were surrendered and operations continued under a single, consolidated development consent.

1.2.3 Anglo American ceased open cut mining operations on the Drayton Mine in October 2016, when the coal resource within the approved mining area was exhausted. Since this time, progressive rehabilitation activities have continued to be undertaken on the site and all key mine infrastructure remains intact. At present, the remaining mine infrastructure includes:

- a Coal Handling and Preparation Plant (CHPP) and associated stockpiling areas;
- a train load-out facility and rail loop;
- a vehicular access via Thomas Mitchell Drive;
- administration buildings, employee amenities and parking facilities;
- workshops and explosives storage facilities; and
- water management infrastructure, including a waste treatment facility.

Drayton Rail Loop and Antiene Rail Spur (DA 106-04-00)

1.2.4 The Antiene Rail Spur is located to the north of the Maxwell Infrastructure site. The rail spur was managed under a shared use arrangement between the former Drayton Mine and the nearby Mt Arthur Coal Complex, under separate development consents, to transport product coal from both mines to the Main Northern Railway Line and on to the Port of Newcastle.

1.2.5 Anglo American's use of the Drayton Rail Loop and Antiene Rail Spur was authorised under DA 106-04-00. This development consent remains in force until 2 November 2025 and permits:

- rail transport of up to 7 Mtpa of product coal from the former Drayton Mine;
- up to 12 train movements per day along the Drayton Rail Loop; and
- a combined limit of up to 30 train movements per day along the Antiene Rail Spur for both Drayton Mine and Mt Arthur Coal Complex.

Maxwell Underground Site

1.2.6 In addition to the various mining leases associated with the Drayton Mine, Anglo American also held an exploration licence (EL 5460) over land to the southwest of the mine (see **Figure 1**).

1.2.7 The land within EL 5460 has long been identified as having a significant coal resource and has been subject to a long history of approved and proposed open cut mining operations.

1.2.8 Prospecting in the area commenced in the 1940's and by the 1960's and 1970's had intensified in scale. In 1986, the then Minister for Planning approved the development of a large open cut coal mine on the site and a mining lease was subsequently issued for the mine in 1989. However, operation of this approved open cut coal mine never commenced and the development consent and associated mining lease lapsed in 1991 and 1994, respectively.

1.2.9 In 1998, Anglo American acquired EL 5460 over the land and recommenced exploration of the site with a view to seeking approval to develop a new open cut mining operation. Between 2012

and 2017, Anglo American lodged two separate proposals to develop a State significant open cut coal mine on the site, known as the Drayton South Coal Project. Both applications were refused by the former Planning Assessment Commission. These proposals, and the reasons for their refusal, are discussed further in **Section 3.3**.

Key Infrastructure in the Locality

- 1.2.10 The Liddell and Bayswater Power Stations are located to the east and southeast of the Maxwell Infrastructure site, respectively (see **Figure 1**). Both facilities are owned and operated by AGL. The Liddell Ash Dam is located immediately to the east of the Maxwell Infrastructure's East Void and the Plashett Reservoir is located to the east of the Maxwell Underground site.
- 1.2.11 The Maxwell Infrastructure site has a long history of interactions and commercial arrangements in place to manage the interaction of mining operations and the adjacent power stations. Most significantly, AGL owns the land containing the East Void and a portion of the South Void and leases this land to Malabar under an existing commercial arrangement (see **Figure 2**).

Critical Industry Clusters (CICs)

- 1.2.12 A large extent of land to the south of the Maxwell Underground site is identified as Strategic Agricultural Land under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP). This area forms part of the Upper Hunter Equine and Viticulture CICs.
- 1.2.13 The Upper Hunter Region Equine CIC comprises world-renowned thoroughbred breeding establishments and associated facilities. The region's two major thoroughbred studs, the Coolmore Stud and Godolphin's Woodlands Stud, are located to the south of the Golden Highway at Jerrys Plains (see **Figure 1**). Together, the Coolmore and Godolphin Studs represent more than 50 percent of Australia's thoroughbred breeding market.
- 1.2.14 The key viticulture operation in the vicinity of the Project Area is Hollydene Estate Wines (Hollydene Estate). Hollydene Estate is located between the Coolmore and Woodlands Studs and is owned by Coolmore (see **Figure 1**). The property includes a winery and associated restaurant and cellar door. Development consent has also been granted for tourist and visitor accommodation on the site. The operators of Hollydene Estate have expressed support for the project.
- 1.2.15 The significance of the Equine and Viticulture CICs is discussed further in **Section 3.1**.

2 Project

2.1.1 As identified above, Malabar is seeking approval to establish a new underground mining operation, known as the Maxwell Underground, to the southwest of the existing Maxwell Infrastructure site. This operation would be connected to the existing Maxwell Infrastructure site by way of a private infrastructure corridor and internal haul road, and would utilise existing and upgraded infrastructure of the former Drayton Mine for coal processing, loading and transport to market.

2.1.2 The key components of the Project are outlined in **Table 2-1** and shown in **Figure 2**.

Table 2-1 | Key Components of the Project

Aspect	Description
Mine Life	26 years
Coal Products	Coking coal (minimum 75 percent) Thermal coal (maximum 25 percent)
Total Resource Recovery	Approximately 148 Mt of ROM coal (which equates to approximately 124 Mt of product coal) over the life of the Project
Mining Method and Target Seams	Bord and Pillar Mining (Whynot Seam) Longwall Mining (Woodlands Hill, Arrowfield and Bowfield Seams)
Annual Production	Extraction and processing would comprise: <ul style="list-style-type: none"> • a maximum rate of up to 8 Mtpa of ROM coal; and • an average rate of 5.7 Mtpa of ROM coal
Coal Handling and Preparation	Initial processing at the new underground Mine Entry Area (MEA), prior to transfer to the Maxwell Infrastructure site for further processing at the existing CHPP
Product Transportation	<ul style="list-style-type: none"> • Up to 7 Mtpa of product coal to be transported by rail via the Antiene Rail Spur and Main Northern Railway • Up to 12 train movements or 6 trains per day • Option to transport thermal coal by conveyor to the Bayswater and/or Liddell Power Stations (subject to commercial agreement)²
Water Management	<ul style="list-style-type: none"> • Water to be sourced from groundwater inflows to new underground workings and existing voids, recovery from tailings, surface water runoff and importation of small quantities of potable water • Water storage in existing dams and in the North and South Voids at the Maxwell Infrastructure site • Option to share water with the Mt Arthur Coal Complex or other nearby water users (subject to commercial agreement)
Gas Management	<ul style="list-style-type: none"> • Gases from underground mining to be drained via centralised gas management system at the MEA • Gases to be flared or used for power generation, or if methane content is insufficient, vented to the atmosphere • Option to install a gas-powered plant (up to 5 megawatts) to provide supplementary power supply on-site

² As the potential conveyor corridor has not been identified or assessed in the EIS, the Department's recommended conditions would not permit off-site transportation by conveyor without a separate development consent

Waste Management	Coarse rejects, tailings and brine to be emplaced in the existing East Void at the Maxwell Infrastructure site.
Subsidence Management	<ul style="list-style-type: none"> • Subsidence monitoring and maintenance on Edderton Road • Option to realign Edderton Road (see Figure 2)³
Blasting	<ul style="list-style-type: none"> • Small blasts proposed during construction phase • Blasting of highwalls within existing mine voids to improve final landform
Rehabilitation and Final Landform	<ul style="list-style-type: none"> • Continuation of rehabilitation at the Maxwell Infrastructure site • Retention of three final voids (North, East and South Voids), with partial backfilling of the East Void
Workforce	<ul style="list-style-type: none"> • Approximately 250 employees during construction • Approximately 350 employees during operation
Hours of Operation	24 hours per day, 7 days per week
Capital Investment Value (CIV)	\$509 million

2.2 Project Infrastructure

2.2.1 The Project includes:

- construction of a new MEA, including:
 - an underground portal and four mine access drifts;
 - underground and overland conveyors, surge stockpiles and coal sizing facilities;
 - power supply, ventilation shafts and gas management infrastructure;
 - water treatment facilities, including a reverse osmosis plant (or similar); and
 - administration buildings, staff amenities and parking facilities, a workshop and storage facilities; and
- construction of a transport and services corridor from the MEA to the Maxwell Infrastructure site, including:
 - a covered, overland ROM coal conveyor;
 - a sealed internal haul road to accommodate two-way truck movements; and
 - power supply and water transfer pipelines;
- use of the existing site entrance on Thomas Mitchell Drive;
- upgrades to existing facilities at the Maxwell Infrastructure site, including:
 - extension of product coal stockpile area, to provide a total storage capacity of approximately 500,000 tonnes;
 - construction of a new ROM coal stockpiling area;
 - installation of additional conveyors to allow coal to bypass the CHPP;
 - replacement, upgrade or augmentation of existing conveyor systems, components of the CHPP and reject handling infrastructure, train load-out facility, pipelines and water management infrastructure; and
 - removal of redundant infrastructure, including sizers and hoppers; and

³ Malabar has subsequently committed to realign Edderton Road prior to commencing longwall mining in the Arrowfield Seam (see **Section 6.3**).

- an overhead 66 kilovolt (kV) powerline and switch station extending from the northwest of the Maxwell Infrastructure site, through the transport and services corridor to the MEA (see **Figure 2**).
- 2.2.2 The MEA would be located at the base of a natural valley, approximately 4.5 km from the closest boundary of the Coolmore and Woodlands Studs.
- 2.2.3 The Project would begin with an initial establishment phase lasting approximately 12 months, prior to the commencement of mining operations. However, the construction and development phase would continue into Year 3 of mining operations.
- 2.2.4 The proposed overland conveyor would be commissioned midway through Year 3 of mining operations. Prior to the commissioning of the conveyor, ROM coal would be transported from the MEA to the Maxwell Infrastructure CHPP by truck using a new internal haul road. This access road would be progressively sealed during the first year of mining operations.

2.3 Geology & Mine Planning

- 2.3.1 The Project would target four coal seams within the Jerrys Plains subgroup of the Wittingham Coal Measures. The extent of these coal seams that can be extracted using underground mining methods is influenced by the Muswellbrook Anticline, a regional fold structure located to the northeast of the underground mining area and a large graben fault to the southwest. Two other significant fault structures to the southeast and northwest of the underground mining area define the boundaries of the underground workings.
- 2.3.2 The target coal seams are all overlain by sandstone, siltstone and laminate units and contain a series of smaller faults (with throws of approximately 2 to 6 m), dykes and dolerite sills, which have influenced the development of mine plans shown in **Figure 3**. The potential impacts of these features on mining operations are discussed further in **Section 6.3**.

The shallowest of these seams, the Whynot Seam, has a depth of cover ranging from 40 to 180 metres (m) and would be extracted using bord and pillar methods to minimise subsidence impacts. This bord and pillar extraction would be undertaken in the following stages:

- First workings:
 - formation of main roadways, to provide access and ventilation; and
 - formation of panels, approximately 185 m wide, emanating from the main roadways; and
 - Second workings:
 - partial pillar extraction to recover up to 70 percent of the coal resource.
- 2.3.3 An indicative layout of bord and pillar extraction in the Whynot Seam is provided in **Figure 3**. A total of 19 bord and pillar panels would be established, with each panel containing six rows of pillars. The proposed pillars would measure 25 m by 25 m and would be separated by 5 m wide roadways. Secondary extraction would involve either partial extraction of the pillars, or removal of the outer four pillars, leaving two rows of 'spine' pillars running down the centre of each panel. Secondary extraction would be limited to areas where the depth of cover exceeds 50 m.

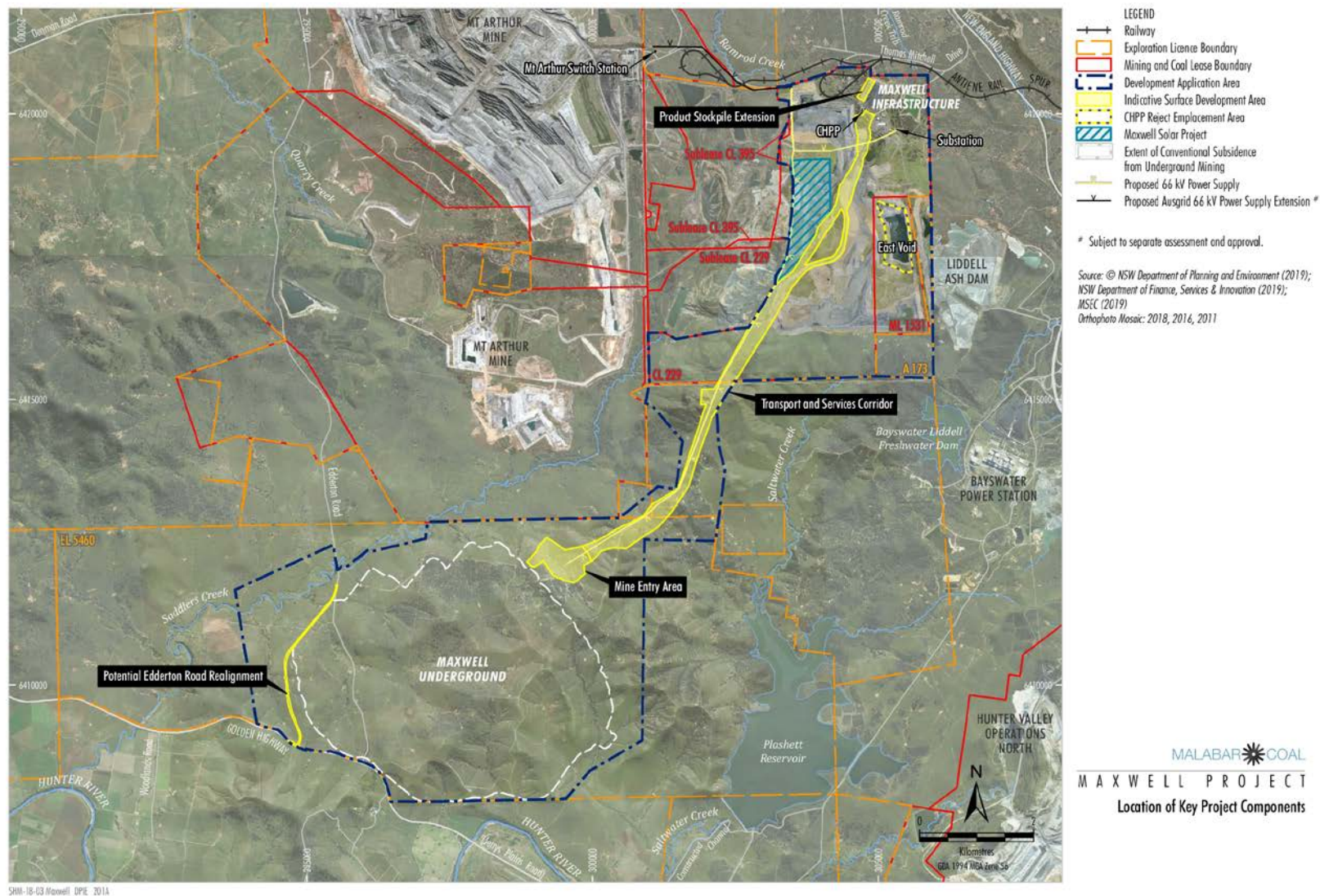


Figure 2 | Proposed site layout

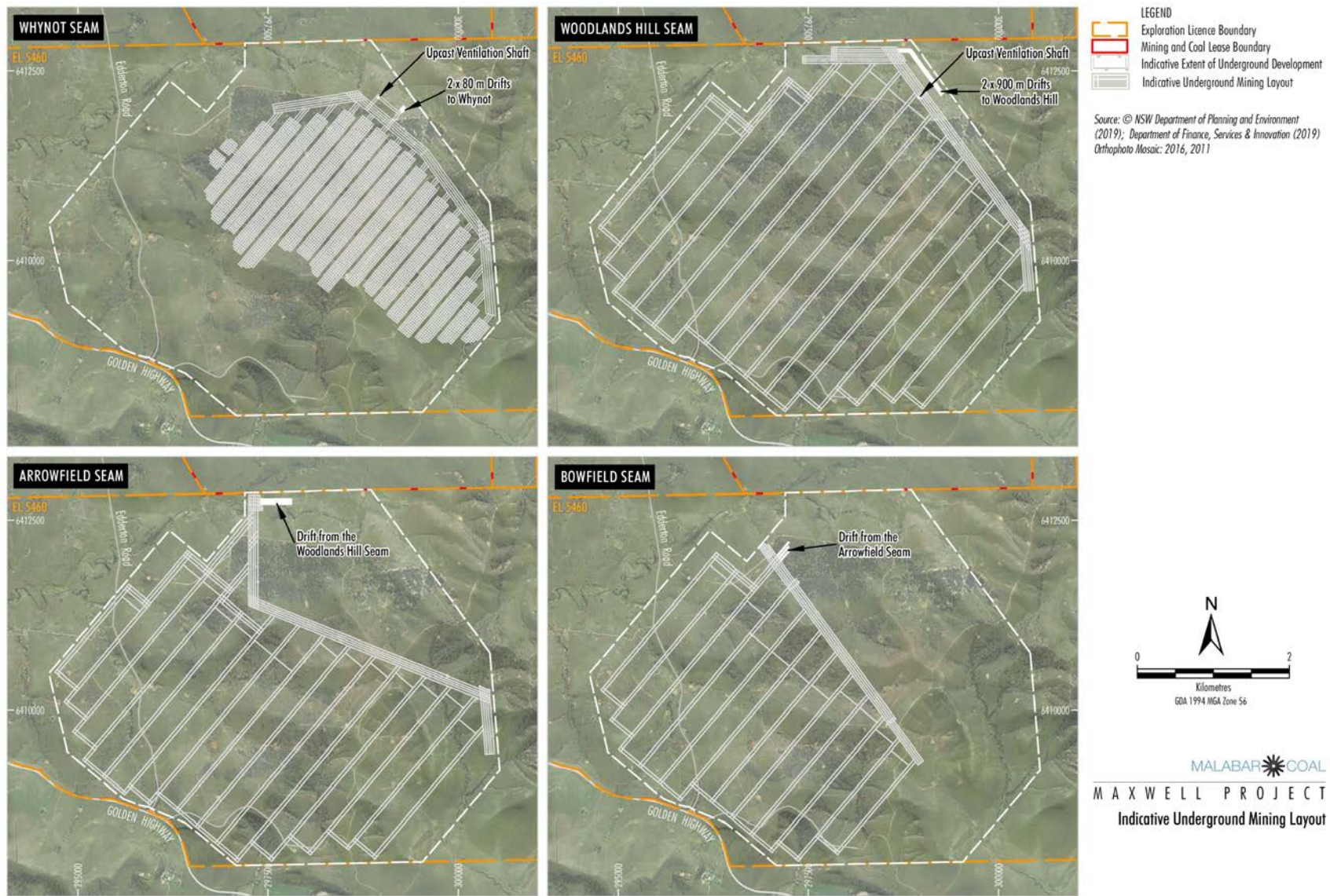


Figure 3 | Proposed underground mining layout

- 2.3.4 The remaining Woodlands Hill, Arrowfield and Bowfield Seams occur at greater depth (with a minimum depth of cover of 125 m) and would be extracted by conventional longwall methods as shown in **Figure 3**. A total of 39 longwalls would be established, down to a maximum depth of approximately 430 m. Each longwall panel would be approximately 305 m wide (including first workings) and range from approximately 1,300 m to 4,100 m in length. Longwalls would be separated by 35 m wide chain pillars. The proposed mine plan has been staggered to ensure that chain pillars in each of the target coal seams do not align, thereby reducing cumulative subsidence impacts.
- 2.3.5 While extraction would generally occur from the shallowest to the deepest seam, Malabar has indicated that the commencement of initial longwall mining in the Woodlands Seam may occur concurrently with the completion of bord and pillar mining in other areas of the Whynot Seam. This concurrence is able to be achieved through the different equipment and mining methods used in these seams and, should this occur, Malabar would maintain a 1 km horizontal buffer between these two types of active mining operations to ensure the safety of mine workers.
- 2.3.6 The Department notes that the proposed underground mining would be subject to formal Extraction Plans under the recommended conditions of consent in consultation with relevant government agencies. This may result in changes to mine layout and geometry over time to address mine safety and ensure environmental performance measures are achieved. This is discussed further in **Sections 6.2, 6.3 and 6.4** below.

2.4 Related Development

Drayton Rail Loop and Antiene Rail Spur

- 2.4.1 The proposed Project includes a range of ancillary upgrades and continuing use of the existing train load-out facility at the Maxwell Infrastructure site. These upgrades are restricted to ancillary infrastructure assets located within the Maxwell Infrastructure site and are required to accommodate the proposed upgrades to and continued use of the CHPP.
- 2.4.2 Malabar's use of the existing Drayton rail loop and Antiene Rail Spur does not form part of the Project and Malabar is not seeking any changes to the number or frequency of train movements permitted under DA 106-04-00. As such, rail haulage activities would continue to be regulated under the separate DA 106-04-00 for the first 5 years of the Project.
- 2.4.3 Notwithstanding, as the proposed Project would continue to extract coal until 2047, Malabar recognizes that it would need to lodge a separate development application or modification application in relation to DA 106-04-00 in order to permit the continued use of the rail loop and rail spur line to accommodate offsite transport of coal products beyond 2025.

Maxwell Solar Project (SSD 9820)

- 2.4.4 In November 2019, Malabar submitted an SSD application to establishment a 25 megawatt (MW) solar farm on an existing overburden emplacement area at the Maxwell Infrastructure site (see **Figure 2**). This proposal, known as the Maxwell Solar Project, was approved by a delegate of the Minister for Planning and Public Spaces on 19 August 2020.

- 2.4.5 The Department acknowledges that this separate renewable energy development would directly interact with an area of the Maxwell Infrastructure Site that is required to be rehabilitated under the former Drayton Mine consent.
- 2.4.6 To address the impacts and interactions of these two developments, Malabar's EIS for the Maxwell Underground Coal Mine Project includes a cumulative assessment of impacts with respect to traffic, biodiversity and mine rehabilitation, should both projects be approved and operate concurrently. The relationship between the solar and underground mining projects is discussed further in **Section 6.12**.

Spur Hill Underground Coking Coal Project (SSD 7239)

- 2.4.7 In addition to the Maxwell Infrastructure and Maxwell Underground sites, Malabar also holds an exploration lease (EL 7429) over a 33 km² area of land to the west of the Project, known as the Spur Hill Underground Coking Project (Spur Hill Project).
- 2.4.8 The Spur Hill Project is a proposed new underground mining operation which would be capable of producing approximately 154 Mt of coal at a rate of up to 10 Mtpa for 25 years.
- 2.4.9 Malabar has advised that development of the Spur Hill Project is unlikely to proceed in the short term and that further geological investigation is needed before the project design is finalised.
- 2.4.10 However, Malabar has indicated that if a future Spur Hill Project were to be approved, the reject material from this project could be emplaced within the existing voids at the Maxwell Infrastructure site. Any such arrangement would be subject to detailed assessment as part of a future development application. Consequently, interactions with the Spur Hill Project have not been considered in the Department's assessment.

Interactions with Mt Arthur Coal Complex

- 2.4.11 The Project Area adjoins the Mt Arthur Coal Complex (see **Figure 2**). The Mt Arthur Coal Complex is owned and operated by Hunter Valley Energy Coal Pty Ltd (HVEC), a subsidiary of BHP Billiton. The Complex includes both open cut and underground coal mining operations, which are authorised under separate development consents (see **Table 1-1**).
- 2.4.12 Coal produced at the Mt Arthur Coal Complex is transported by rail, via the Bayswater Rail Loop and the Antiene Rail Spur. HVEC's use of the Bayswater Rail Loop and Antiene Rail Spur is currently authorised under MP 09_0062. This consent is valid until 30 June 2026 and permits:
- rail transport of up to 27 Mtpa of product coal (with the option to increase tonnage if an agreement is reached with the Drayton Mine to use its spare rail capacity); and
 - up to 30 train movements per day along the Antiene Rail Spur.
- 2.4.13 As part of the current Project, Malabar is seeking to continue mutually beneficial interactions that were established between the former Drayton Mine and the Mt Arthur Coal Complex.⁴ This includes the shared use of the Antiene Rail Spur, potential water sharing arrangements and an option to receive reject material from the Mt Arthur Coal Complex within the existing voids at the Maxwell Infrastructure site.

⁴ These interactions are currently permitted under MP 06_0202 and DA 106-04-00

- 2.4.14 The shared use of the Antiene Rail Spur is regulated under existing development consents held by Malabar (DA 106-04-00) and HVEC (MP 09_0062), with respective transport arrangements and operational interactions managed under a commercial agreement between the parties.
- 2.4.15 As outlined in **Section 6**, the Department's recommended conditions for the Project seek to encourage coordination between the two operations to minimise cumulative noise, blasting, air quality and traffic impacts. Additionally, these conditions would ensure that both operations provide a proportionate contribution to the upgrading and maintenance of Thomas Mitchell Drive, facilitate potential water sharing arrangements between the sites and maximise opportunities for the integration of woodland corridors and final landforms.

Interactions with AGL-owned land and infrastructure

- 2.4.16 An AGL-owned coal conveyor runs through the Project Area. This conveyor transports coal from the Mt Arthur Coal Complex to AGL's Bayswater Power Station. The conveyor falls within an easement over Malabar-owned land, in favour of AGL. Malabar proposes to construct an overpass over AGL's conveyor, as part of its transport and services corridor.
- 2.4.17 Malabar has also entered into a commercial agreement with AGL to facilitate the construction of the transport and services corridor over a small portion of AGL-owned land to the south of CL 229 (see **Figure 4**).

Coal Mining Operations in the Locality

- 2.4.18 The Project Area is located within the Hunter coalfield and is surrounded by existing and proposed coal mining operations on three sides (see **Figure 1**). The approved and proposed mining operations in the vicinity of the Project Area are summarised in **Table 2-2** below.

Table 2-2 | Approved and proposed coal mining operations in the locality

Complex	Location from Maxwell Underground	Proponent	Current Status
Spur Hill Underground Coal Project	West	Malabar	<ul style="list-style-type: none"> SEARs issued December 2016. The Project involves a new underground coal mine to extract up to 8 Mtpa of ROM coal for up to 25 years While no development application has been lodged for this project, it would produce primarily coking coal (if approved)
Mt Arthur Coal Complex	Immediately north	HVEC (BHP Billiton)	<ul style="list-style-type: none"> Open cut mining operations permitted until 2026 at a rate of up to 32 Mtpa under MP 09_0062 Underground mining operations also authorised under MP 06_0091 – currently under care and maintenance Produces thermal coal
Bengalla Mine	North	Bengalla Mining Company Pty Ltd	<ul style="list-style-type: none"> Open cut mining operations permitted under SSD 5170 at a rate of up to 15 Mtpa until 2039 Produces thermal coal

Mount Pleasant Mine	North	MACH Energy Australia Pty Ltd	<ul style="list-style-type: none"> • Open cut mining operations authorised under DA 92/97 at a rate of up to 10.5 Mtpa until 2026 • SEARs issued February 2020 for the Mount Pleasant Optimisation Project (SSD 10418) to extend the life of the mine until 2048 and increase production up to 21 Mtpa • Produces thermal coal
Mangoola Mine	Northwest	Mangoola Coal Operations Pty Ltd (Glencore Coal Pty Ltd)	<ul style="list-style-type: none"> • Open cut mining operations authorised under MP 06_0014 to extract up to 13.5 Mtpa until 2029 • The Mangoola Coal Continued Operations Project (SSD 8642) is currently under assessment. The Project would extend mining operations to the north to extract an additional 52 million tonnes of ROM coal and extend mining operations until 2030 • Primarily produces thermal coal
Hunter Valley Operations (HVO) Complex	Southeast	Yancoal Australia Ltd and Glencore Coal Pty Ltd	<ul style="list-style-type: none"> • Open cut coal mining operations authorised at HVO North until 2025 and HVO South until 2030 • Produces both thermal and coking coal

2.4.19 Notably, approved coal mining operations in the locality are predominantly open cut operations which primarily produce thermal coal.

3 Strategic context

3.1 Regional History and Context

- 3.1.1 The Project Area is located at the interface between established coal mining operations and some of the State's most fertile and productive agricultural land. These land uses have successfully co-existed in the Hunter Region for decades, however in recent years potential land use conflicts between the mining, equine and viticulture industries have emerged as a key planning issue in the Upper Hunter Valley.
- 3.1.2 The visual landscapes associated with these industries differ substantially and have been traditionally separated by a series of ridgelines that define the rich alluvial floodplains of the Hunter River between Jerry's Plains and Denman to the southwest and the cleared grazing lands, open cut mining complexes and power stations to the northeast.
- 3.1.3 The existing pattern of land ownership shown in **Figure 4** and **Figure 5** illustrates that the areas directly north and east of the Project site are owned by and have been traditionally developed for mining and energy generation projects. Additionally, HVEC has an existing approval for an underground coal mine to the northwest of the site, and Malabar holds an existing exploration lease to the west of the site for the proposed future Spur Hill Underground Coal Project.
- 3.1.4 Conversely, the areas to the south of the Jerrys Plains ridgeline are typified by high value agricultural properties, including broadscale irrigated agricultural lands, grazing lands, viticulture enterprises and the two most significant thoroughbred horse studs in the Hunter Valley.

Upper Hunter Coal Industry

- 3.1.5 Coal is the State's most significant export commodity. The NSW coal industry provides more than 22,000 direct jobs and 89,000 indirect jobs and generates royalty revenue used to fund essential public services and infrastructure.⁵
- 3.1.6 Coal mining has occurred in the Hunter Valley since the 1790s, with mining in the Muswellbrook area commencing in the early 1900s. Coal exploration within the Project Area first occurred in the 1940s. Operations at the former Drayton Mine commenced in 1983 and concluded in 2016.
- 3.1.7 The Upper Hunter region contains approximately 40 percent of the State's identified coal reserves and accounts for approximately 60 percent of the State's coal exports. The mining sector is a well-established and mature industry in the Hunter Valley and has been a key and staple employer for residents of the Hunter Region over many decades, as illustrated by the fact that around 23 percent of all jobs in the Muswellbrook Shire LGA are in the mining sector. With the creation of up to 250 construction and 350 operational jobs, the Project represents a secure employment opportunity for around 3% of the mining jobs in the Hunter Coalfield.

⁵ NSW coal royalty revenue in 2018-19 was approximately \$2 billion

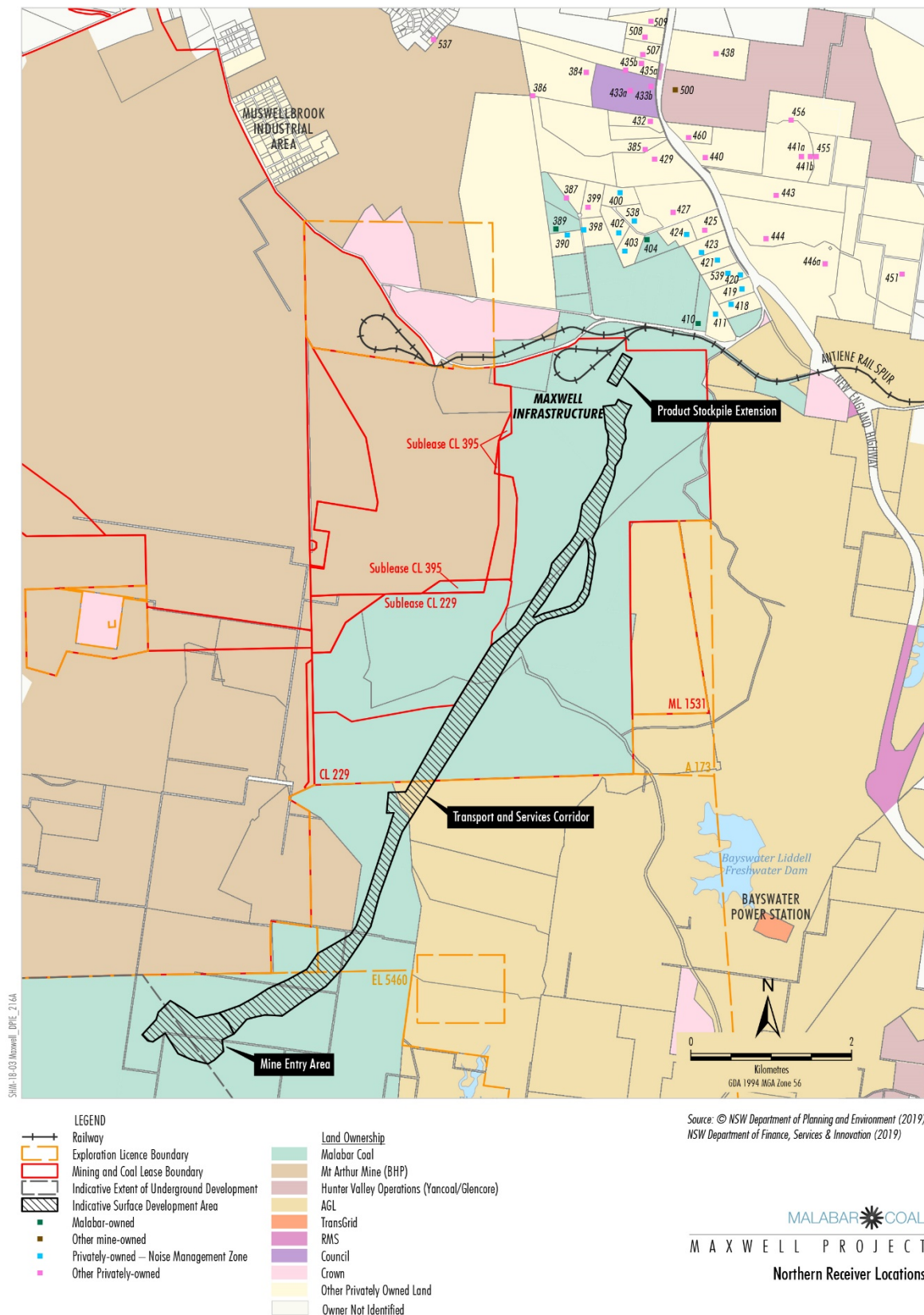


Figure 4 | Land ownership and location of sensitive receivers (North)

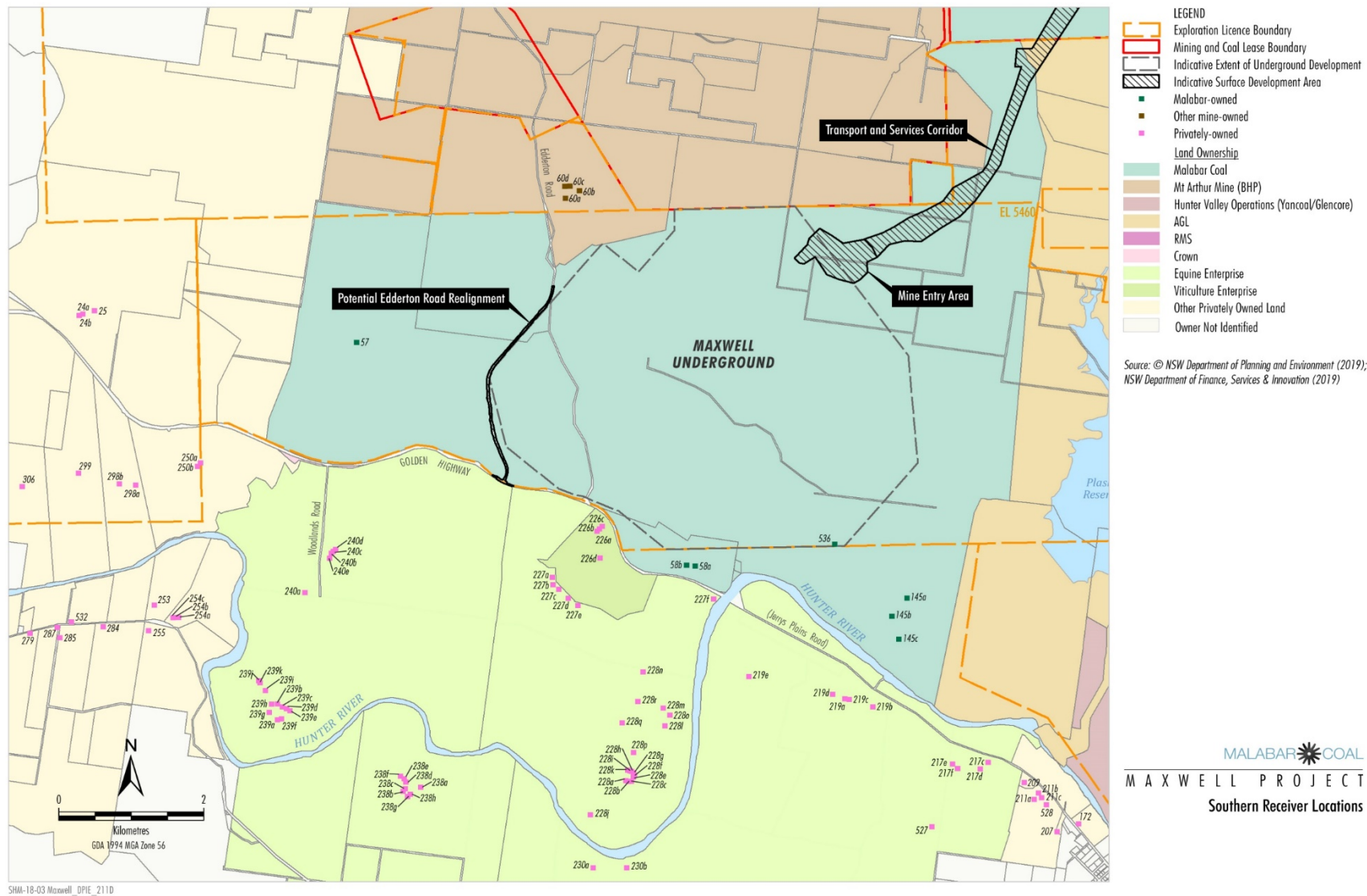


Figure 5 | Land ownership and location of sensitive receivers (South)

- 3.1.8 The Department notes that society remains heavily reliant on coal to meet its basic energy needs, both at the domestic and international level, with coal delivering vast majority of secure energy generation in NSW, Australia and the world. While steps are being taken to increase renewable energy generation and reduce society's reliance on fossil fuels, the International Energy Agency's (IEA's) World Energy Outlook 2016 forecast that global coal demand is expected to continue to grow at a rate of 0.2% per year over the life of the Project, in line with an expected increase in world energy consumption of a further 10% by 2040.
- 3.1.9 In addition to energy generation, in excess of 75 percent of product coal to be recovered by the Project (ie at least 93 Mt) would be high quality coking (metallurgical) coal, an important component of steel-making. There is no currently no economically viable alternative to the use of metallurgical coal as a reducing agent in commercial scale blast furnaces. Approximately 770 tonnes (t) of coal is used to make 600 t of coke, which in turn is used to create 1,000 t of steel. The coking coal that would be recovered by the Project therefore represents an important contribution to global steel production (in excess of 120 Mt of steel), which remains a fundamental material for a variety of construction and manufacturing industries.
- 3.1.10 While the NSW coal industry has been affected by fluctuations in export coal prices in recent years, the NSW Government's recent *Strategic Statement on Coal Exploration and Mining in NSW* recognises that there will remain a strong demand for NSW coal exports over the coming decades, as the global economy transitions to different forms of energy generation. During this period, the NSW Government will continue to support the responsible development of high quality coal resources for the benefit of the State.

Thoroughbred Breeding in the Hunter Valley

- 3.1.11 As identified above, the Upper Hunter Region Equine CIC comprises world-renowned thoroughbred breeding establishments and associated facilities. The region's two major thoroughbred studs, the Coolmore Stud and Godolphin's Woodlands Stud, are located to the south of the Golden Highway, at Jerrys Plains (see **Figure 1**). Together, the Coolmore and Godolphin Studs represent more than 50 percent of Australia's thoroughbred breeding market.
- 3.1.12 The area between Jerrys Plains and Denman has had a long history of agistment, with horse and 'pioneer' thoroughbred breeders dating back to the early days of European settlement. However, it was not until the mid-1980s that serious investment was made in 'world class' equine breeding operations. This included the purchase of the Woodlands Stud by the Ingham brothers in 1985.
- 3.1.13 Godolphin established a commercial breeding operation in the Hunter Valley in 2001 and later purchased the Woodlands Stud in 2008. The Woodlands Stud now operates in conjunction with Godolphin's Kelvinside Stud, located in Aberdeen. The two operations have a combined workforce of over 150 and host over 4,000 clients and visitors per year. Edderton Road forms part of the transport route between the two Godolphin facilities.
- 3.1.14 The Coolmore Stud was established in 1996. It also employs up to 150 workers, with the majority of employees residing on the property. The business has two key revenue streams: horse breeding and agistment. The agistment stream also includes the rearing of foals until they become yearlings, at which time they are sold or retained for future racing.

- 3.1.15 The thoroughbred studs are supported by an extensive support industry including the Scone Equine Hospital, the largest equine hospital in the southern hemisphere, as well as the Hunter Valley Equine Research Centre, located approximately 60 km north of Jerrys Plains. Edderton Road forms part of the transport route between the Coolmore and Godolphin Studs and the Scone Equine Hospital, although there are alternative routes via the Golden Highway.
- 3.1.16 The Equine CIC generates approximately \$300 million in annual income, provides direct employment for approximately 1,100 people and accounts for around 80 percent of the value of Australian stud horse exports.

Upper Hunter Viticulture CIC

- 3.1.17 The Hunter Valley is the oldest wine-making region in Australia. There are three key centres of wine-making which comprise the Upper Hunter Viticulture CIC: Broke, Pokolbin and Denman.
- 3.1.18 There are three commercial vineyards located within 15 km of the Project Area:
- Hollydene Estate, located at Jerrys Plains (see **Figure 1**);
 - Merton Vineyard and Small Forest Winery, located 10 km west of the Project Area, near Denman (owned by Malabar); and
 - Two Rivers Wines, located 12 km west of the Project Area, near Denman.
- 3.1.19 Local vineyards, cellar doors and associated restaurant and visitor accommodation are the key tourist attractions in the Denman area. The village of Denman is the key tourism centre in the Muswellbrook Shire LGA and hosts the Upper Hunter Wine and Food Affair in May each year.
- 3.1.20 Given the separation distance between the Merton and Two Rivers vineyards and the Project Area, the Project is not expected to impact those operations. The Department also notes that the operators of Hollydene Estate have expressed support for the Project (see **Section 5.4**). Nevertheless, impacts on Hollydene Estate are considered throughout **Section 6**.

3.2 Strategic Policy Framework for Land Use Compatibility

- 3.2.1 The NSW Government's *Upper Hunter Strategic Regional Land Use Plan* (SRLUP, 2012) aims to strike an appropriate balance between mining and agricultural development and provide for the sustainable management of the region's natural resources.
- 3.2.2 As the SRLUP acknowledges, balancing these two often competing interests presents a key policy and planning challenge:

The strength of the mining industry creates many benefits directly to the Upper Hunter region. These benefits include lower employment, higher average incomes and increased business and investment... However, these benefits are not felt evenly across the region. There are areas and industries that compete directly with the mining industry for resources, such as land, labour and water... For example, there are concerns that the growth of mining is placing pressure on the thoroughbred and wine industries. If the critical mass of

*these industries declines (due to mine expansions or mining impacts) or the image of the region suffers, there could be appreciable damage to the wider industry and economy...*⁶

3.2.3 The SRLUP also recognises that:

Significant and well established agricultural activities need to have confidence that their future in the region is secure and there are opportunities for their industry to develop and grow, particularly as these industries have the potential to continue sustainably well beyond the expected lifespan of most coal mines.

3.2.4 The SRLUP forms part of the Government's broader *Strategic Regional Land Use Policy*. **Table 3-1** outlines the key components of the Policy and how these components have been incorporated into the assessment of the Project.

Table 3-1 | Components of the Strategic Regional Land Use Policy

Policy Component	Comment
Strategic Agricultural Land Map	<ul style="list-style-type: none"> The Project Area includes mapped Biophysical Strategic Agricultural Land (BSAL) – see Figure 6 below and discussion in Sections 4.2 and 6.13 The Project Area is located to the north of mapped CIC land – see Figure 6 below and assessment and evaluation of potential impacts in Section 6.11
Gateway Process	Conditional Gateway Certificate issued – see Section 4.2
Agricultural Impact Assessment	Agricultural Impact Statement (AIS) included in Appendix Q of EIS – see Appendix A of this Report and discussion in Section 6.13
Aquifer Interference Policy (AIP)	Assessment against relevant provisions of the AIP included in Attachment 8 of the EIS – see Appendix A of this Report and discussion in Section 6.2

3.2.5 The Department has also considered a number of other relevant regional plans and strategies in its assessment of the Project, including the *Hunter Regional Plan 2036* and the *Upper Hunter Economic Diversification Action Plan: Implementation Priorities*. Both of these plans identify the protection of the Equine CIC and allowing for the expansion of the equine industry as regional priorities for the Muswellbrook Shire LGA. These plans also seek to protect and enhance agricultural productivity and to grow regional tourism through integration with the Equine CIC.

3.2.6 Importantly however, these documents do not identify a preferred land use for EL 5460. Nor do they seek to restrict mining development in favour of the equine and viticulture industries. Rather, these plans promote sustainable development of each of the region's key industries and continued diversification of the regional economy.

3.2.7 Other relevant regional strategies and plans are discussed in **Appendix F**.

⁶ UHSRLUP pg 44

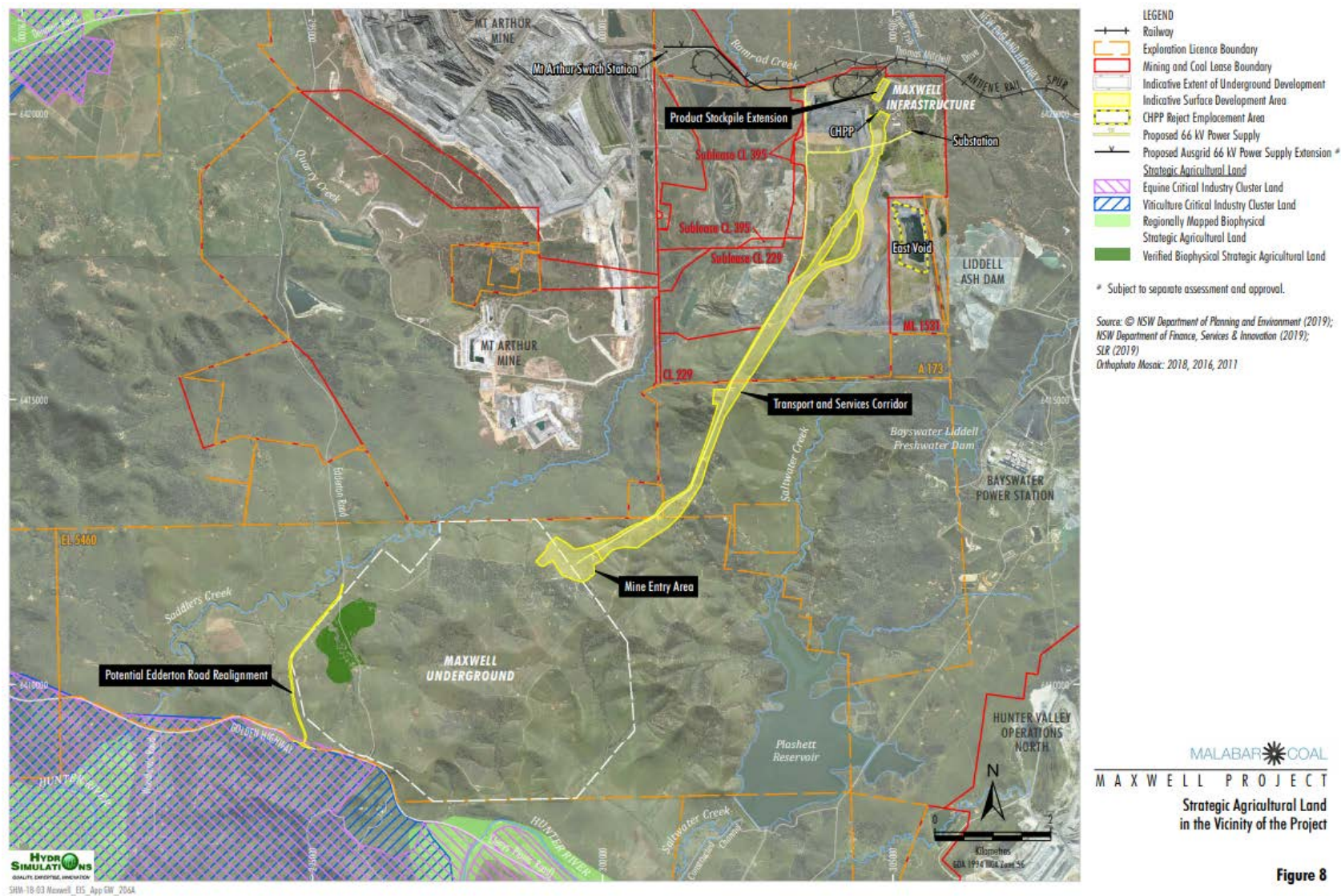


Figure 8

Figure 6 | Location of Strategic Agricultural Land in the vicinity of the Project Area

3.3 Previous Drayton South Coal Projects

- 3.3.1 In November 2012, Anglo American submitted a project application under the former Part 3A of the EP&A Act for the Drayton South Coal Project (PA 11_0062). The project involved the establishment of three new open cut pits within EL5460, to extract approximately 100 million tonnes of ROM coal over 20 years. The project was refused by the former Planning Assessment Commission (the Commission) in October 2014.
- 3.3.2 In May 2015, Anglo American submitted a new application for the Drayton South Coal Project (SSD 6875). This project involved the establishment of two open cut pits within EL5460. The project included a substantial reduction in the proposed mining area and reduced the project lifespan to 15 years
- 3.3.3 On 22 February 2017, the Commission refused the Project on the basis that it would have unacceptable air quality and blasting impacts and would have a detrimental impact on the sustainability of the Equine CIC.
- 3.3.4 In making its determination, the Commission observed that there is a fine balance between open cut mining and the Equine CIC. The Commission acknowledged that while the two industries were successfully co-existing at present, the proximity of an open cut mining operation of the scale of the proposed Drayton South Coal Project to the adjacent Coolmore and Godolphin studs could 'tip this relationship out of balance to the detriment, and ultimate decline of the internationally renowned Hunter Valley equine CIC'.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment (Jerry's Plains Prohibition) 2017

- 3.3.5 On 22 December 2017, the NSW Government amended Schedule 1 of the Mining SEPP to provide greater certainty for both the mining and equine industries regarding future development within EL 5460. As a result of this amendment, open cut mining is now prohibited within EL 5460.
- 3.3.6 In December 2017, as part of its Mining Act renewal of EL 5460 and in recognition of the interactions with the adjacent thoroughbred industry, Malabar relinquished the portion of EL 5460 which had been previously located south of the Golden Highway and the right to explore for open cut mining potential anywhere within the licence renewal area.

3.4 Strategic Statement on Coal Exploration and Mining in NSW

- 3.4.1 In June 2020, the NSW Government released its *Strategic Statement on Coal Exploration and Mining in NSW*. The Statement recognises that while many countries are beginning to transition from fossil fuels to low carbon energy sources, the demand for thermal coal in Asian markets is likely to remain stable until at least 2040. In particular, the demand for coking coal is likely to continue well beyond 2040 as coal-free steel making technologies are unlikely to be commercially available for some time.
- 3.4.2 The Statement seeks to support investment in the NSW coal industry to respond to short-to-medium term global demand, while helping regional communities transition to a low carbon future over the long-term.

- 3.4.3 The Statement seeks to reduce the impacts of mining on regional communities, by:
- supporting the improved management of impacts on air quality and water resources;
 - facilitating the beneficial re-use of land following the conclusion of mining;
 - reducing fugitive greenhouse gas emissions; and
 - ensuring that affected communities receive an appropriate share of the benefits of mining.
- 3.4.4 The Statement also recognises the benefits of brownfield mining proposals, adjacent to existing mining operations, as a means of delivering economic returns to the State while reducing environmental impacts.
- 3.4.5 Overall, the Department considers that the Project, being an underground coal mine primarily targeting coking coal resources for steel making, aligns with the objectives of the Statement. The Project would also enable reuse of rehabilitated mining land at the Maxwell Infrastructure site for the development of a renewable energy solar farm and would not diminish the land use capability and potential future grazing use of the conventional subsidence area post mining.

4 Statutory context

4.1 State significance

- 4.1.1 The Project involves coal mining and is declared to be SSD under clause 8(1)(b) of *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP).
- 4.1.2 The Planning Secretary's Environmental Assessment Requirements (SEARs) for the Project were issued on 3 September 2018. The SEARs were subsequently reissued on 17 January 2019 to incorporate the recommendations of the Mining and Petroleum Gateway Panel (see **Section 4.2**), the Commonwealth's supplementary environmental assessment requirements (see **Section 4.5**) and strengthened requirements regarding potential impacts on the Equine CIC, following representations from Coolmore and Godolphin.

4.2 Gateway Certificate

- 4.2.1 On 20 December 2018, the Mining and Petroleum Gateway Panel granted a conditional Gateway Certificate for the Project under Part 4AA, Division 4 of the Mining SEPP.⁷
- 4.2.2 The Gateway Certificate certifies that the Project Area does not contain CIC land. The Certificate also indicated that land within the Project Area exhibits some BSAL characteristics, however, further investigation was needed to verify the presence of BSAL.
- 4.2.3 The Gateway Panel identified various matters to be addressed in the EIS for the Project, including additional verification of BSAL mapping, the development of a comprehensive subsidence model, further refinement and calibration of the groundwater model and further assessment of impacts on Groundwater Dependent Ecosystems (GDEs). Malabar has provided a table outlining how each of these matters were addressed in the preparation of the EIS (see Table A7-2 at **Appendix A** of this report).
- 4.2.4 Further studies undertaken to inform the EIS have confirmed that 72 ha of verified BSAL is located within the subsidence zone for the underground mining area. This area of BSAL is split by the current alignment of Edderton Road and would be rehabilitated as part of the proposed realignment of the existing road pavement (see **Section 6.13**).

4.3 Permissibility

- 4.3.1 The Project Area is zoned RU1 Primary Production and SP2 Infrastructure under the *Muswellbrook Local Environmental Plan 2009* (MLEP). The proposal is not permissible in either of these zones under the MLEP. However, "underground mining" is permissible with consent on any land under clause 7(1)(a) of the Mining SEPP. Under clause 5(3) of the Mining SEPP, the SEPP prevails over the provisions of the MLEP.

⁷ Clause 50A of the EP&A Regulation requires that a development application involving mining on land shown on the Strategic Agricultural Land Map must be accompanied by either a Gateway Certificate or Site Verification Certificate.

4.4 Other Statutory Licences and Approvals

Mining Tenements

- 4.4.1 The Maxwell Underground site is wholly contained within EL 5460, which is currently held by Malabar. Malabar also holds four mining authorisations for the Maxwell Infrastructure Area (ML 1531, CL 229, CL 395 and A 173). **Figure 2** shows the boundaries of these tenements.
- 4.4.2 Malabar has indicated that it intends to lodge a Mining Lease Application (MLA) in respect of EL 5460. Exploration activities would continue to occur within EL 5460 over the life of the Project, to inform ongoing mine planning. These activities are regulated under the *Mining Act 1992* (Mining Act) and may include 3D seismic surveys, as well as in-seam and surface-to-seam drilling using truck-mounted drilling rigs. However, any exploration activities within the project area that relate to the Project would also be required to be detailed in an Exploration Activities and Minor Surface Infrastructure Management Plan (see **Appendix H**).
- 4.4.3 Malabar has committed to continue rehabilitation within the Maxwell Infrastructure tenements and eventually relinquish any areas not required for the continued operation of the Project.

Environment Protection Licence

- 4.4.4 Malabar currently holds an Environment Protection Licence (EPL) under the *Protection of the Environment Operation Act 1997* for operations at the Maxwell Infrastructure site (EPL 1323). Should development consent be granted for the Project, Malabar would need to seek a licence variation or a new EPL. The EPA has confirmed that it is satisfied that it can either vary the existing EPL for the Maxwell Infrastructure site or issue a new EPL for the Project.

Water Access Licences

- 4.4.5 Malabar holds a number of existing Water Access Licences (WALs) and has committed to obtain all necessary WALs for the Project in accordance with the *Water Management Act 2000* and in consultation with relevant agencies. This is discussed further in **Section 6.2**.

Approvals under *Roads Act 1993*

- 4.4.6 Malabar must obtain approval from the relevant Roads Authority under section 138 of the *Roads Act 1993* for any works within a road reserve. This would include both the repair and realignment of Edderton Road, which is a local road under the control of Muswellbrook Shire Council.

4.5 Commonwealth Approval

- 4.5.1 On 12 November 2018, a delegate of the then Commonwealth Minister for the Environment and Energy determined that the Project is a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), on the basis that the Project is likely to have a significant impact on:
- listed threatened species and communities (sections 18 and 18A); and
 - water resources (sections 24D and 24E).

- 4.5.2 Malabar subsequently sought a variation of the Controlled Action Decision, following a reduction to the proposed disturbance area for the Project. The variation was granted on 10 July 2019.
- 4.5.3 The Project is to be assessed by the NSW Government, using an accredited assessment process under Part 4 of the EP&A Act, and in keeping with the Bilateral Agreement between the NSW and Commonwealth Governments.
- 4.5.4 The Department sought advice from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) regarding the Project's potential impacts on water resources. The IESC's advice and Malabar's subsequent response are provided in **Appendices E** and **D**, respectively.
- 4.5.5 The Department's assessment against the controlling provisions of the EPBC Act relating to water resources and biodiversity is provided in **Sections 6.2, 6.4** and **Appendix G**.
- 4.5.6 Following the NSW determination of the development application, the matter will be referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for Commonwealth determination in accordance with the relevant provisions of the EPBC Act.

4.6 Consent Authority

- 4.6.1 Under section 4.5(a) of the EP&A Act and clause 8A of the SRD SEPP, the Independent Planning Commission of NSW (the Commission) is the consent authority for the application, as more than 50 unique submissions in the form of objections were made in respect of the Project.

4.7 Independent Planning Commission

- 4.7.1 On 23 September 2020, the Minister for Planning and Public Spaces directed the Commission to hold a public hearing in relation to the Project.
- 4.7.2 The Minister's Terms of Reference request the Commission to:
 - 1. Conduct a public hearing into the carrying out of the Maxwell Underground Coal Mine Project (SSD 9526) prior to determining the development application for the project under the *Environmental Planning and Assessment Act 1979*, paying particular attention to:
 - a) the Department of Planning, Industry and Environment's assessment report, including any recommended conditions of consent;
 - b) key issues raised in public submissions during the public hearing; and
 - c) any other documents or information relevant to the determination of the development application.
 - 2. Complete the public hearing and make its determination of the development application within 12 weeks of receiving the Department's assessment report in respect of the project, unless the Planning Secretary agrees otherwise.

4.8 Mandatory Matters for Consideration

4.8.1 The Department has undertaken a detailed assessment of the Project, taking into consideration each of the relevant matters in section 4.15 of the EP&A Act, including:

- applicable environmental planning instruments (see **Appendix F**);
- issues raised in submissions on the Project (see **Section 5**);
- the likely environmental, social and economic impacts of the Project (see **Section 6**);
- the suitability of the site for the Project (see **Section 6.11**);
- the objects of the EP&A Act, including Ecologically Sustainable Development (see **Appendix F**); and
- the public interest (see **Section 7**).

5 Engagement

- 5.1.1 Malabar implemented a comprehensive community engagement program during the preparation of the EIS, including direct consultation with Coolmore, Godolphin, Hollydene Estate and other neighbouring landowners via community information sessions and the Maxwell Infrastructure Community Consultative Committee (CCC). Malabar's engagement program is detailed in Section 5 of the EIS (see **Appendix A**).
- 5.1.2 After accepting the EIS, the Department placed the Project on public exhibition for an extended period of 42 days, from Wednesday 14 August 2019 until Tuesday 24 September 2019. The EIS was made available on the Department's website and at the offices of the Department, Muswellbrook Shire Council and the Nature Conservation Council.
- 5.1.3 The Department advertised the exhibition in the *Muswellbrook Chronicle*, *Hunter Valley News*, *Daily Telegraph*, the *Sydney Morning Herald* and *The Australian*.
- 5.1.4 The Department also notified:
- nearby landowners, including Coolmore, Godolphin and Hollydene Estate;
 - relevant infrastructure providers, including Ausgrid and the Australian Rail Track Corporation (ARTC); and
 - relevant Government agencies, including Muswellbrook Shire Council.
- 5.1.5 The Department also carried out a site visit on 22 August 2019 to both the Maxwell Infrastructure and Maxwell Underground sites.
- 5.1.6 The Department considers that its engagement process met the community participation requirements under the EP&A Act and associated EP&A Regulation. The Department also considers that this process has fulfilled the State's obligations under the Bilateral Agreement with the Commonwealth Government.

5.2 Summary of Submissions

- 5.2.1 The Department received a total of 231 public submissions during the exhibition period, including 187 submissions from individuals and 44 submissions from special interest groups (SIGs). These submissions comprised:
- 178 (77 percent) submissions expressing support for the Project;
 - 51 (22 percent) submissions objecting to the Project; and
 - 2 submissions that provided comments on the Project.
- 5.2.2 The issues raised in public submissions are discussed in **Section 5.4**. The geographical distribution of submitters is shown in **Figure 7** and demonstrates that the majority of objections were received from geographic areas associated with the Equine CIC (e.g. Aberdeen and Scone in the Upper Hunter Valley).
- 5.2.3 The Department also received advice on the Project from 14 government agencies and infrastructure providers. The issues raised in agency advice are discussed in **Section 5.3**.

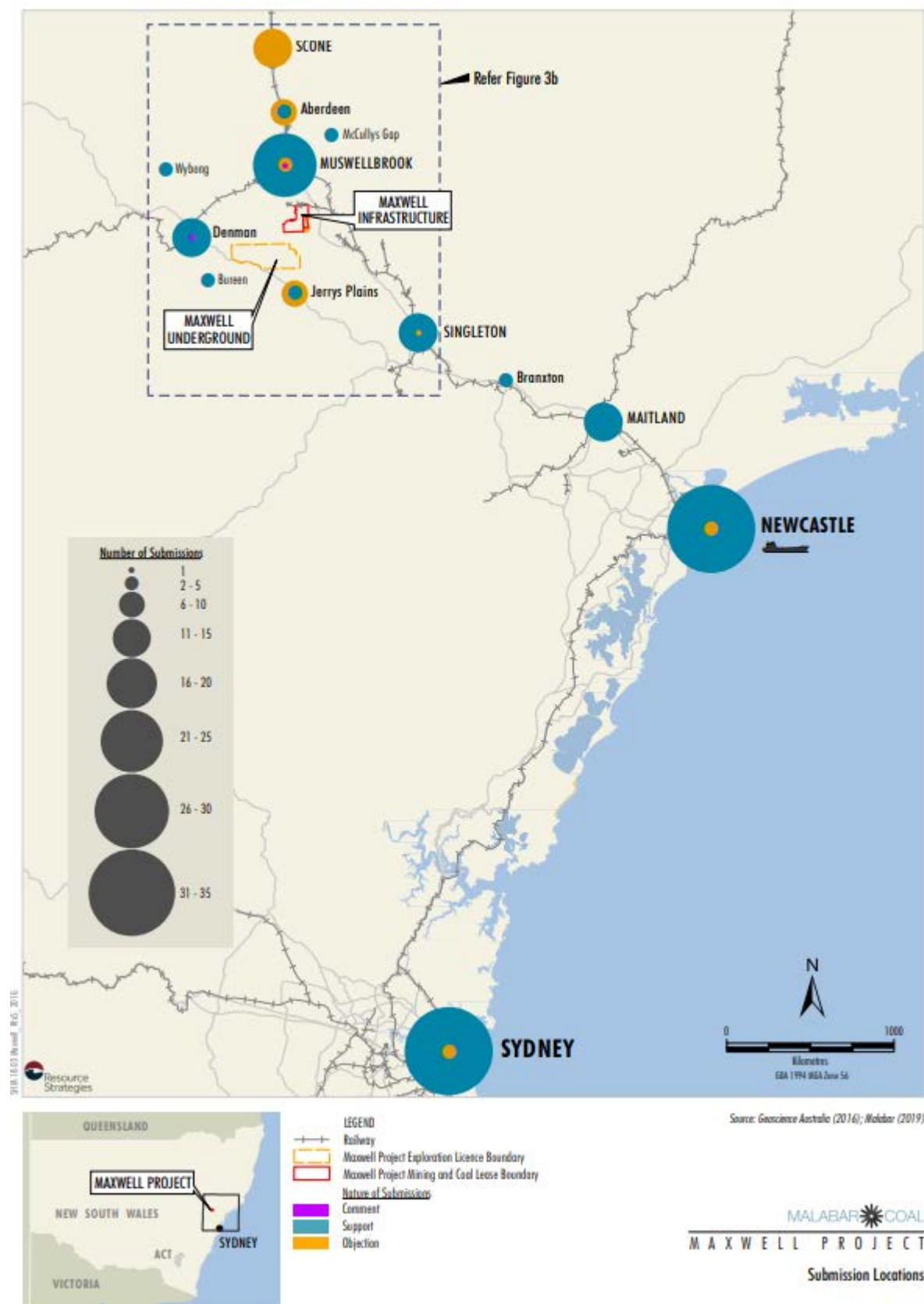


Figure 7 | Geographical distribution of public submissions

5.3 Summary of Agency Advice

- 5.3.1 The **ARTC** advised that the Department should have regard to *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) and *Development Near Rail Corridors and Busy Roads – Interim Guideline* (December 2008) in its assessment. The Department has considered the Infrastructure SEPP and Interim Guideline in its assessment of rail noise (see **Section 6.5** and **Appendix F**).
- 5.3.2 The **Biodiversity and Conservation Division** (BCD) within the Department advised that it was satisfied with the assessment of Aboriginal cultural heritage in the EIS but requested further information with respect to biodiversity and flooding impacts on Edderton Road. These matters were addressed in Malabar's Submissions Report and are discussed further in **Sections 6.4** and **6.2**, respectively. Heritage NSW⁸ has since confirmed that it is satisfied with the recommended conditions at **Appendix H** as they relate to Aboriginal cultural heritage matters.
- 5.3.3 BCD later raised concerns regarding the flora surveys undertaken during the preparation of the EIS, noting that further surveys were required to adhere to the Biodiversity Assessment Method (BAM). This issue has been subsequently resolved and is discussed in **Section 6.4**. BCD was supportive of the recommended conditions at **Appendix H**, subject to one minor amendment which has been adopted by the Department.
- 5.3.4 The **Crown Lands Group** within the Department (DPIE – Crown Lands) advised that Malabar would need to enter into a compensation agreement or access arrangement under the Mining Act prior to undertaking mining operations or prospecting activity on Crown land or roads. This is reflected in the Department's recommended conditions.
- 5.3.5 The **Department of Primary Industries** (DPI) which includes Agriculture and Fisheries advised it had no comment on the Project.
- 5.3.6 The **Environment Protection Authority** (EPA) requested additional information with respect to noise and air quality impacts, impacts on water resources and waste management. These matters were addressed in Malabar's Submissions Report and supplementary information (**Appendices C** and **D**). The EPA subsequently advised that sufficient information had been provided to adequately assess the environmental impacts of the proposal and issued a number of indicative conditions, most of which would be imposed through an EPL for the site.
- 5.3.7 The Department has continued to consult with the EPA and has sought to ensure that contemporary management controls are imposed to regulate the above matters and align the EPA's separate regulatory requirements with the recommended conditions at **Appendix H**. Finally, the EPA advised that it did not wish to be consulted on the development of operational management plans for the Project.
- 5.3.8 **Mining, Exploration and Geoscience** (MEG)⁹ within Regional NSW advised that the Project represents an efficient use of resources which would yield significant social and economic benefits for NSW. MEG also advised that the Project could be effectively regulated under the conditions of Malabar's mining authorisations and the recommended conditions at **Appendix H**.

⁸ Heritage NSW within the Department of Premier and Cabinet was formerly the Heritage Branch of BCD

⁹ MEG was formerly known as the Division of Resources and Geoscience (DRG) within the Department

MEG also recommended that potential resource sterilisation be considered in the selection of any biodiversity offset areas. Malabar has committed to consult with MEG in this regard.

- 5.3.9 **NSW Health** did not raise any specific concerns regarding the Project. Following its review of the EIS, NSW Health noted that the Project would have minimal additional impact on public health.
- 5.3.10 The **NSW Heritage Council** did not raise any concerns regarding the Project, on the basis that it would have no identified impact on State-listed heritage items or historical archaeological relics.
- 5.3.11 The **Resources Regulator** within Regional NSW raised concerns that the EIS did not provide sufficiently information with respect to the conceptual final landform design and rehabilitation. The Resources Regulator requested additional information with respect to a range of matters, including the proposed rehabilitation objectives and methodology, a more detailed assessment of potential risks, potential spillover from the East Void in the final landform and the management of geochemically hazardous materials and rejects. These matters were addressed in Malabar's Submissions Report and supplementary information provided in **Appendices C** and **D**. The Department has consulted with and adopted the Resources Regulator's recommendations in relation to the recommended conditions at **Appendix H**.
- 5.3.12 **Subsidence Advisory NSW (SANSW)** did not raise any concerns regarding the Project. However, SANSW requested to be consulted in the development of management plans for the Project. This is reflected in the Department's recommended conditions.
- 5.3.13 **Transport for NSW (TfNSW)** ¹⁰ raised concerns that the Road Transport Assessment (RTA) assumed that the intersection of Thomas Mitchell Drive and Denman Road would be upgraded prior to the commencement of the Project. The intersection upgrade is required under conditions of consent for the Mt Arthur Open Cut Consolidation Project (MP 09_0062).
- 5.3.14 TfNSW noted that until a Works Authorisation Deed is in place for these works, Malabar should not rely on any upgrade by a third party to mitigate the Project's impacts on the road network. TfNSW therefore requested that Malabar update the RTA and provide revised intersection modelling. TfNSW also requested clarification with respect to traffic generation associated with the Mangoola Coal Continued Operations Project (SSD 8642) and parking arrangements for the Project's construction workforce.
- 5.3.15 As discussed in **Section 6.7**, Malabar provided additional traffic modelling to address the issues raised in relation to the Thomas Mitchell Drive and Denman Road intersection. TfNSW did not express any further concerns about this matter following its review of the Submissions Report.
- 5.3.16 TfNSW also recommended that the Road Transport Assessment be updated to identify the transport route for dangerous goods (including fuel and explosives) associated with the Project. Malabar provided the requested information in its Submissions Report. The transportation of hazardous materials is considered in **Section 6.13**. The Department has consulted with TfNSW and reflected the road standards and requirements of TfNSW where appropriate in the recommended conditions at **Appendix H**.

¹⁰ As of the date this advice was given, TfNSW and RMS were two separate entities and provided separate advice. For the purposes of this assessment report, the two agencies are referred to collectively as TfNSW.

- 5.3.17 **Upper Hunter Shire Council (UHSC)** objected to the Project. The Department notes that the Project Area is wholly located within the Muswellbrook Shire LGA. The issues raised in UHSC's submission closely align with those raised in submissions from the equine industry, which are discussed in detail in **Section 5.4**.
- 5.3.18 The **Water Group** within the Department (DPIE Water) and the Natural Resources Access Regulator (NRAR) provided joint advice on the Project. DPIE Water requested further details on Malabar's water licensing strategy for the Project, noting that Malabar would need sufficient WALs under the relevant Water Sharing Plans to account for all water take associated with the Project, including groundwater inflows to the existing voids at the Maxwell Infrastructure site.
- 5.3.19 Malabar provided supplementary data regarding annual inflows to the existing voids in its Submissions Report (**Appendix C**) and subsequent correspondence (**Appendix D**). While Malabar has expressed a residual opposition to the basis for DPIE Water's requirements for WALs, it has agreed to acquire all licences necessary for the Project. Malabar has since acquired the necessary WALs to account for all water take associated with the Project, including future inflows to the voids. Water licensing is discussed further in **Section 6.2**.
- 5.3.20 DPIE Water also provided advice regarding groundwater monitoring and the timing of preparation of Water Management Plans. This advice is reflected in the Department's recommended conditions (see **Section 6.2**).
- 5.3.21 Finally, **Muswellbrook Shire Council (MSC)** provided an extensive submission commenting on the NSW planning framework, the environmental, social and economic impacts of the Project and the cumulative impacts of the mining industry in the Hunter region. MSC also stressed the need for a planned transition to a post-coal future and urged the NSW Government to lead this process.
- 5.3.22 MSC noted that the Upper Hunter experiences periodic housing shortages due to short-term spikes in employment, often associated with the construction phase of mining projects. MSC stated that land to the southeast of Muswellbrook has been or is proposed to be rezoned for residential use and submitted that certain infrastructure, particularly the intersection of the New England Highway and Bimbadeen Drive, would need to be upgraded to accommodate the new residential estate and suggested that this should be funded through the State Government's proposed Hunter Region Special Infrastructure Contributions program for new residential and industrial development.
- 5.3.23 In response, Malabar noted that it has offered to enter into a substantial Voluntary Planning Agreement (VPA) with MSC and that funds from Malabar's proposed annual community contribution could be used to fund the upgrade should Council choose to use the funding for this purpose. As there is no clear nexus between the Project and the planned intersection upgrade, and there is no applicable contributions plan in place that would necessitate a specific contribution for this work, the Department considers to be no basis to impose any requirements.
- 5.3.24 The Department also notes that the subject intersection has been providing access to land releases in the southeast of Muswellbrook that have been approved by MSC and progressively developed over the last decade. Overall, the management of residential development applications by land developers is unrelated to the proposed Project and any infrastructure demands on the road network arising from these activities should be managed through

appropriate regulatory pathways associated with these separate rezoning proposals. Accordingly, this matter has not been discussed further in this report.

- 5.3.25 MSC recommended a variety of local apprenticeship programs, training and employment initiatives, and suggested that Malabar should provide a contribution towards the diversification of the local post-mining economy. Employment issues and the proposed VPA are discussed further in **Section 6.9**.
- 5.3.26 While MSC recognised that mining operations may hold the relevant water licences to account for their water take, it complained about the State Government's methods of regulating the water market and asserted that current government policies result in social and ecological impacts. The Department notes that the Project has been assessed in accordance with strict NSW Government water regulations and the impacts of this water take are considered further in **Sections 6.2, 6.9 and 6.10**.
- 5.3.27 MSC expressed concern that initial trucking of ROM coal between the MEA and the CHPP would commence prior to the sealing of the site access road. MSC stated that the road should be sealed prior to the commencement of mining. This issue is discussed further in **Section 6.6**.
- 5.3.28 MSC submitted that the NSW Government's policies and contemporary methodology for assessing air quality impacts was inadequate and recommended an alternative basis for assessing air quality impacts for major developments in the State. The Department notes that MSC's suggestion diverges significantly from the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* which has been rigorously developed by the EPA over many years, and as this approach is inconsistent with State Government policies, cannot be applied to the assessment of this Project.
- 5.3.29 MSC also requested that the NSW Government undertake a cumulative study of the health impacts of mining in the Upper Hunter. The Department notes that a similar study has already been conducted by the State Government in recent years and that as an underground mining operation, the air quality impacts and health risks of the Project are expected to be very minor (as discussed in **Section 6.6**).
- 5.3.30 MSC also recommended that Malabar prepare an Export Management Plan to restrict and control the Project's greenhouse gas emissions. The Department's recommended conditions do not prescribe the preparation of a management plan to manage coal exports as matters of trade are managed by the Commonwealth government and there is no NSW Government policy that would support the imposition of such a condition. The draft *Environmental Planning and Assessment Amendment (Territorial Limits) Bill 2019* is also currently before Parliament. If passed, this Bill would prevent consent authorities under the EP&A Act from imposing conditions that would regulate impacts that may occur outside Australia. Notwithstanding, international climate policy and target export markets are considered further in **Section 6.6**.
- 5.3.31 MSC noted that the Project would lead to increased road and rail traffic on the State transport network and that the cumulative transport impacts infrastructure should be considered. MSC also commented on site access and safety issues and noted that any changes to the local road network would require Council's approval as the relevant Roads Authority. Road transport issues are considered in **Section 6.7**. The Department notes that no increases to train movements are proposed. Nonetheless, the Department has consulted with relevant State agencies regarding potential impacts on the rail network.

- 5.3.32 MSC initially provided advice indicating that adaptive management of subsidence impacts and traffic management on Edderton Road could occur with appropriate subsidence-related repairs. However, following its review of the Submissions Report, MSC advised that given the scale of predicted subsidence impacts on Edderton Road and the risks associated with ongoing repairs, Malabar should commit to realign the road. Malabar subsequently committed to realign the road prior to commencing longwall extraction in the Arrowfield Seam. This issue is discussed further in **Section 6.3**.
- 5.3.33 MSC noted that the noise impacts should be proactively monitored and that noise mitigation and management should be tailored to the individual needs of affected landowners. Noise management is discussed further in **Section 6.5**.
- 5.3.34 MSC also raised concerns as to whether the BAM had been appropriately applied in the preparation of the Biodiversity Development Assessment Report (BDAR) in the EIS. MSC raised particular concerns regarding flora surveys for Pine Donkey Orchid (*Diuris tricolor*). In response, the Department sought further advice from BCD, which affirmed MSC's concerns. Malabar subsequently provided a range of supplementary information, additional survey results and an explanation of the survey methodology used to assess identified threatened flora species. BCD has since confirmed that the additional information satisfactorily addressed its requirements and that any residual impacts to biodiversity can be managed under the Department's recommended conditions (see **Section 6.4**).
- 5.3.35 In addition, MSC expressed concern that the EIS sought to offset biodiversity impacts using biodiversity credits and did not provide for a local land-based offsets. MSC also commented on the need for an adaptive management plan for subsidence-related biodiversity impacts, particularly with respect to impacts on the Pink-tailed Legless lizard and Striped Legless Lizard. Malabar has subsequently identified a potential biodiversity offset area within EL 5460, which along with adaptive management of subsidence impacts, is discussed further in **Section 6.4**.
- 5.3.36 MSC also provided comments on rehabilitation and final land use. In its initial submission, MSC expressed some concern that the Preliminary Rehabilitation and Mine Closure Strategy did not contain detailed performance and completion criteria for the site and appeared to be lacking in clear commitments. MSC emphasised the need for final landforms which are in keeping with the natural landscape. MSC also observed that it may be difficult to re-establish productive grazing land on the site and suggested that a stronger focus on woodland establishment may be preferable.
- 5.3.37 MSC also emphasised the need for mine closure planning in consultation with the local community. The Department supports appropriate planning for mine closure and has recommended contemporary conditions to manage this process. Other rehabilitation issues are discussed further in **Section 6.12**.
- 5.3.38 MSC also noted that the Project would realign a biodiversity corridor that forms part of the Drayton Mine final landform approved under MP 06_0202. MSC expressed some concern that the majority of the realigned corridor would not be established until the conclusion of mining, as it forms part of the proposed surface disturbance area for the Project. MSC expressed a preference to expand the proposed corridor and to begin the progressive establishment of the corridor as soon as possible. Malabar subsequently increased the size of the proposed corridor and committed to undertake progressive planting between 2020 and 2026 (see **Section 6.12**).

- 5.3.39 MSC also suggested that the internal site access road could be dedicated as a public road following the conclusion of mining. The Department notes that the road is proposed to be removed and rehabilitated, along with the remainder of the transport and services corridor (see **Section 6.12**). Nevertheless, the recommended conditions do allow for certain pieces of surface infrastructure to be retained with the agreement of the Resources Regulator, where a beneficial future use can be identified for these infrastructure assets.
- 5.3.40 MSC also provided comments on Aboriginal and historic heritage. MSC encouraged Malabar to establish a partnership with the local Aboriginal community to establish employment opportunities for indigenous people and manage the Project's impacts on affordable housing supplies. Malabar has committed to establish a workforce target of 10 percent indigenous workers and to engage with local Aboriginal groups to monitor and mitigate impacts on local housing stocks (see **Section 6.9**).
- 5.3.41 MSC also observed that the former Drayton Mine has local heritage significance, based on its previous economic and social benefits, noting that it was one of the first open-cut drag line operations in NSW. MSC requested that a memorial be established on site, and that an assessment and photographic record be undertaken for all remnant infrastructure on site. This is discussed further in **Section 6.13**.
- 5.3.42 Finally, MSC noted that its preference for all operations to be regulated under a single development consent. The Department notes that DA 163/2002 was surrendered in 2009 and, if the proposed Project is approved, MP 06_0202 for the Drayton Mine Extension Project would also be surrendered.
- 5.3.43 Malabar has opted not to consolidate DA 106-04-00, which relates to the Drayton Rail Loop and Antiene Rail Spur, into the current proposal. The Department notes that mining and rail operations at the site have been successfully managed under separate development consents for some time. The Department also notes that DA 106-04-00 imposes more stringent requirements on Malabar with respect to rail noise than would be required under contemporary policy (see **Section 6.5**). Consequently, retaining the existing development consent affords additional protection for noise-affected receivers.

5.4 Summary of Public Submissions

Submissions in Support

- 5.4.1 Submissions in support of the Project came from various locations throughout NSW and interstate (see **Figure 7**). The majority of these submissions commented on the Project's potential economic benefits, including job creation and the payment of royalties. These submissions also discussed the positive social impacts of the Project, noting Malabar's support for local businesses and community organisations, as well as increased wellbeing associated with employment opportunities and local investment. The social and economic impacts of the Project are discussed further in **Sections 6.9** and **6.10**, respectively.
- 5.4.2 Many submissions also observed that an underground mine would represent a better environmental outcome for the site than previous open cut proposals, particularly with respect to dust and visual impacts. These submissions noted that economic benefits of the Project that would be achieved by targeting a high quality coking coal product and making beneficial use of

existing mine infrastructure. Submissions also commented on Malabar’s ongoing commitment to rehabilitate the former Drayton Mine and expressed support for the Maxwell Solar Project.

- 5.4.3 Notably, the operators of Hollydene Estate provided a submission in support of the Project. This submission noted that while Hollydene Estate objected to Anglo American’s previously proposed Drayton South Coal Project, the current proposal:

‘... eliminates all of our real concerns and will enable Hollydene Estate Wines to completely co-exist sustainably with the Maxwell Project.’

Submissions in Objection

- 5.4.4 The key reasons given for objecting to the Project are summarised in **Figure 10** and discussed in further detail below.

Geographical Distribution of Submissions

- 5.4.5 The majority of submissions objecting to the Project came from the historic and important equine industry locations of Jerrys Plains, Scone and Aberdeen (see **Figure 7**). These submissions raised particular concerns with the cumulative impact of mining operations in the Hunter region and the Project’s potential impacts on the Equine CIC, as well as farming, viticulture and tourism (see **Figure 8**).

- 5.4.6 In addition to project specific concerns, approximately 25 percent of submissions in objection raised broader concerns with the mining industry focused on the contribution of mining and coal fired power generation to greenhouse gas emissions and anthropogenic climate change. These submissions originated from various locations throughout the State.

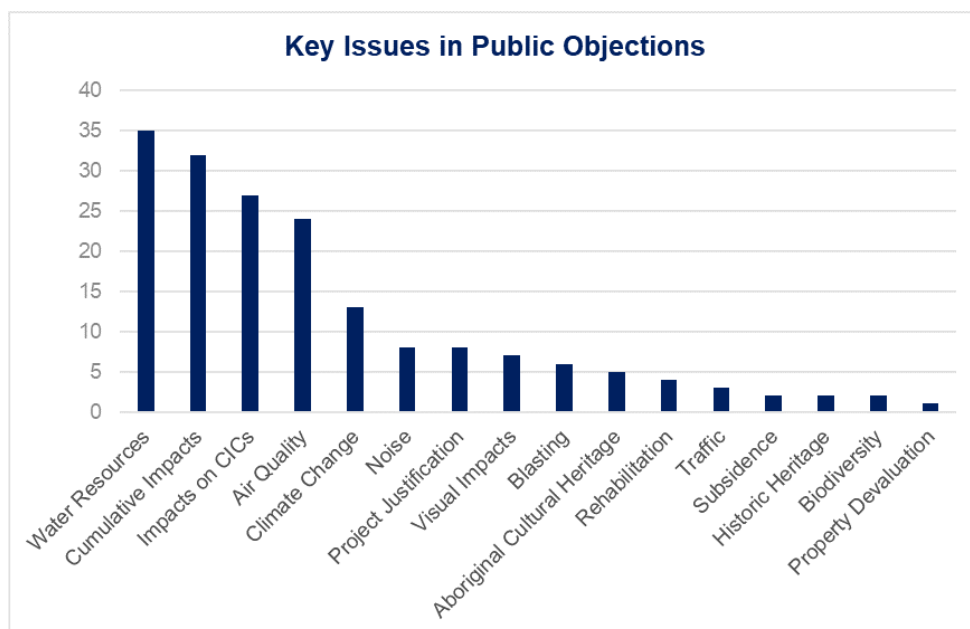


Figure 8 | Key reasons for objection in public submissions

Potential Impacts on the Equine CIC

- 5.4.7 Approximately 50 percent of objections raised concerns regarding the Project’s potential impacts on the Equine CIC. Detailed submissions were provided by Coolmore and Godolphin,

along with members of the wider Upper Hunter equine industry, including the Scone Equine Hospital and the Hunter Thoroughbred Breeders Association (HTBA).

- 5.4.8 These submissions were primarily concerned with the Project's potential impacts on water resources, as well as air quality, noise and blasting, traffic and visual impacts. The submissions underscored the important contribution of the equine industry to the Upper Hunter regional economy and the need to preserve the international reputation of the Equine CIC.
- 5.4.9 Several submissions expressed frustration that a further mining proposal is under consideration for the former Drayton South site, noting that a lack of certainty regarding the future of the site makes it difficult to secure investment in the area.
- 5.4.10 In this respect, the Department notes that the current underground proposal differs substantially from previous open cut proposals at the site and that under existing NSW statutory and policy frameworks, Malabar is entitled to seek approval to develop the site in a manner that is permissible under relevant planning controls. Furthermore, as outlined in **Section 3.3**, the NSW Government has provided greater certainty for both the mining and equine industries regarding future development in the area by prohibiting open cut mining on the site.
- 5.4.11 Both Coolmore and Godolphin raised concerns regarding the Project's potential impacts on surface and groundwater resources noting that any impacts on the availability or quality of water for stock watering and irrigation could have a significant adverse impact on their operations.
- 5.4.12 Coolmore raised concerns regarding apparent disparities in the EIS, particularly with respect to the site water balance, noting that the model was calibrated during a dry period and does not adequately consider the risk of a water surplus during the life of the project. Coolmore also questioned whether the groundwater modelling adequately considers climatic influences, including a scenario in which the Hunter River and associated aquifers take longer to recharge.
- 5.4.13 Coolmore also expressed concerns regarding the potential leakage or spillover from the three final voids at the Maxwell Infrastructure site, noting that these voids would be located close to a 'highly productive' alluvial aquifer. The Department notes that these voids are already an approved feature of the final landform at the former Drayton Mine and has considered the potential for any additional impacts on surface and groundwater resources and environmental risks associated with the amendments proposed to these final voids in **Section 6.2**.
- 5.4.14 Coolmore and Godolphin both raised concerns regarding the cumulative air quality impacts of the Hunter Valley mining industry. Coolmore expressed concerns that ROM coal would be trucked to the CHPP for the first three years of the Project, noting that the proposed haul road would not be fully sealed until the end of Year 1. Additionally, Coolmore questioned whether the overland conveyor proposed to replace these truck movements would actually be built.
- 5.4.15 The Department notes that the early haulage of ROM coal by truck would be at a reduced rate, dust suppression would still be required and air quality impacts would be minor (see **Section 6.6**). The Department's recommended conditions would also ensure that the sealing of the site access road and the commissioning of the overland conveyor occurs in line with commitments in the EIS.
- 5.4.16 Coolmore and Godolphin also raised concerns regarding noise and blasting impacts on broodmares, as well as employees and their families who reside on the respective properties.

The Department has assessed the noise and blasting impacts in **Sections 6.5** and **6.13** and has specifically addressed impacts on the Equine CIC in **Section 6.11**.

- 5.4.17 Coolmore noted that any potential traffic delays associated with the realignment of Edderton Road (including roadworks) are a cause for concern, as this road provides access to the Scone Equine Hospital. The Department recognises the importance of this road for the thoroughbred industry and has discussed the management of Edderton Road further in **Sections 6.3** and **6.7**.
- 5.4.18 Coolmore also raised concerns that the Project may have cumulative visual impacts along Edderton Road, where the MEA and associated stockpiles would be visible. Coolmore noted that while the visual impacts of the Project would be substantially less than those of the previous Drayton South proposals, the surrounding 'landscape and the stud farm are a visual platform off of which we sell what is in essence a luxury product and experience.' Visual impacts are discussed in **Sections 6.8** and **6.11**.
- 5.4.19 Godolphin also stressed the need to protect the image and reputation of the Equine CIC, noting:

Our operations and industry are predicated on producing champion athletes in a clean, green and serene environment. Our business model is particularly vulnerable to threats to our environment, image and reputation – all impacting on client perceptions and expectations. For the past decade (and indeed many decades longer if exploration licences are taken into account) we have had no investment certainty, no planning certainty and the Upper Hunter has been vulnerable to lost investment and employment generating opportunities to our rivals interstate and overseas.

- 5.4.20 The environmental and reputational impacts of the Project on the Equine CIC are discussed in **Section 6.11**.

Other key issues raised in Submissions

- 5.4.21 Several submitters challenged Malabar's overall justification for the Project, the accuracy of technical assessments and the rigour behind the predicted worst-case impacts. In particular, some submitters questioned the economic benefits of the Project and suggested that the EIS may have overstated the value of coal produced by the Project, given that that previous Drayton South proposals would have primarily produced a thermal coal product. These submitters also questioned the future demand profile for coking coal, citing the development coal-free steel making technologies.
- 5.4.22 In response, Malabar noted that the Project would target specific, high value coal seams that are located deeper than the previous open cut proposals and would therefore yield higher quality coking coal. Further consideration of coking coal demand and developing technologies is discussed in **Section 6.6**.
- 5.4.23 Overall, the Department considers that the EIS clearly outlines Malabar's justification for the proposed underground mine design and provides a robust assessment of the worst-case impacts of the Project, in accordance with relevant guidelines and best practice. The EIS also included peer reviews of the groundwater and subsidence assessments for the Project by highly qualified experts in their respective fields.
- 5.4.24 The predicted impacts on water resources both during and following operations was a key issue raised in public submissions, with many submitters also concerned over the potential impacts

this may have on nearby agricultural operations. The Department has carried out a detailed assessment of potential groundwater and surface water impacts, in consultation with relevant agencies and having regard to the advice of the IESC. The findings of the Department's assessment are summarised in **Section 6.2**.

- 5.4.25 The majority of objectors expressed varying degrees of concern with the cumulative health, amenity and social impacts of mining in the broader Hunter region, with a particular focus on cumulative impacts to air quality, noise, water resources and the scenic quality of the Hunter Valley landscape.
- 5.4.26 The Department has undertaken a detailed assessment of the air quality, noise, visual and blasting impacts of the Project in **Section 6** and has integrated consideration of cumulative impacts into its assessment of the Project and development of recommended conditions at **Appendix H**.
- 5.4.27 Submissions also raised concerns with the potential impacts to local wildlife and the proposed final landform and rehabilitation outcomes. This included concerns over the retention of existing voids at the Maxwell Infrastructure site and the adequacy of rehabilitation bonds to cover the remediation of impacts, particularly given subsidence induced impacts would continue to occur for a period of time following the conclusion of mining. The Department has consulted closely with BCD and Resources Regulator to inform its assessment of these matters and has included its considered assessment of biodiversity impacts and rehabilitation in **Sections 6.4** and **6.12**.
- 5.4.28 A submission made on behalf of the Wonnarua people also raised concerns that the Aboriginal Cultural Heritage Assessment (ACHAR) did not address the impact of the Project on the native title claimed area of the Wonnarua people or consider the impacts of the Project on a potential massacre site south of Mt Arthur.¹¹ The submission also raised concerns regarding the consultation with Registered Aboriginal Parties (RAPs) undertaken for the Project and raised concerns that Malabar had not fulfilled its statutory obligations with respect to native title under relevant State and Commonwealth legislation.
- 5.4.29 Malabar responded to these concerns in its Submissions Report (see **Appendix C**). In addition to this, the Department requested that BCD respond to the matters raised in the submission. BCD confirmed that the ACHAR was prepared in consultation with all RAPs and met the relevant requirements of the SEARs and applicable guidelines. BCD commented that the ACHAR did not find any evidence of a massacre site within the Project Area¹² and noted that the native title claim referenced in the submission had been discontinued. A copy of BCD's response is provided in **Appendix E**.
- 5.4.30 In relation to heritage impacts, some submitters also questioned the adequacy of the Historic Heritage Assessment in the EIS and in one case, argued that additional plans were required to understand the full extent of potential impacts. While the Project would not cause direct impacts to any historic heritage items, the Department has considered the potential for impacts, including subsidence induced impacts, in **Sections 6.3** and **6.13**.

¹¹ The submission included a copy of an Aboriginal Heritage Review (GLM Heritage 2015) commissioned by the HTBA in 2015, which discussed the possibility of a massacre site c. 1826 in the vicinity of Mt Arthur

¹² The ACHAR included a review of documentary sources regarding potential massacre sites to the southwest of Mt Arthur and concluded that those potential sites fall outside the Project Area

- 5.4.31 Several individuals also expressed varying degrees of concern with predicted or perceived impacts of the Project on their properties or assets, with impact upon their property values. The matters raised in these submissions have generally been addressed through the provision of additional information in the Submissions Report or application of relevant assessment standards in **Section 6**. In relation to concerns over property values, the Department notes that the NSW Land and Environment Court has consistently held that concerns regarding property devaluation can be given little weight in the absence of supporting evidence and the EP&A Act does not provide any compensation mechanism for development which is permissible under relevant planning controls.
- 5.4.32 In relation to the benefits of the Project, some submissions expressed doubt as to whether projected jobs would eventuate and benefit the local economy, particularly if workers reside outside of the area. To address this, Malabar has committed to initiate local employment and training programs, engage apprentices who are permanent residents of the Muswellbrook Shire LGA and prioritise employment of workers residing in the Muswellbrook Shire, Singleton and Upper Hunter LGAs. Employment and economic benefits are discussed further in **Sections 6.9** and **6.10**.
- 5.4.33 In addition to the above impacts, a number of submissions expressed broad objections to various NSW Government policies and land use planning decisions associated with the cumulative impacts of the mining industry in the Hunter Valley. Many of these submitters expressed concerns with anthropogenic climate change and prolonged drought conditions experienced in the Hunter region over recent years and advocated for a transition away from the use of fossil fuels in the NSW energy market.
- 5.4.34 Some submitters also expressed frustration that the duration of the exhibition period. The Department notes that the EIS was intentionally placed on exhibition for an extended period of 42 days, rather than the standard statutory period of 28 days, in order to enable detailed consideration by the community. The Department also advised the HTBA that its members were welcome to provide supplementary comments in the weeks following the conclusion of the exhibition period, to allow a more detailed review of the EIS, however no supplementary comments were received.

5.5 Submissions Report

- 5.5.1 Malabar submitted a Submissions Report responding to issues raised in agency advice and public submissions on 18 November 2019. The Submissions Report was published on the Department's website and copies were provided to relevant agencies for further comment.
- 5.5.2 A copy of the Submissions Report is provided in **Appendix C**.

6 Assessment

6.1 Key Assessment Issues

6.1.1 In assessing the merits of the Project, the Department has considered all the requirements of the EP&A Act and EP&A Regulation, and all relevant information including:

- the EIS accompanying the development application;
- current conditions of consent for the Drayton Mine;
- advice on the project received from the IESC and government agencies;
- public submissions;
- response to submissions and additional information provided by Malabar, including peer reviews of groundwater and subsidence assessments; and
- relevant environmental planning instruments, policies and guidelines.

6.1.2 The Department has assessed the full range of potential impacts of the project, but considers that the key assessment issues relate to water resources, biodiversity, subsidence, noise, air quality and greenhouse gas emissions, traffic and transport, visual impacts, social and economic impacts, land use compatibility and mine rehabilitation, as described in detail in **Sections 6.2 to 6.12** below. A summary of the Department's assessment of other issues is provided in **Table 6-21** in **Section 6.13**.

6.2 Water Resources

Groundwater Impacts

6.2.1 The EIS included a Groundwater Assessment (GA) prepared by HydroSimulations, which was peer reviewed by Dr Frans Kalf.

Local Hydrogeology and Water Licensing Framework

6.2.2 The target coal seams at the Maxwell Underground site are located with the Sydney Basin-North Coast Groundwater Source, which is regulated under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016* (NC Fractured Rock WSP).

6.2.3 The Hunter River and its associated alluvium are located to the south of the underground mining area. The Hunter River alluvium falls partly within the Upstream Glennies Creek Management Zone under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (Hunter Unregulated WSP) and partly within Management Zone 1B under the *Water Sharing Plan for the Hunter Regulated River Water Source 2016* (Hunter Regulated WSP).

6.2.4 The mapped extent of the Hunter River alluvium is shown in **Figure 9** and reaches a thickness of up to 20 m. The thickest sequences of sand and gravel that occur along the alignment of the river are considered to be 'highly productive', while the thinner edges of the alluvium are considered 'less productive' land.

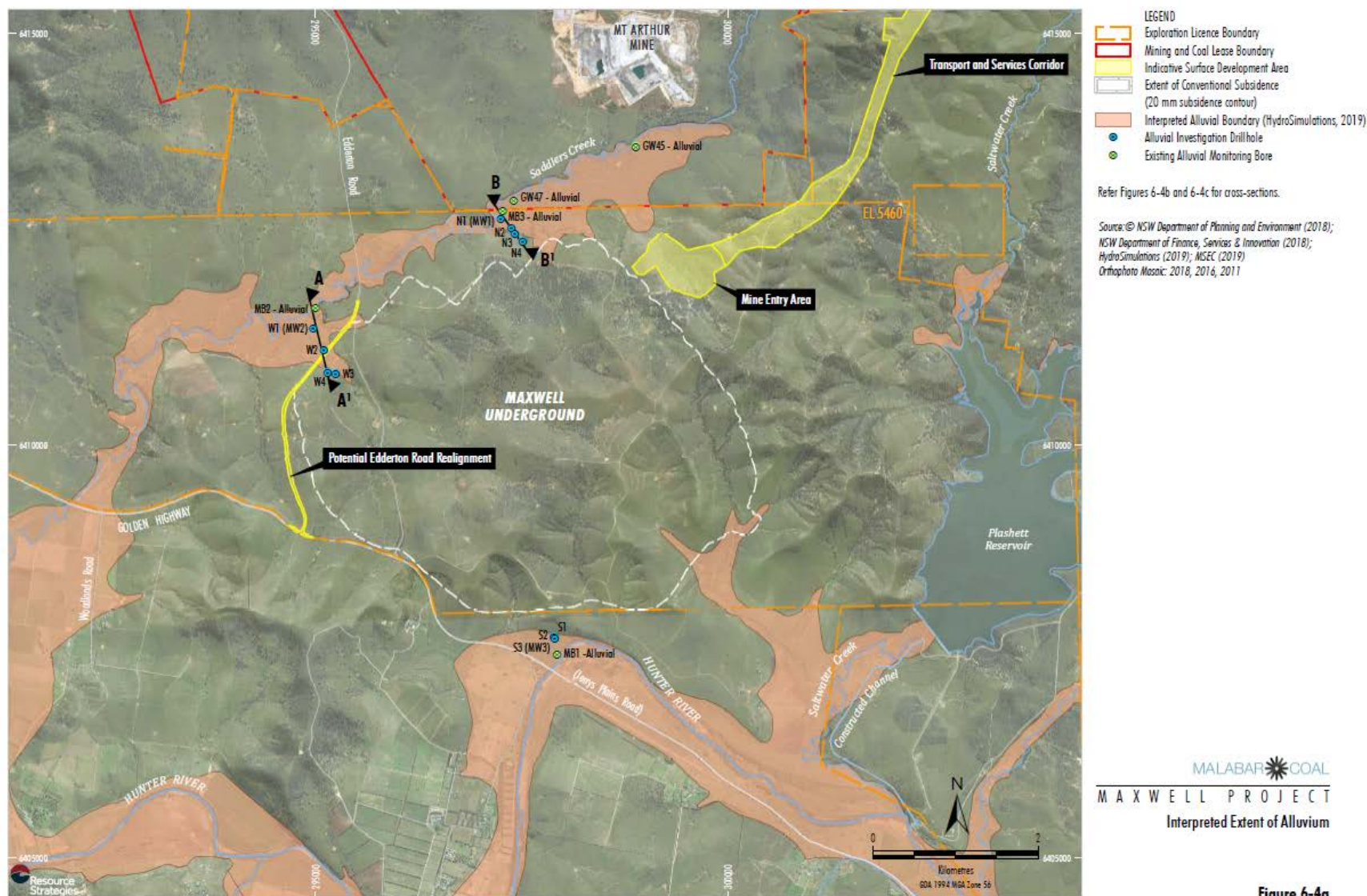


Figure 6-4a

Figure 9 | Mapped extent of alluvium – Maxwell Underground

- 6.2.5 Water quality within the Hunter River alluvium ranges from fresh to moderately saline, with total dissolved solid (TDS) concentrations of between 354 mg/L and 5,070 mg/L. Groundwater from the 'highly productive' alluvium can be used for irrigation, subject to salt tolerance, however, groundwater from the 'less productive' alluvium is considered unsuitable for irrigation.
- 6.2.6 The mapped extent of alluvium associated with Saddlers Creek, Saltwater Creek and their associated tributaries, is shown in **Figure 9**. The Saddlers Creek and Saltwater Creek alluvial groundwater sources are located in the Jerrys Management Zone of the Jerrys Water Source, which is also regulated under the Hunter Unregulated WSP.
- 6.2.7 While mapping undertaken by DPI in 2017 would indicate that the Saddlers Creek alluvium is 'highly productive', the GA undertaken for the Project has identified that the alluvium in the vicinity of the Project Area is typically moderately saline and low-yielding and therefore does not meet the definition of a 'highly productive' aquifer under the *NSW Aquifer Interference Policy* (AIP).¹³
- 6.2.8 The Permian coal measures within the underground mining area are classified as 'less productive' aquifers under the NC Fractured Rock WSP. Groundwater within the target coal seams is typically moderately saline.
- 6.2.9 The Maxwell Infrastructure site is located on boundary of the Sydney Basin-North Coast Groundwater Source and the New England Fold Belt Coast Groundwater Source. Both water sources are regulated under the NC Fractured Rock WSP.

Groundwater Model

- 6.2.10 In order to capture the full extent of potential groundwater impacts, the GA was prepared in consultation with a specialist geotechnical engineer (Ditton Geotechnical Services Pty Ltd) and incorporated conservative assessments for the height of mining-induced fracturing. In particular, the GA conservatively assumed that the maximum possible vertical subsidence, or 100 percent of total seam thickness, would occur.¹⁴
- 6.2.11 A regional groundwater model was developed to simulate the effects of underground mining over the life of the Project and during the post-mining recovery period. The GA simulated likely changes to hydraulic properties due to sub-surface fracturing using the 'stacked drain' method to simulate the progression of multi-seam mining. The model was calibrated using groundwater inflow data from initial underground mining at the neighbouring Mt Arthur Coal Complex.
- 6.2.12 The model considered the cumulative impacts of the Project, as well as historical activity at the former Drayton Mine and approved open cut and underground mining operations at the Mt Arthur Coal Complex. While the GA considered groundwater impacts associated with other mining operations in the wider locality (see **Table 2-2**), those operations were excluded from the model on the basis that no groundwater interactions are expected to occur.

¹³ Average total dissolved solid concentrations in the Saddlers Creek alluvium are approximately 3,400 mg/L and the long-term yield of local bores is less than 5 litres per second

¹⁴ The GA indicates that based on multi-seam mining data from similar operations, actual subsidence is more likely to range between 70 and 90 percent of total seam thickness

6.2.13 Sensitivity analysis was undertaken to test modelled assumptions with respect to hydraulic conductivity, coal seam drain conductance, recharge rates and the presence of dykes.¹⁵ The results of this sensitivity analysis are presented in the GA and are discussed later in this Section.

6.2.14 Dr Kalf's peer review concluded that the groundwater model is suitable and fit for purpose. While the IESC raised residual concerns regarding uncertainty in predicting subsidence and associated groundwater impacts during multi-seam mining, the Department notes that:

- a peer review of the Project's Subsidence Assessment concluded that it provides a conservative assessment of likely subsidence impacts (see **Section 6.3**);
- both the subsidence and groundwater models would be progressively updated and refined over the life of the Project; and
- the Department's recommended conditions provide for further refinement of the mine plan and for the adaptive management of unexpected subsidence and groundwater impacts.

Groundwater Inflows to Underground Workings

6.2.15 Groundwater inflows into the proposed underground workings are predicted to peak at 2.9 ML/day or 1,085 megalitres per year (ML/year) in Year 12 of the Project and average approximately 750 ML/year over the life of the Project (see **Figure 10**).

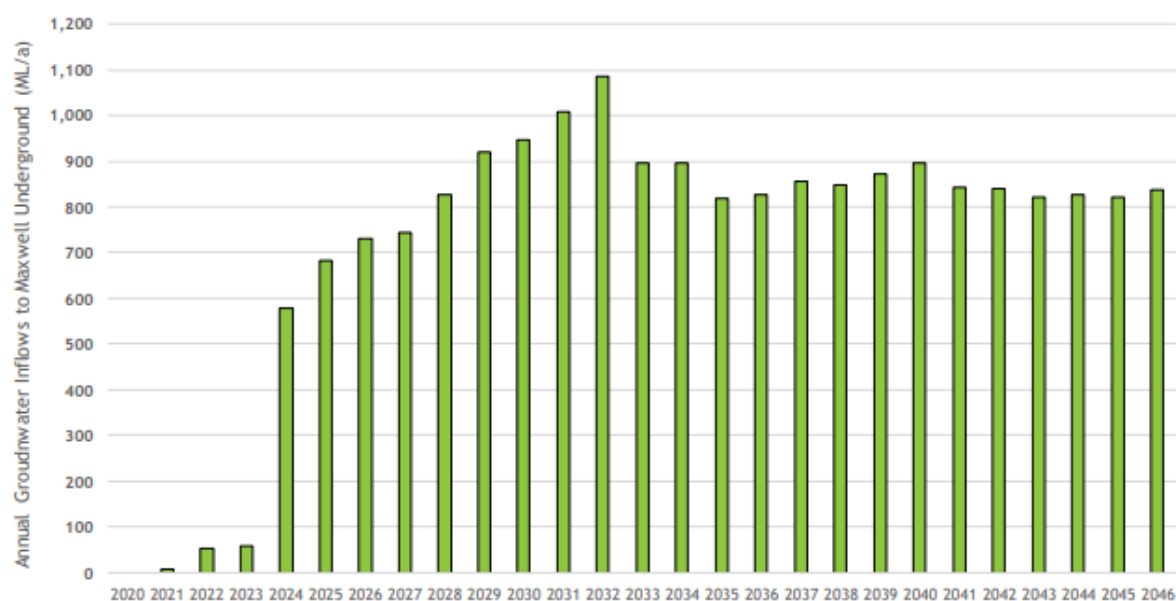


Figure 5.2 - Annual groundwater inflows - Maxwell Underground

Figure 10 | Predicted inflows to Maxwell Underground workings during mining operations

6.2.16 Groundwater inflows into the legacy open cut voids at the Maxwell Infrastructure site are predicted to peak at 11 ML/year and average approximately 3 ML/year over the life of the Project.¹⁶

¹⁵ The sensitivity analysis incorporated NARClIM projections, including a 16 percent increase and 13 percent reduction to average rainfall for the period between 2020 and 2039 and an 8 percent increase to average rainfall between 2060 and 2079

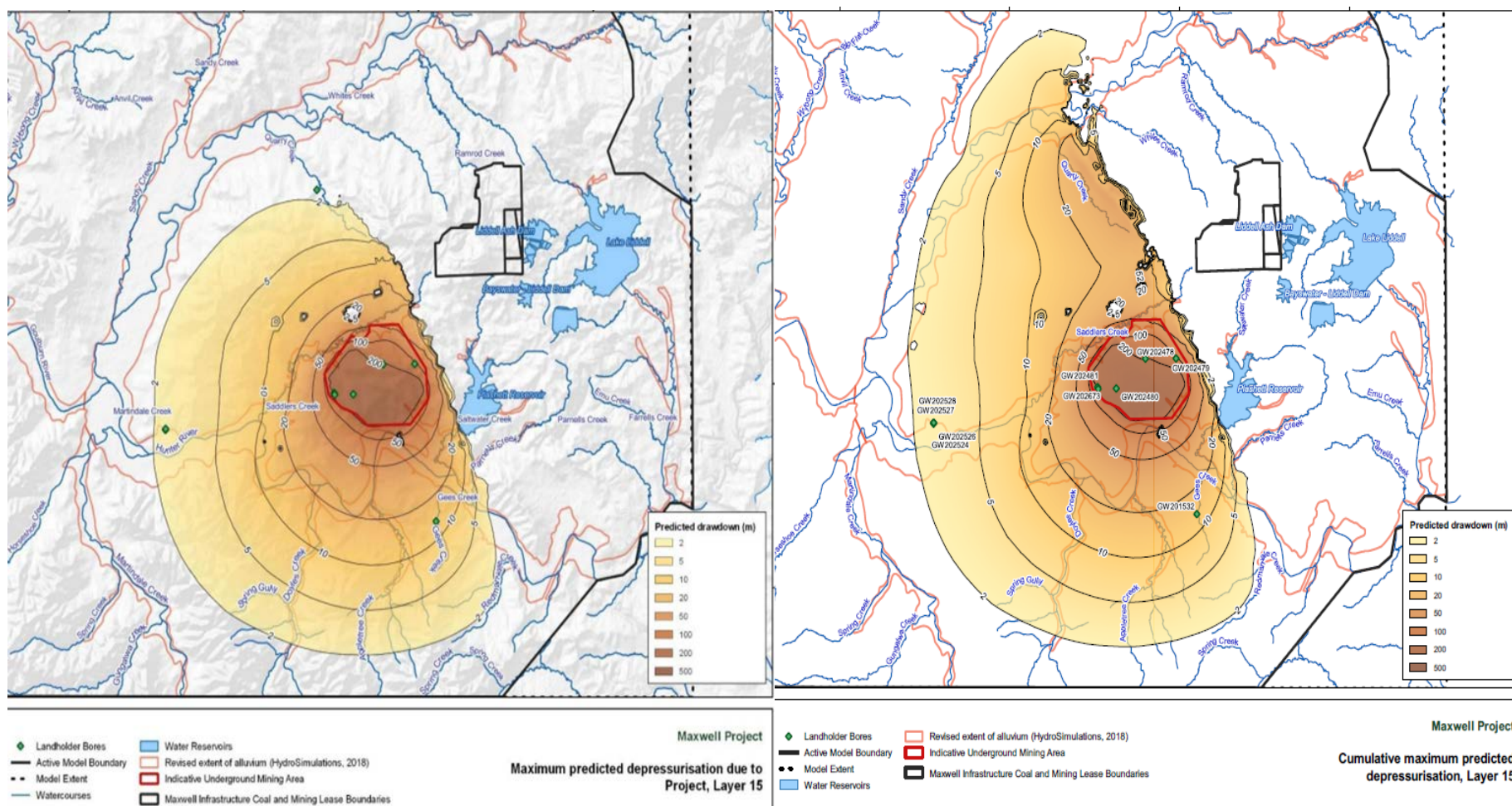
¹⁶ This does not account for 'internal' groundwater inflows which are discussed later in this Section.

Impacts on Permian Aquifers

- 6.2.17 The GA indicates that depressurisation of the Permian aquifers in the vicinity of the Maxwell Underground site would extend approximately 11 km from the underground mining area. Maximum cumulative predictions, incorporating adjacent operations at the Mt Arthur Coal Complex, are shown in **Figure 11**.
- 6.2.18 The Department notes that regional fractured rock groundwater systems have been extensively altered by approved mining operations in the locality. As these groundwater resources are of limited utility for agricultural operations and the zone of greatest depressurisation from the Project would occur beneath mine owned land and elevated ridgelines on surrounding private property, the Project is considered unlikely to significantly impact existing groundwater users.

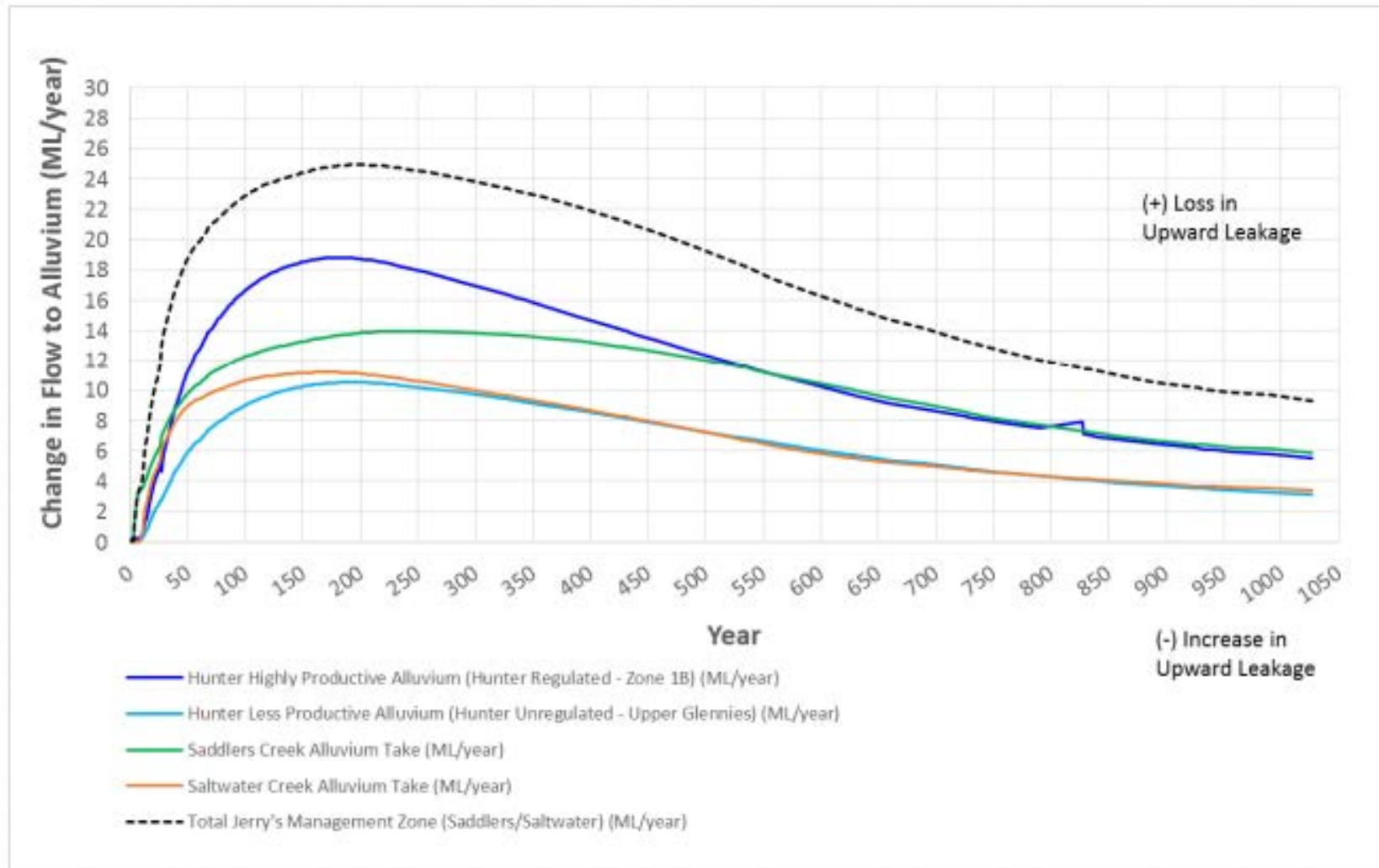
Impacts on Alluvial Aquifers

- 6.2.19 The establishment and dewatering of longwall panels is predicted to depressurise the surrounding Permian coal measures and reduce upward seepage to alluvial aquifers along the Hunter River, Saddlers Creek and Saltwater Creeks (see **Figure 12**). Impacts on alluvial aquifers are predicted to peak approximately 200 years post-mining and gradually reduce thereafter.
- 6.2.20 The reduction in upward seepage to the Hunter River alluvium is predicted to peak at around 5 ML/year during mining operations. The GA indicates that the reduction in seepage to the 'highly productive' Hunter River alluvium would peak at 19 ML/year around 175 years post-mining, after which time the reduction in upward seepage would reduce back to a level of under 6 ML/year by the end of the simulation. The GA indicates that this would result in less than 0.5 m drawdown within the Hunter River alluvium. The GA also indicates that recharge of the alluvium is primarily driven by regulated stream flows and rainfall infiltration. Consequently, the predicted decline in upward seepage is likely to have a negligible impact on the alluvium.
- 6.2.21 The combined reduction in seepage to the Saddlers Creek and Saltwater Creek alluvium is predicted to peak at 12 ML/year during mining operations (see **Figure 12**). In the post-mining phase, the reduction in seepage is predicted to peak at 25 ML/year and stabilise at 9 ML/year by the end of the simulation.
- 6.2.22 The GA predicted drawdown of up to 8 m in the Saddlers Creek alluvium and up to 4m in the Saltwater Creek alluvium. The maximum predicted drawdown would be expected to occur in two localised areas of the Saddlers Creek alluvium close to the proposed workings, as shown in **Figure 13**. Drawdown impacts would progressively increase for a period of around 250 years post mining, and reduce thereafter to lower drawdown rates in the long term (see **Figure 12**).
- 6.2.23 Predicted impacts on alluvial aquifers remained relatively consistent under the majority of modelled sensitivity scenarios, albeit where hydraulic conductivity was increased, the extent of depressurisation and associated groundwater take from the Hunter River alluvium increased by up to 90 ML/year. In its Submissions Report, Malabar noted that the hydraulic conductivity assumptions in the base case model for the Project are already based on conservative assumptions and as such, the sensitivity scenario is unlikely to eventuate. In any case, Malabar has also advised that it holds sufficient WALs to account for the higher water take if necessary.



Note: Groundwater bores GW202524, GW202526, GW202527, GW202528 and GW201532 shown above are used monitoring/test drilling purposes only

Figure 11 | Maximum predicted depressurisation – incremental (left) and cumulative (right)



*Note: Cumulative groundwater impacts are limited to Permian aquifers.
The predicted impacts on alluvial aquifers shown in the above figure are specific to the Project.*

Figure 12 | Predicted reduction in upward seepage to alluvium

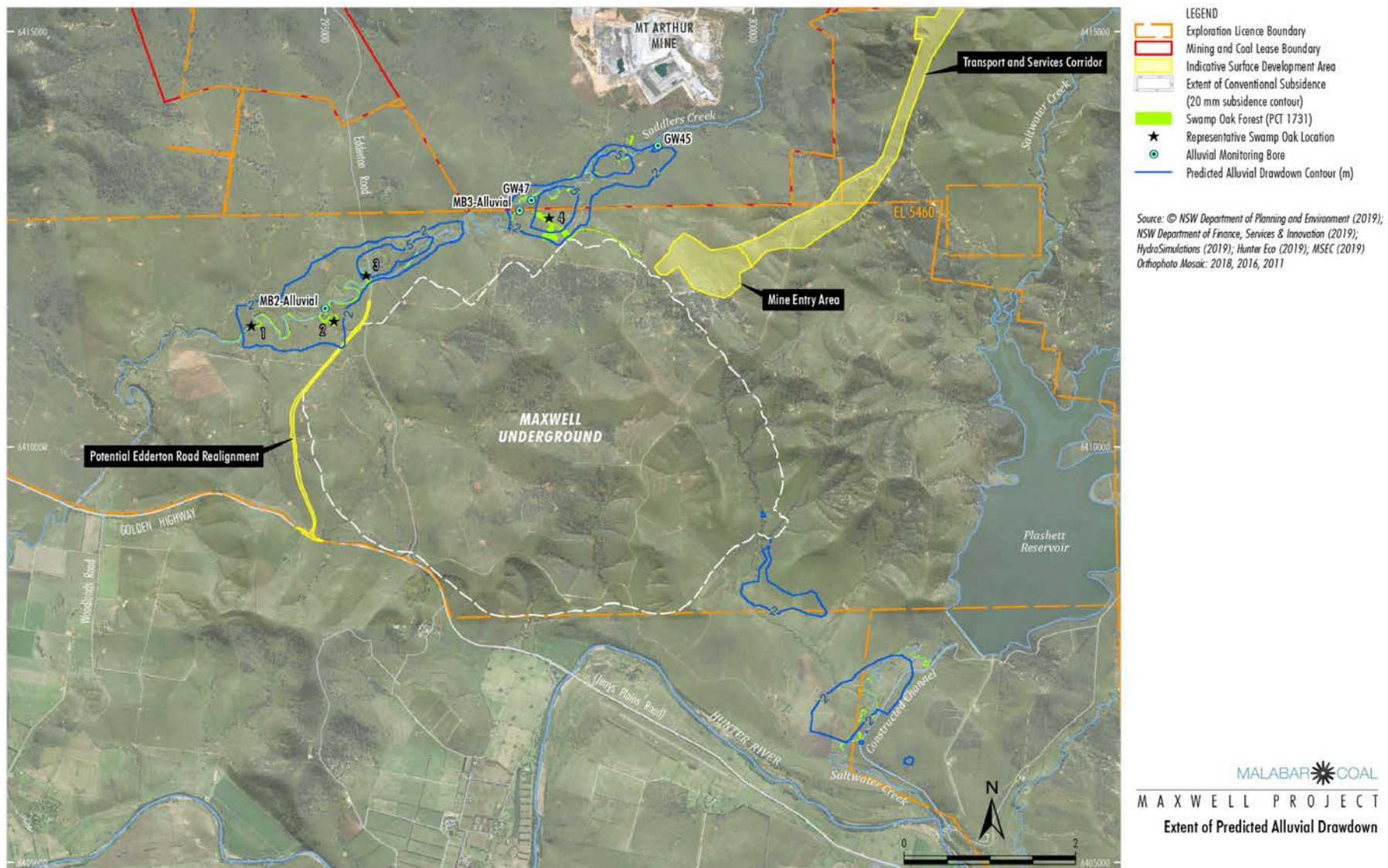


Figure 13 | Predicted alluvial drawdown and location of groundwater dependent ecosystems

Impacts on Baseflows

- 6.2.24 Predicted impacts on baseflows in the Hunter River and Saddlers Creek are shown in **Figure 12**. The GA did not predict any change baseflows to Saddlers Creek or Saltwater Creek.
- 6.2.25 The GA indicates that Saddlers Creek already exhibits natural losses in the vicinity of the Project Area. As such, while groundwater drawdown within the saturated alluvium is predicted, the GA indicates that there would be no reduction in baseflow to Saddlers Creek.
- 6.2.26 Baseflows to the Hunter River are predicted to decline by up to 0.55 ML/year in the post-mining period. For context, the nearest Hunter River gauging station has a median flow rate around 240 ML/day, with flows exceeding 1,000 ML/day about 16 percent of the time.
- 6.2.27 Given that flows down the Hunter River are regulated through upstream dam storages, such a minor reduction in baseflow is likely to have a negligible impact on river flow or water security for other water users.

Impacts on Private Groundwater Bores

- 6.2.28 Malabar carried out a bore census during the preparation of the EIS. Four nearby landowners participated in the census, however, several nearby landowners, including Coolmore and Godolphin, declined to participate in the census.
- 6.2.29 Of the groundwater bores located within a 10 km radius of the Project Area, 62 are used for groundwater monitoring and testing, 15 are registered groundwater bores owned by mining companies and 70 are classified as private registered groundwater bores. **Figure 14** shows the locations of private and mine-owned bores in the vicinity of the Maxwell Underground site.
- 6.2.30 The Project is predicted to result in drawdown of up to 2.3 m at one privately-owned stock watering bore (GW029660) to the northwest of the underground mining area (see **Figure 14**). The bore is approximately 75 m deep and has a water column of approximately 35 m. Predicted cumulative drawdown due to all mining operations in the area at GW029660 is 3.7 m, with drawdown expected to peak in the post-mining period. The GA notes that these predictions are conservative, as they do not account for the presence of intervening fault structures which would likely reduce drawdown impacts.
- 6.2.31 There are two additional privately-owned bores (GW029647 and GW029648) which are predicted to experience cumulative depressurisation of approximately 3 m. However, the GA indicates that these bores are already likely to be dry as the water table is located well below the base of each bore. Consequently, these bores are not identified in **Figure 14**.
- 6.2.32 Most of the remaining 67 privately-owned bores target water extraction from alluvial aquifers (as shown in **Figure 14**) and have been developed to shallower depths. While the predicted impacts for each individual bore has not been quantified, the GA indicates that drawdown at all 67 of these locations would experience less than 2 m of drawdown at all stages of the Project. Consequently, the Project is predicted to comply with the Level 1 minimal impact criteria under the AIP at all remaining privately-owned bores.

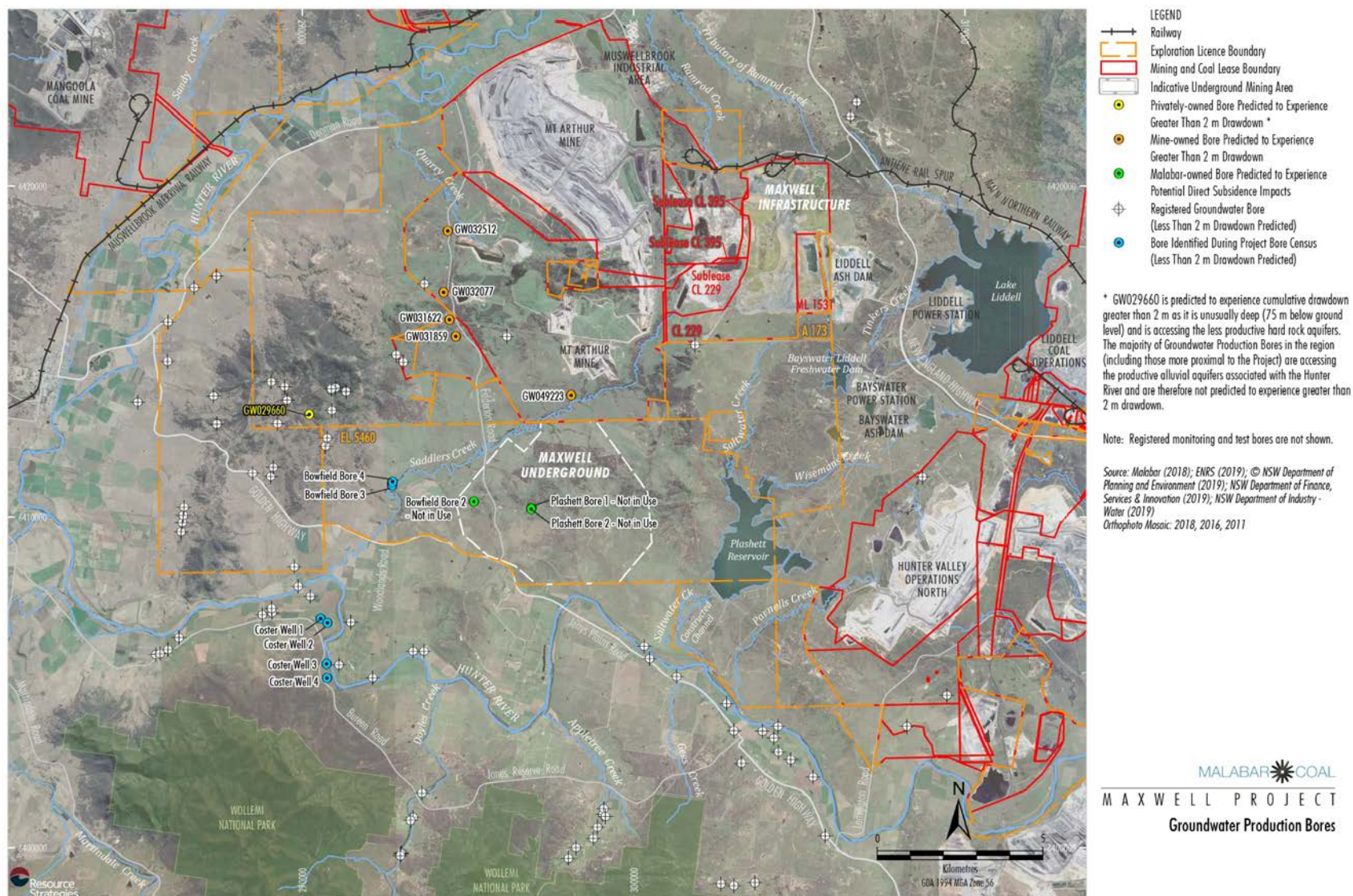


Figure 14 | Location of groundwater bores

- 6.2.33 Malabar has committed to monitor groundwater impacts at affected privately-owned bores over the life of the Project, and to consult with affected landowners regarding the implementation of 'make good' provisions, where the Project's impacts exceed the Level 1 minimal impact criteria under the AIP. Malabar has advised that in the event of a groundwater-related complaint from a private-landowner, Malabar would provide a temporary water supply while a detailed impact investigation is undertaken. The Department supports these commitments and has reflected this commitment in its recommended conditions.
- 6.2.34 With respect to mine-owned bores, more significant impacts are predicted at five stock watering bores within the Mt Arthur Coal Complex. Predicted drawdown at these bores ranges from 1.8 m to 13.5 m due to the Project alone. However, the Department notes that these bores are already substantially impacted by HVEC's own mining operations at the Complex and are located adjacent to existing open cut operations or above the approved Mount Arthur underground workings.

Impacts on Groundwater Quality

- 6.2.35 The GA indicates that the Project is likely to have a neutral or beneficial impact on groundwater quality in the vicinity of the Maxwell Underground site, as the underground mine workings are predicted to act as a permanent groundwater sink, and the resulting reduction in upward seepage of saline groundwater from the Permian aquifers is likely to improve water quality in the Hunter River and Saddlers Creek alluvium.

Groundwater Dependent Ecosystems (GDEs)

- 6.2.36 No 'high priority' GDEs would be impacted by the Project. Groundwater resources within the majority of the underground mining area occurs at depths of between 20 m to 70 m, meaning that terrestrial vegetation within the mining area and the adjacent stretches of the Hunter River, Saddlers Creek and Saltwater Creeks have a low potential for groundwater interaction.
- 6.2.37 Terrestrial vegetation along Saddlers Creek and Saltwater Creek and their associated tributaries consists primarily of Swamp Oak Forest (*Casuarina glauca*) and is limited to the stream edges and high banks (see **Figure 13**). The GA and BDAR indicated that Swamp Oak communities along the creek lines are Type 2 GDEs, which are unlikely to be significantly impacted by predicted drawdown within the alluvium.¹⁷
- 6.2.38 Following its review of the GA, the IESC recommended that Malabar provide additional evidence as to whether terrestrial vegetation within the predicted extent of drawdown is likely to be groundwater dependent and develop an ecohydrological conceptual model to illustrate potential impact pathways and likely ecological responses to predicted water quality and quantity changes within the Project Area and downstream. The IESC advised that this model should be used to inform a comprehensive risk assessment for the Project which considers cumulative impacts under a range of climatic scenarios and recommended that Malabar commit to undertake targeted ecological surveys to inform adaptive management.
- 6.2.39 With respect to the IESC's recommended modelling, the Department notes that the EIS included an Integrated Assessment of GDES, incorporating mapping of the depth of the water table and hydrographs of Swamp Oak Forest along Saddlers Creek. The GA and BDAR indicate that the

¹⁷ A Type 2 GDE is dependent on groundwater which reaches the ground surface, for example, through baseflows or upward seepage through the soil profile

approximate depth to groundwater along the Saddlers Creek alluvium ranges between 3 m and 10 m, and Swamp Oak trees along the creek lines may have a root depth of up to 4.5 m.

- 6.2.40 While it is therefore possible that some larger trees with deeper root systems could access groundwater within the deeper water table, the absence of trees beyond the high bank of the creeks indicates that it is more likely these trees rely primarily on intermittent stream flow and groundwater seepage along stream channels following rain events. On this basis, the GA and BDAR concluded that predicted drawdown in the Saddlers Creek and Saltwater Creek alluvium is unlikely to adversely impact Swamp Oak Forest along the creek lines.
- 6.2.41 On balance, the Department considers that risks to groundwater dependent vegetation in the vicinity of the Project Area are likely minimal. Nevertheless, the Department supports the IESC's recommendation for ongoing monitoring and adaptive management and has reflected this in the Department's recommended conditions.
- 6.2.42 The EIS also included an assessment of impacts on stygofauna within the Hunter River and Saddlers Creek alluvium. Given the negligible drawdown predicted within the Hunter River alluvium, impacts on stygofauna are predicted to be minimal. While localised drawdown of up to 8 m is predicted within the Saddlers Creek alluvium, the GA notes that stygofauna populations are mobile and the predicted reduction in salinity is likely to have a beneficial impact on the existing stygofauna environment. Impacts on stygofauna are discussed further in **Section 6.4**.

Surface Water

- 6.2.43 The EIS included a Surface Water Assessment (SWA) prepared by WRM Water & Environment, a Geomorphology Assessment (GmA) prepared by Fluvial Systems and an Environmental Geochemistry Assessment (EGA) prepared by Geo-Environmental Management Pty Ltd.

Local Hydrology and Water Licensing Framework

- 6.2.44 The Project Area is located within the catchment area for the Hunter River. The stretch of the Hunter River to the south of the Project Area is Management Zone 1B (Goulburn River Junction to Glennies Creek Junction) under the Hunter Regulated WSP.
- 6.2.45 The Maxwell Underground site drains to Saddlers Creek to the northwest and Saltwater Creek to the southeast. Saddlers Creek subsequently drains to the Hunter River to the southwest of the Project Area, while Saltwater Creek drains to the Hunter River downstream of AGL's Plashett Reservoir (see **Figure 15**).¹⁸
- 6.2.46 Median flows for the Hunter River in the vicinity of the Project Area are in the order of 240 ML/day, however much higher flows of more than 10,000 ML/day are known to occur.¹⁹ Water quality within the Hunter River generally meets ANZECC and ARMCANZ guidelines for irrigation, stock watering and aquatic ecosystem protection.

¹⁸ The Plashett Reservoir provides freshwater storage for the Bayswater Power Station and water supply for the Jerrys Plains township

¹⁹ Based on historical data between 1969 and 2019 at the nearest gauging station, approximately 9 km downstream of the Maxwell Underground site

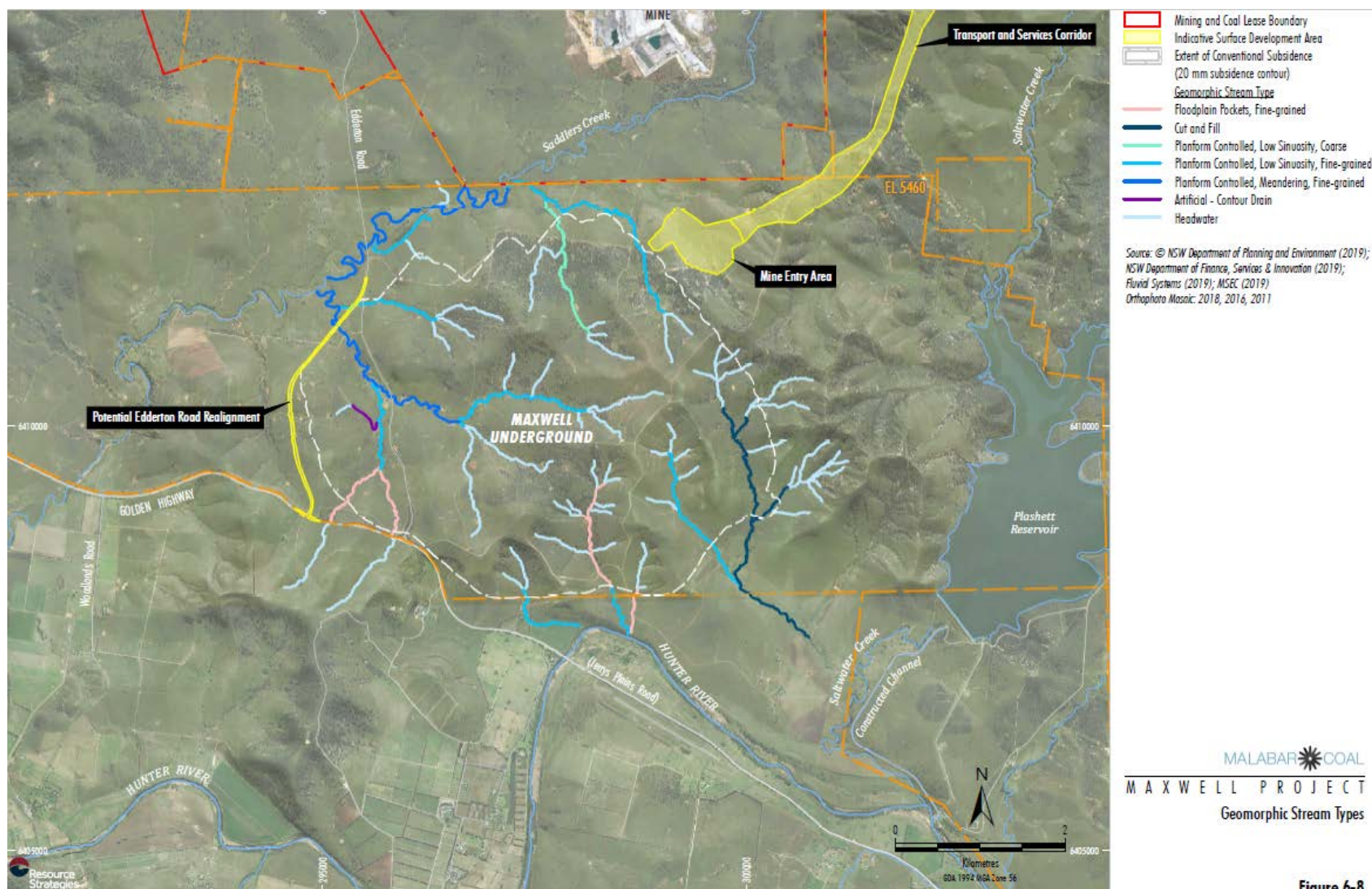


Figure 6-8

Figure 15 | Stream locations in the vicinity of Maxwell Underground site

- 6.2.47 Saddlers Creek has a defined bed ranging between 5 and 10 m wide. The SWA indicates that Saddlers Creek is typically dry, with recorded flows only occurring where daily rainfall exceeds 25 mm.²⁰ Recorded flows within Saddlers Creek are typically saline, with high concentrations of total dissolved solids and are generally unsuited to irrigation or stock watering.
- 6.2.48 Thirty unnamed drainage lines traverse the Maxwell Underground site (see **Figure 15**). Most of these streams are ephemeral with flows only occurring following storm events, however persistent flows may occur in two streams during wet years, when storm events follow in quick succession. The GmA indicates that the geomorphic condition of these streams is typically poor, with several streams exhibiting moderate gully erosion, frequent and substantial knickpoints and scant riparian vegetation.
- 6.2.49 Catchment areas in the vicinity of the Maxwell Infrastructure site have been substantially altered by previous mining operations. While areas that historically drained to the Bayswater, Saddlers and Saltwater Creeks no longer drain off-site, some areas of the Maxwell Infrastructure site still drain north to Ramrod Creek, which flows into the Hunter River, approximately 10 km northwest of the Project Area. Ramrod Creek is an ephemeral creek which has been significantly impacted by agricultural activity and exhibits significant erosion.

Impacts on Stream Flow

- 6.2.50 The construction of the proposed MEA would temporarily reduce the Saddlers Creek catchment by 38 ha for the duration of the Project life. This area would be reinstated as part of the rehabilitated final landform following the conclusion of mining.
- 6.2.51 The Project is not predicted to have any direct subsidence impacts on the Hunter River, Saddlers Creek or Saltwater Creek (see **Section 6.3**). However, the Project would undermine the unnamed tributaries that flow into Saddlers and Saltwater Creeks (see **Figure 15**). The majority of these tributaries are headwater streams, which are geomorphologically resilient and unlikely to be significantly altered by mining.
- 6.2.52 Subsidence-related cracking is predicted within the stream beds of these drainage lines are likely to result in surface cracks less than 100 mm wide, however in around 5 percent of cases these cracks may extend to more than 300 mm wide (see **Section 6.3**). Limited surface cracking of this nature is typical of underground mining operations and can be readily managed through monitoring and either naturally remediated over time through deposition or targeted remediation works. Overall, this cracking is predicted to have a negligible impact on stream flows during large storm events, however some loss of stream flow may be experienced in these tributary channels during periods of low flow.
- 6.2.53 Mining-induced tilts may also increase stream gradients and resulting flow velocities and increase the risk of scouring, erosion and changes to natural channel alignments. The GmA identified six streams which are predicted to experience an increase in mean stream power, with the largest predicted increase in the order of 19 percent. Under 95th percentile predictions,

²⁰ Historical records from 1956 to 1981 indicate that flows in Saddlers Creek were recorded approximately 55 percent of the time, however, monitoring undertaken by Malabar between September 2018 and April 2019 recorded only a single flow event, which likely reflects the substantial alterations to the upper reaches of the creek catchment and climatic changes which have occurred since 1981

increased stream power poses a risk of mining-induced channel instability in these six streams²¹ along with two additional streams²² that may be subject to channel realignment.

- 6.2.54 The GmA also indicates that the drainage lines overlying the underground mining area could become wider and deeper. While most of these subsidence-induced depressions would be less than 5 cm deep, cumulatively they have the potential to retain up to 32 ML of surface water. The most significant depressions are predicted to occur at two locations in the north and west of the underground mining area.²³ Ponding-related impacts on biodiversity at these locations have been assessed in **Section 6.4**.
- 6.2.55 Malabar has proposed a range of active and passive strategies to manage subsidence impacts on minor drainage lines within the underground mining area. Some lower risk in-channel subsidence areas would be allowed to naturally infill with sediment, while higher risk areas would be actively managed, include by infilling cracks and regrading stream beds. These management strategies are discussed further in **Section 6.3**
- 6.2.56 Following its review of the EIS, the IESC recommended that Malabar provide further analysis regarding subsidence-related surface water losses, including quantification of all water losses along Saddlers Creek and other waterways, with particular consideration of potential impacts on the number of low and zero-flow days in affected streams.
- 6.2.57 Rather than providing a quantification of these losses, Malabar stated in its response to the IESC that historical flow data collected on Saddlers Creek, downstream of the Project Area between 1956 and 1981 indicates that the creek is primarily fed by baseflows. As the Project is not predicted to have any material impact on baseflows to Saddlers Creek, Malabar has contended that any surface water losses within the underground mining area are unlikely to alter the number of low and zero-flow days in the creek (see **Appendix D**).
- 6.2.58 Having carefully reviewed the SWA, GA and Malabar's response to the IESC, the Department notes that while historical data may indicate that mining induced surface water losses would not significant alter the low or zero-flow regime in Saddlers Creek, the collection of contemporary stream gauge data would assist in quantifying any changes in stream flows and inform a Trigger Action Response Plan to respond to or rectify any measured increase in low flow days.
- 6.2.59 Consequently, the Department has recommended conditions would require Malabar to install monitors to obtain detailed baseline data, including flow data, for Saddlers Creek and Saltwater Creek and any other streams which may be impacted by the Project. The Department notes that Malabar has already installed a continuous gauging station on Saddlers Creek which is expected to contribute to this ongoing monitoring.
- 6.2.60 Malabar would be required to report on the result of this monitoring network and any changes to stream flows in its Annual Reviews and obtain the necessary licences for all water take.
- 6.2.61 On this basis, the Department considers that impacts on stream flow can be appropriately monitored, mitigated and licensed under the recommended conditions.

²¹ These streams are identified as a3, c2(3), b1(2), a2(4), c2(2) and c1(2) in the GmA

²² These streams are identified as b2(2) and b3 in the GmA

²³ Associated with streams a3 and b2(2) in the GmA

Impacts on Water Quality

- 6.2.62 No controlled discharges from the Project Area are proposed, however there is potential for uncontrolled discharges of up to 30 ML from the Maxwell Infrastructure site to Ramrod Creek.²⁴ These discharges would only occur in the event that the existing Rail Loop Dam and Access Road Dam overflows during extreme rainfall events, with a one percent probability of occurrence in any year.
- 6.2.63 In response to IESC advice, WRM provided additional analysis of the impacts of potential overflow events on the downstream environment (see **Appendix D**). This analysis indicates that any mine-water affected discharges would be heavily diluted by surface water runoff from elsewhere in the Ramrod Creek catchment, and that the quality of discharges from the Maxwell Infrastructure Dams would be similar or better than baseline water quality in Ramrod Creek. WRM also noted Malabar can manage the risk of overflow by increasing pumping from the two dams in the event of significant rainfall.
- 6.2.64 The EPA noted that the modelled overflows from the Rail Loop Dam and Access Dam would be less saline than the receiving waters of Ramrod Creek. However, EPA advised that as Ramrod Creek is a tributary of the Hunter River, conditions should be imposed to ensure that any discharge or overflow from the dams is consistent with the Hunter River Salinity Trading Scheme. This recommendation is reflected in the Department's recommended conditions.
- 6.2.65 In addition to these low probability overflow events, if left unmanaged the subsidence induced impacts on the land overlying the underground area have the potential to result in offsite sediment transport. To address this risk to downstream water quality, Malabar has proposed a range of erosion and sedimentation control measures, which are discussed later in this Section.
- 6.2.66 As the Project would not extract water directly from the Hunter River and would not result in material impacts to the overall flows volumes or water quality in the Hunter River, no significant impacts are predicted to arise in relation to the quality or availability of surface water resources for private water users located downstream of the Project.
- 6.2.67 Subject to the implementation of Malabar's proposed mitigation and management measures, and the Department's recommended conditions, the residual impacts of the Project on surface water quality are predicted to be minor and manageable.

Flooding

- 6.2.68 The Project is considered unlikely to alter flood behaviour in the surrounding area, given that the maximum predicted extent of conventional subsidence impacts would remain entirely outside of the Probable Maximum Flood extent for both the Hunter River and Saddlers Creek. This is supported by the IESC's overall conclusion that the Project's impacts on current flood risks were not 'of material concern.'
- 6.2.69 Notwithstanding, BCD raised initial concerns regarding the Project's potential impacts on the flood immunity of Edderton Road, where it crosses Saddlers Creek (as discussed in **Section 5.3**). The Department notes that the existing causeway in this location is predicted to experience

²⁴ The Department notes that while the indicative water manage system schematic in **Figure 19** indicates that there is potential for additional dams to overflow to Saddlers Creek, no overflows from these dams were predicted to occur under any of the various climatic scenarios modelled in the SWA.

less than 20 mm of vertical subsidence due to the Project. Following its review of the Submissions Report, BCD advised that it was satisfied that the Project is unlikely to reduce the flood immunity of Edderton Road as a result of conventional subsidence.

- 6.2.70 In addition to this, Malabar has committed to upgrade the Saddler's Creek causeway to a 1 in 100-year design standard. This upgrade would be undertaken as part of the realignment of Edderton Road, prior to commencing extraction in the Arrowfield Seam (see **Section 6.3**).

Water Management and Site Water Balance

Water Management System

- 6.2.71 The SWA included a conceptual schematic of Malabar's proposed water management system for the Project, which would allow for integrated water management across the Project and two-way transfers of water between the MEA and Maxwell Infrastructure site (see **Figure 16**).
- 6.2.72 Four mine water storage dams already exist at the Maxwell Infrastructure site, being the Access Road Dam, the Industrial Dam, the Rail Loop Dam and the Savoy Dam. These dams have a combined storage capacity of 1,658 ML.
- 6.2.73 Three new mine water storage dams would be established at the MEA, including a 4 ML purpose-built dam to temporarily store approximately 0.52 ML of highly saline brine water generated each day by the newly proposed water treatment facility. Treated water from the facility would also be stored at the MEA and be re-used in underground operations.
- 6.2.74 Reject materials generated over the Project life would be emplaced in the East Void, while the North and South Voids would be utilised for storage of surplus water (see **Figure 16**).
- 6.2.75 Malabar's surface water management system would be progressively updated at five stages in the Project life, as rehabilitation of historical mining areas within the Maxwell Infrastructure site progresses. This would allow for the progressive diversion of clean surface water runoff around rehabilitated emplacement areas and into Ramrod Creek. The final stage, which would be established approximately 5 years prior to the conclusion of mining is shown in **Figure 17**.
- 6.2.76 Malabar is seeking flexibility to enter into a commercial water sharing arrangement with the Mt Arthur Mine and provide for the future beneficial reuse of water stored in the North Void (see **Figure 16**). Any water transfer infrastructure would be located within approved disturbance areas for the two mines and would be documented in their respective Mining Operations Plans under the Mining Lease.

Site Water Balance

- 6.2.77 The SWA included a comprehensive site water balance simulation that incorporated 129 years of climatic data across 103 modelled scenarios. Modelling was based on the five progressive stages of the surface water management system.
- 6.2.78 As discussed above, the predicted average groundwater inflows to the underground workings are approximately 750 ML/year. Annual surface water take is also expected to average around 1,600 ML/year, over each stage of the Project.

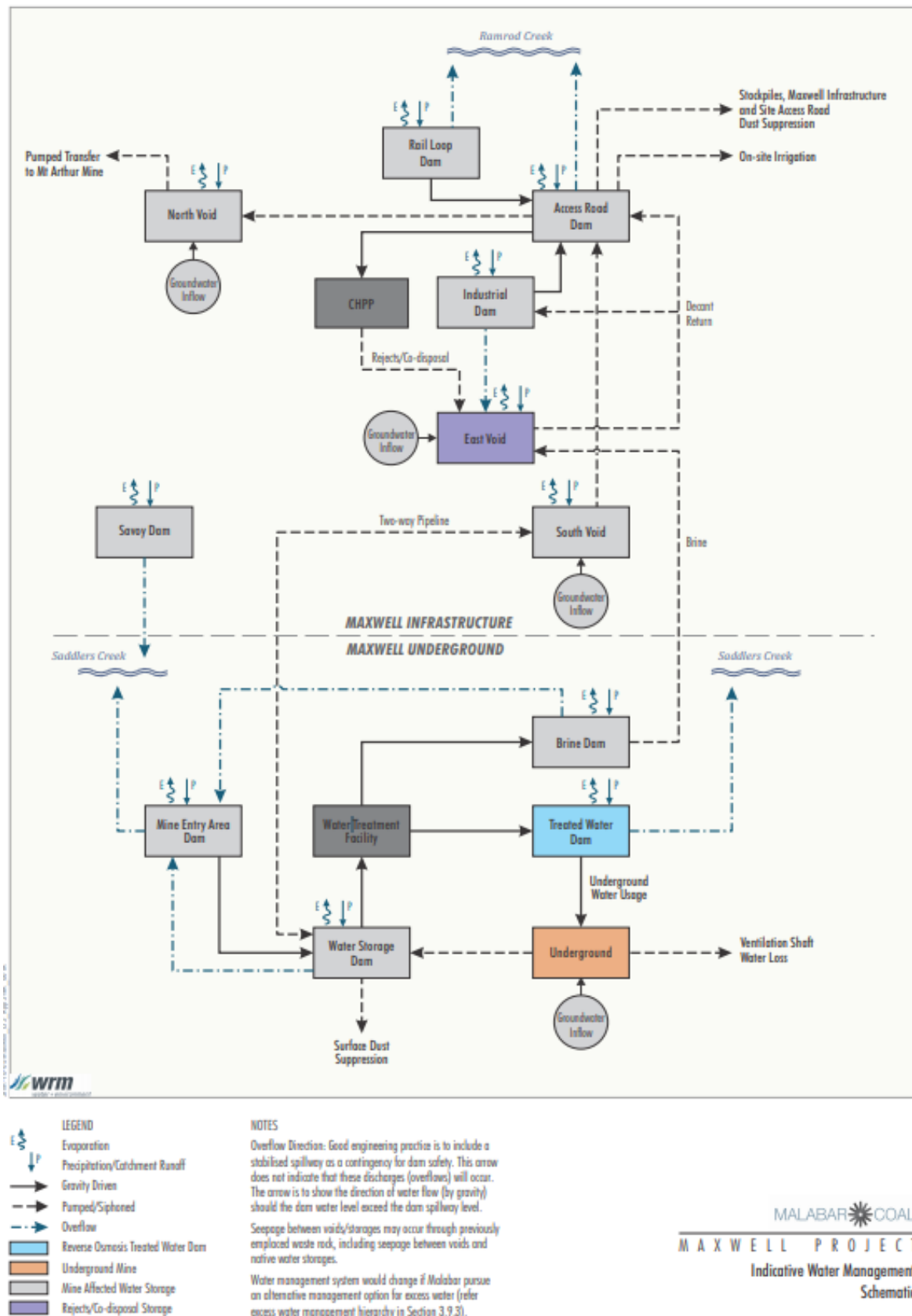


Figure 5.1

Figure 16 | Indicative water management system schematic

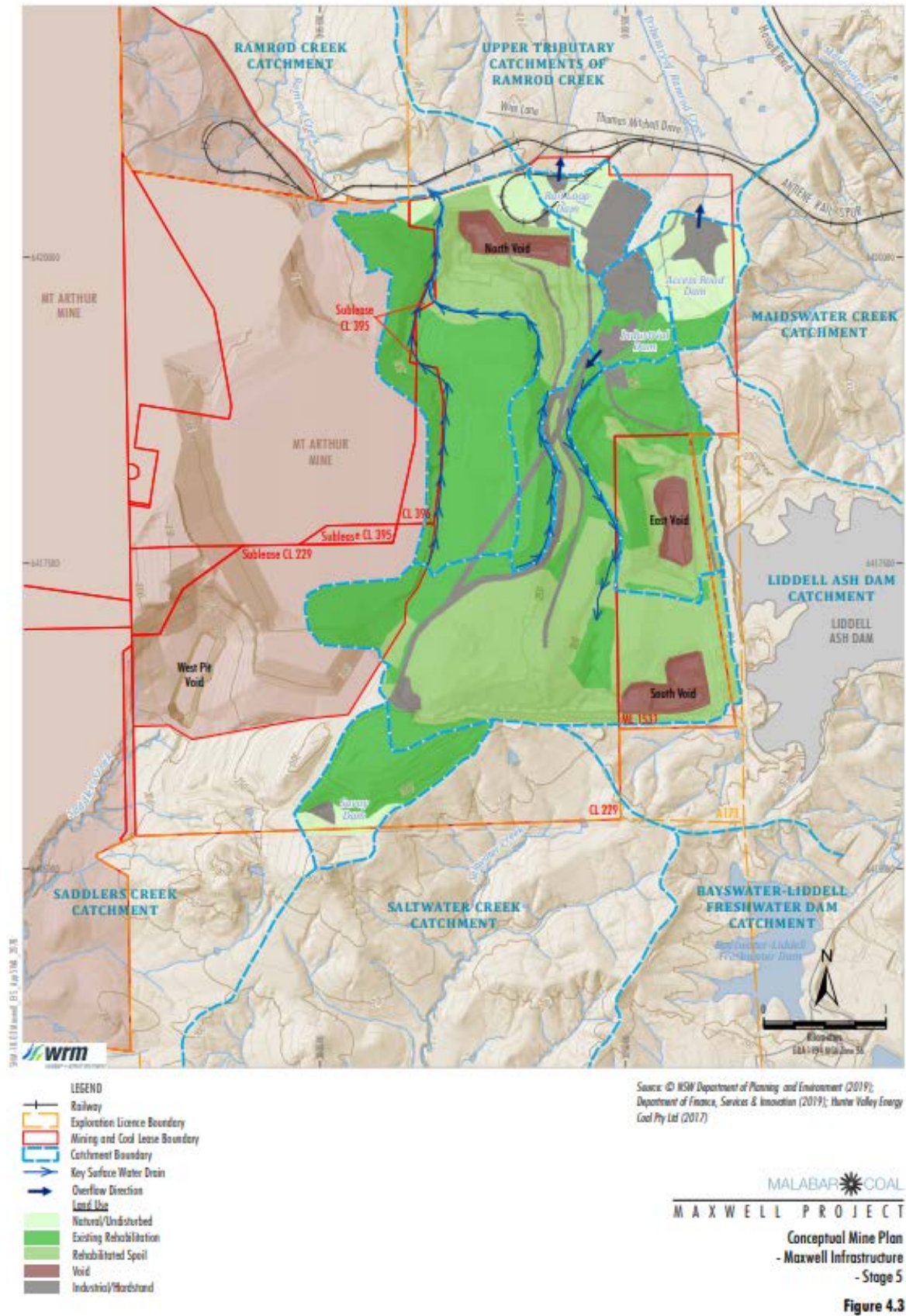


Figure 17 | Conceptual surface water management system - Maxwell Infrastructure (Stage 5)

- 6.2.79 The primary operational water demands for the Project include up to 1,704 ML/year for operation of the CHPP and up to 558 ML/year of water for underground operations. Water savings initiatives would allow for approximately 30 percent of moisture from tailings to be recovered and re-used at the CHPP and the proposed water treatment plant at the MEA would treat saline water recovered from dewatered mine workings to supply the underground operations.
- 6.2.80 Total operational water demands are expected to remain steady for the first 12 years of mining and decline substantially over the remaining Project life. The Project is predicted to experience an annual water surplus, even during very dry years, ranging between 341 and 1,091 ML.
- 6.2.81 Malabar has outlined a range of potential strategies for managing surplus water and expressed a preference for water sharing arrangements with the Mt Arthur Coal Complex or other industrial water users, including AGL. If these water sharing arrangements are unable to be reached, Malabar would seek to share treated water nearby agricultural operators, irrigate rehabilitation areas and Malabar-owned pasture lands or use evaporation cannons.
- 6.2.82 The Department considers that surplus water can be appropriately managed to ensure that there is sufficient water storage volume on site in advance on significant storm events and has recommended conditions that include performance measures in this regard.

Waste Management

- 6.2.83 In a similar manner to the former Dayton Mine, Malabar proposes to emplace CHPP reject material, including coarse rejects and tailings, in the East Void to a maximum height of 175 m AHD. This would result in the partial backfilling of the void (see **Figure 43** in **Section 6.12**). Decant water from emplaced material would drain to a sump and be re-used at the CHPP. As emplacement areas reach the final landform height, they would be progressively capped with inert material sourced from borrow pits within the Maxwell Infrastructure site and rehabilitated.
- 6.2.84 The GA included an analysis of tailings and leachate which would be generated by underground mining operations, drawing on monitoring data from the tailings dam at the Mt Arthur Complex. Decant water is typically slightly alkaline with a salinity level of approximately 5,000 µS/cm. Consistent with the recommendations in the EGA, Malabar has committed to design the reject emplacement areas to prevent oxidisation and migration of salts to the surface layer.
- 6.2.85 The proposed Brine Dam at the MEA would be designed with sufficient capacity for a 1 in 100 Annual Recurrence Interval, 72-hour storm event. Brine would be pumped to the Maxwell Infrastructure site, where it would be impounded in a storage cell within the East Void. Brine and CHPP reject material would be stored separately within the void.
- 6.2.86 Overall, the Department and the Resources Regulator consider this is a reasonable approach to managing reject material and brine on the site, and is similar to previous practices for the management of rejects and tailings material at the former Drayton Mine.

Water Management in the Final Landform

Groundwater Recovery

- 6.2.87 The GA modelled groundwater recovery over a 1000-year period following the conclusion of mining. The GA indicates that the underground workings at the Maxwell Underground site would

act as a permanent groundwater sink throughout the active mining and recovery periods, drawing in groundwater from the surrounding strata. **Figure 18** shows the recovery of the water table in the post-mining environment, including the cumulative recovery of water levels at the Maxwell Infrastructure site, Maxwell Underground site and the Mount Arthur Complex.

- 6.2.88 The final voids at the Maxwell Infrastructure site have a total water storage volume comprised of both the open void capacity, as well as the areas of porous backfilled spoil within each pit. Consequently, total groundwater inflows into these voids includes both external flows from the surrounding strata, as well as internal flows through the spoil between the three remaining voids.
- 6.2.89 Following an initial review of the EIS, the Department, the Resources Regulator and the IESC raised concerns regarding the risk of overflows from the South and East Voids and the potential impacts on the downstream environment.
- 6.2.90 Malabar subsequently advised that the predicted water levels in the final voids are conservative, based on 129 years of historical climate data and that no overflows were predicted at any time during the simulation period. To address the IESC's commentary on the potential impacts of climate change on modelled predictions, WRM undertook supplementary modelling based on a 'worst-case' climate scenario in which annual rainfall increases by 4.4 percent. This analysis concluded peak water levels in all three voids would increase by less than 0.5 m and still remain below the overflow level even under these conservative climatic conditions.
- 6.2.91 The characteristics of the final voids at the Maxwell Infrastructure site, as shown in **Table 6-1**, have been calculated based on simulated water levels in over a 400-year period.

Table 6-1 | Characteristics of final voids

Void	Depth (m)	Overflow Level (mAHD)	Overflows to	Equilibrium Water Level in 400 years (mAHD)	Predicted freeboard in void in 400 years (m)
East	25	175	Liddell Ash Dam	166	9
South	101	177	East Void	166	11
North	157	210	Ramrod Creek	166	44

- 6.2.92 As shown in **Figure 19**, the South Void water storage has an initial water level of around 172 m, which would reduce over time as water travels through the spoil to fill the East and North Voids and achieve a consistent water level between the three voids around 25 years post mining.
- 6.2.93 Water levels would continue to recover across the site as a whole, reaching a relatively stable level of 164 m AHD around 100 years post-mining. Despite periods of predicted climate variability, this final water level remains broadly consistent across the simulated model period, reaching a maximum long term equilibrium level of only 166 m AHD 400 years post-mining. Importantly, throughout the entire simulated period the maximum predicted water levels in each of the voids remained well below the potential overflow level to receiving environments

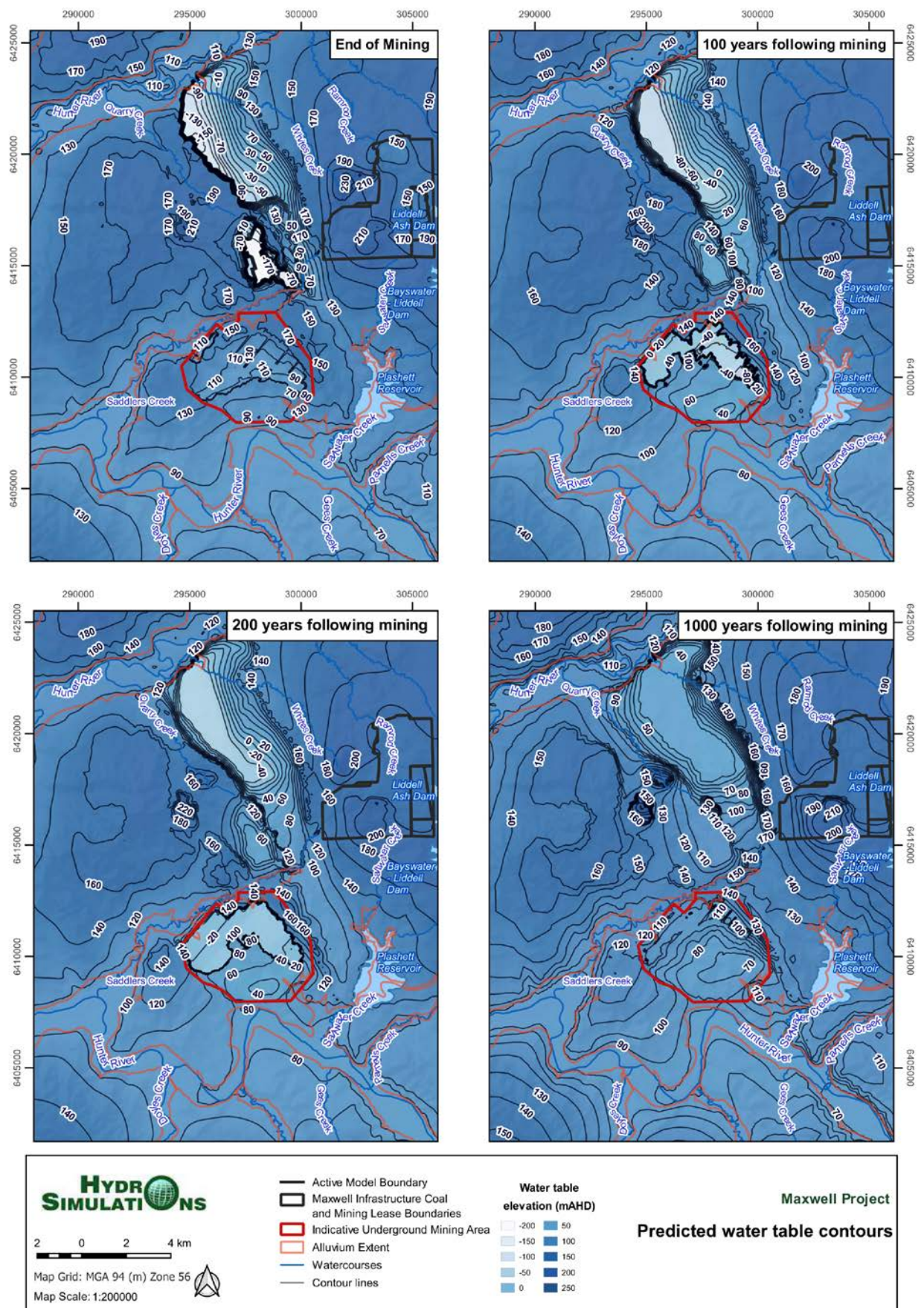


Figure 18 | Post-mining water table contours

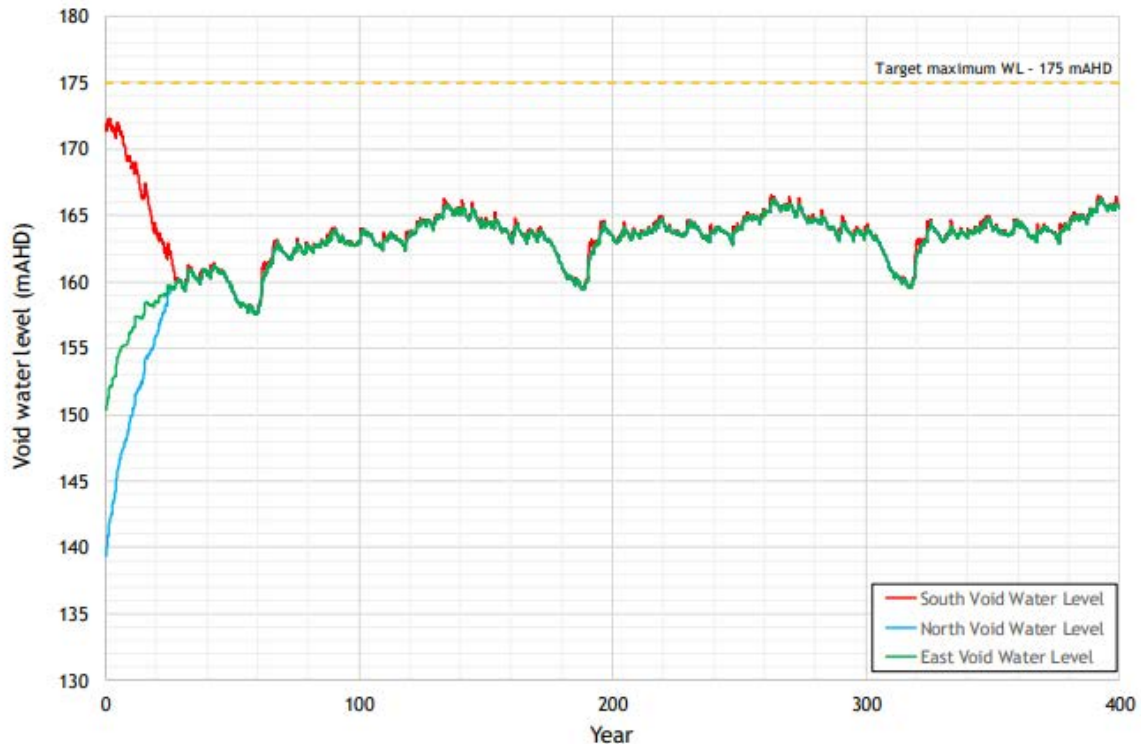


Figure 19 | Post-mining water levels in the final voids

- 6.2.94 The GA indicates that the three voids would act as permanent groundwater sinks and would be hydraulically connected due to the permeability of spoil underneath and between each of the voids. As the water table is lowest at the northern end of the Maxwell Infrastructure site, groundwater would be drawn towards the North Void.
- 6.2.95 While connectivity with the East Void is expected to progressively decline as it is backfilled with reject material, this void is still expected to maintain a slight downward gradient from the adjacent Liddell Ash Dam. Consequently, the GA indicates that the voids are unlikely to pose a long term risk to Permian groundwater systems outside of the Maxwell Infrastructure site.
- 6.2.96 Malabar's Submissions Report indicates that salinity levels in the East Void currently range between 7,520 and 8,870 $\mu\text{S}/\text{cm}$. As the final voids form a closed system, they are expected to become hyper-saline over time, reaching approximately 14,000 $\mu\text{S}/\text{cm}$ in 400 years. While no seepage from the East Void is expected, the GA indicates that the water quality within the void is likely to be comparable to that in the Liddell Ash Dam and surrounding regolith.
- 6.2.97 The Department notes that most of the above impacts would already eventuate as part of the existing approved final landform for the former Drayton Mine and considers that the EIS provides a conservative assessment of incremental and cumulative downstream environmental risks associated with the retention of these voids at the Maxwell Infrastructure site.
- 6.2.98 Nonetheless, the Department has recommended conditions to ensure that these impacts are appropriately managed over the life of the Project and in preparation for mine closure. In particular, the Department considers that there may be an opportunity to refine the proposed placement of reject material in the East Void to form a smaller, deeper pit lake. This would reduce the potential for surface evaporation and thereby reduce salinity within the void. The

Department's recommended conditions would require Malabar to consider options to optimise the design of the final voids and to minimise the risk of spillover or seepage from the voids as part of future Rehabilitation Management Plans for the Project, in consultation with the Resources Regulator.

Surface Water Catchments in the Final Landform

6.2.99 Catchment areas within the final landform are as shown in **Figure 17**. The South, North and East Voids would have a total catchment area of 445.6 ha, 181.6 ha and 168.4 ha, respectively.

6.2.100 The Department notes that no long-term changes to the Saddlers Creek, Saltwater Creek or Bayswater Creek catchments are proposed, beyond those already authorised under MP 06_0202. Approximately 249 ha of the Ramrod Creek catchment currently draining to the North Void would be restored by Stage 5 of the Project (see **Figure 17**).

Water Licensing

6.2.101 The EIS indicated that Malabar holds sufficient WALs for all water take associated with the Project (both during and post-mining), except with respect to the Sydney Basin-North Coast Groundwater Source under the NC Fractured Rock WSP. Malabar committed to progressively acquire the balance of those entitlements following the determination of the Project.

6.2.102 Having considered the assessment contained in the EIS, DPIE Water identified that Malabar had not adequately considered licensing requirements for the three legacy voids at the Maxwell Infrastructure site. In particular, DPIE Water expressed concern that the Malabar had only accounted for 'external inflows' and had not assessed the licensing requirements of 'internal flows' associated with seepage of groundwater between the spoil and final void lakes.

6.2.103 DPIE Water's advice had substantial implications for the licensing of the Maxwell Infrastructure site. While external flows are considered to be relatively minor in terms of volume, averaging at 3 ML/year and reaching a maximum of up to 11 ML/year, internal flows through the backfilled spoil between aquifers would increase the total groundwater inflows to around 766 ML/year.

6.2.104 In response to this advice Malabar acknowledged that groundwater take within the final voids should be appropriately licensed, but contested that this should be restricted to active take (eg pumping of water from the voids) that would increase groundwater inflows and that passive flows within the in-pit spoil should not need to be licensed.

6.2.105 Notwithstanding its position in relation to this matter, in August 2020, Malabar advised that it had secured the balance of WALs (ie an additional 800 ML/year) that had been identified by DPIE Water as being required to account for the projected take for the Sydney Basin-North Coast Groundwater Source under the NC Fractured Rock WSP. This includes both external and internal groundwater inflows to the Maxwell Infrastructure voids and all proposed water take required to carry out the Project.

6.2.106 Following the purchase of these additional licenses, the Department is now satisfied that Malabar holds more than enough licenses to account for the water take across all stages of the Project. The Project's water licensing requirements are summarised in **Table 6-2**.

Table 6-2 | Project Water Licensing Requirements

Water Sharing Plan	Water Source	Maximum Predicted Annual Water Take (ML/year)		Entitlements Required for Project (units)	Current Malabar Entitlements (units)	Balance of Entitlements (units)
		During Project	Post-Mining			
<i>Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016</i> (NC Fractured Rock WSP)	Sydney Basin-North Coast Groundwater Source	1,085 (U)	-	846 ^b (U)	932 (U)	+86
		766 (I) ^a	-	<291 (I) ^a	527(I)	+236
	New England Fold Belt Coast Groundwater Source	-	-	<475 (I) ^a	860 (I)	+385
<i>Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009</i> (Hunter Unregulated WSP)	Upstream Glennies Creek Management Zone in the Hunter Regulated River Alluvial Water Source (Hunter River alluvium)	15	35	38	125	+87
	Jerrys Management Zone of Jerrys Water Source (Saddlers and Saltwater Creek alluvium)	12	25	25	50	+25
	Muswellbrook Water Source	-	-	-	207	+207
<i>Water Sharing Plan for the Hunter Regulated River Water Source 2016</i> (Hunter Regulated WSP)	Management Zone 1A	-	-	-	925	+925
	Management Zone 1B (Hunter River alluvium)	5	19	55	198	+143

Notes:	(I) Infrastructure (U) Underground	^a Includes both external inflows and internal inflows from in-pit spoil, consistent with DPIE Water's interpretation of the AIP ^b Total assumes unused entitlements can be carried over into subsequent years.
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Mitigation and Monitoring

6.2.107 The Department's recommended conditions would require Malabar to develop an overarching Water Management Plan (WMP) for the Project, along with further detailed WMPs as a component of each future Extraction Plan for second workings. These plans would include a Groundwater Monitoring Program (GWMP) and Surface Water Monitoring Program and detail the adaptive water management practices to be implemented over the life of the Project.

Groundwater Management

6.2.108 The Department has also recommended conditions that would require Malabar to commission an independent peer review of the groundwater model every three years, compare ongoing monitoring results against modelled predictions and update its model as required.

6.2.109 The IESC recommended further analysis of a fault located near Saddlers Creek to determine whether it would material affect groundwater flow. The IESC advised that the findings of this analysis should be incorporated to future updates of the groundwater model. Malabar committed to undertake further hydraulic testing during the first three years of mining and incorporate the findings into the model, but noted that this feature was unlikely to influence the findings of the GA. This commitment has been reflected in the recommended conditions.

6.2.110 The GA included an overview of the proposed groundwater monitoring network for the Project, including the targeted use of daily water level loggers, including nine loggers within the Hunter River, Saddlers Creek and Saltwater Creek alluvium, supplemented by quarterly monitoring of water levels and quality at various other locations. Malabar has also committed to undertake shallow borehole monitoring of the Saddlers Creek alluvium near its confluence with the Hunter River, consistent with Dr Kalf's recommendations and the IESC's advice. This is reflected in the Department's recommended conditions.

6.2.111 The IESC recommended that Malabar commit to revegetation of riparian areas above the underground workings ahead of mining, in order to strengthen the resilience of stream ecosystems to subsidence impacts. This requirement has been reflected in the recommended conditions that would require Malabar to develop a riparian vegetation enhancement strategy as a component of future Extraction Plans.

6.2.112 The Department's recommended conditions also include strict performance measures for riparian ecosystems along Saddlers Creek, Saltwater Creek and the Hunter River.²⁵ Malabar would be required to monitor the condition of GDEs, including Swamp Oak Forest and stygofauna, and develop a Trigger Action Response Plan to respond to unexpected impacts.

6.2.113 In relation to impacts on private groundwater users, the recommended conditions require Malabar to provide appropriate make good provisions to the owners of any private bores which are directly and adversely impacted by the Project.²⁶

6.2.114 In the event of a complaint relating to a privately-owned bore which appears to have been adversely and directly impacted by the Project, Malabar has committed to facilitate the provision

²⁵ Recommended performance measures include negligible environmental consequences to riparian and aquatic ecosystems beyond those predicted in the EIS

²⁶ Make good provisions would apply to GW029660 and any other privately-owned bore where the cumulative impacts of the Project exceed Level 1 Minimal Impact Considerations under the AIP.

of a temporary water supply, pending the outcome of a groundwater investigation and/or the provision of an alternative long-term compensatory water supply. Further, the Department's recommended conditions stipulate that Malabar would hold responsibility for demonstrating that any loss of water supply is not due to mining impacts.

6.2.115 The recommended conditions would also require Malabar to regularly update its local bore census to establish benchmark data for water levels, yields and water quality, consistent with the advice of DPIE Water.

Surface Water Management

6.2.116 Malabar proposes to implement an adaptive management approach to subsidence-related impacts on minor drainage lines within the underground mining area. Malabar has committed to engage a qualified geomorphologist to:

- monitor the development and migration of knickpoints and direct the installation of control structures where required; and
- monitor changes to stream alignment and direct the implementation of management measures, such as hard-lining of stream beds and banks, as needed.

6.2.117 Areas of ponding would be passively remediated, by allowing ponds to naturally infill with accumulated sediment.

6.2.118 The IESC advised that it supports the proposed remediation strategies outlined in the GmA, but recommended that triggers for active remediation of geomorphic and erosional impacts be clearly defined and justified in future SWMPs. The IESC also recommended that the Malabar monitor the effectiveness of active remediation measures to inform ongoing adaptive management processes. The Department has recommended conditions in this regard.

6.2.119 Malabar has also committed to stabilise an existing knickpoint identified within an unnamed drainage line in the underground mining area, consistent with the recommendations of the GmA and the IESC's advice.

6.2.120 Malabar initially proposed to monitor surface water quality at seven locations within the Project Area and six locations downstream, including Saddlers Creek, Saltwater Creek and Ramrod Creek. MSC recommended monitoring at three additional locations to monitor the quality of runoff from the underground mining area and transport and services corridor. Malabar subsequently committed to monitoring at each of the three additional locations. In particular, Malabar has committed to monitor stream health along Saddlers Creek on a quarterly basis.

6.2.121 Malabar has also committed to expand its water quality monitoring parameters to include molybdenum, selenium, antimony and arsenic, consistent with the recommendations of the EGA and the IESC.

6.2.122 Malabar has committed to prepare a Brine Management Plan, in consultation with the EPA. This would include detailed designs for the Brine Dam and include a program to monitor the potential risks associated with the storage, transfer and disposal of brine.

6.2.123 All of the above commitments are reflected in the Department's recommended conditions. The Department's recommended conditions also require Malabar to provide detailed plans and performance criteria for all key water management infrastructure, including tailings storage

facilities, and to provide detailed plans for the capping and rehabilitation of reject emplacement areas as part of its Rehabilitation Management Plan for the Project.

Water Licensing

6.2.124 The IESC advised that surface water losses associated with subsidence should be appropriately monitored, and all necessary licences obtained. DPIE Water has advised that all licenses required for the Project must be obtained prior to the relevant water take occurring.

6.2.125 The Department's recommended conditions require Malabar to ensure it has sufficient WALs at all stages of the Project and to report all water take on an annual basis.

Water Management in the Final Landform

6.2.126 The Department's recommended conditions would require Malabar to develop strategies to manage downstream environmental risks associated with spillover or seepage of saline water from the final voids as part of a detailed Rehabilitation Management Plan for the Project.

Conclusion

6.2.127 The Department has carefully considered the Project's potential impacts on water resources, having regard to expert advice provided by DPIE Water, the EPA and the IESC.

6.2.128 The Department considers that the Project is unlikely to have a significant impact on the quality or quantity of groundwater within the Hunter River alluvium, or substantially alter flow regimes or water quality within the Hunter River.

6.2.129 The Project is predicted to result in the depressurisation of Permian aquifers in the vicinity of underground mining area and this is expected to result in up to 8 m of drawdown in the Saddlers Creek alluvium and up to 4 m drawdown in the Saltwater Creek alluvium. Mining-induced subsidence also has the potential to result in significant geomorphological change to unnamed streams within the underground mining area, which may pose a risk to downstream water quality.

6.2.130 However, the Project's impacts are expected to be largely confined within groundwater sources and surface water catchments which have already been substantially altered by existing and approved mining operations, and which do not provide significant water supplies for domestic or agricultural use.

6.2.131 Furthermore, the Department considers that the water-related impacts of the Project can be adaptively managed and mitigated under recommended conditions. The Department also notes that all water take associated with the Project would be appropriately licensed and Malabar would be required to provide compensatory water supplies to any private bore owners significantly impacted by the Project.

6.2.132 Consequently, the Department considers that the Project's impacts on water resources are acceptable, subject to the implementation of the recommended conditions and the development of detailed management plans.

6.3 Subsidence

- 6.3.1 The EIS included a Subsidence Assessment (SA) prepared by MSEC Mine Subsidence Engineering Consultants. The EIS also included a peer review of the SA by Professor Bruce Hebblewhite.

Local Geology

- 6.3.2 As discussed in **Section 2.3**, the underground mining area contains a number of faults, dykes and dolerite sills. Malabar has indicated that these features are unlikely to impede mining operations, provided that suitable management measures, such as the use of support structures and grouting, are implemented as part of the underground operations.
- 6.3.3 While the presence of these geological features creates a degree of uncertainty regarding subsidence impacts, both the SA and Professor Hebblewhite's peer review indicate that any unexpected impacts associated with these features are likely to be localised and manageable. Ongoing geotechnical investigation over the life of the Project would also provide greater certainty regarding the extent and potential effects of these structures.

Subsidence Model

- 6.3.4 The SA applied the Incremental Profile Method (IPM), which has been developed by MSEC and draws on subsidence data from other underground coal mines in the Hunter Valley and Newcastle coal fields. Professor Hebblewhite's peer review notes that IPM is the most effective method of subsidence prediction in Australia.
- 6.3.5 That said, the SA acknowledges that there is limited multi-seam subsidence monitoring data from NSW coal mines and that subsidence predictions for multi-seam operations are more complex and less certain than single seam operations. To address this, the SA sought to adopt conservative measures to predict worst case cumulative subsidence impacts.
- 6.3.6 Professor Hebblewhite's peer review also recognised that there is a degree of uncertainty regarding the stability of partially extracted pillars in the Whynot Seam. However, Professor Hebblewhite ultimately concluded that the subsidence model provides an appropriate and conservative assessment of subsidence impacts, which can be refined following detailed mine design and ongoing geotechnical investigation.

Proposed Mine Plan

- 6.3.7 **Table 6-3** below identifies the depth of cover and proposed mining height in each of the four target coal seams.

Table 6-3 | Depth of Cover and Proposed Mining Height

Seam	Depth of Cover (m)	Mining Height (m)
Whynot	40 – 180 ^a	1.5 – 2.3

Woodlands Hill	125 - 365	2.1 – 3.5
Arrowfield	165 - 415	2.1 – 3.7
Bowfield	215 - 425	2.4 – 3.3

Notes:

^a Secondary extraction in the Whynot Seam would not occur where depth of cover is less than 50 m

6.3.8 At a width of approximately 300 m, the proposed longwalls are wider than those used at many underground coal mines in NSW. In considering this, the Department notes that the Project Area has fewer surface constraints than most underground mining projects. There are no buildings or named watercourses within the proposed mining area, and with the exception of the Edderton Road reserve, the entire Maxwell Underground site is owned by Malabar.

6.3.9 Panels with a width-to-depth ratio of more than 1.4 are considered 'supercritical', meaning that the maximum achievable vertical subsidence may occur when the panel is extracted. The width-to-depth ratios of the proposed mining panels are shown in **Table 6-4** below and demonstrate that all four seams may exhibit the full extent of vertical subsidence. The IPM developed by MSEC uses subsidence data from other coal mines, including those with width-to-depth ratios of more than 2.0, and has been used to calibrate the subsidence model for the Project.²⁷

Table 6-4 | Width-to-Depth Ratios of Proposed Mining Panels

Seam	Panel Width to Depth Ratio		Average Classification
	Range (m)	Average (m)	
Whynot	0.36 – 1.6	0.65	Supercritical
Woodlands Hill	0.88 – 2.4 0.84 – 1.5	1.2 ^a 1.1 ^b	Critical to Supercritical
Arrowfield	0.73 – 1.8	0.97	Critical to Supercritical
Bowfield	0.72 – 1.4	0.90	Critical to Supercritical

Notes:

^a Single seam mining – where longwalls do not overlap with bord and pillar panels in the Whynot Seam

^b Multi-seam mining – where longwalls overlaps with bord and pillar panels in the Whynot Seam

Predicted Subsidence Impacts

6.3.10 **Figures 23 and 24** show the total extent of predicted conventional subsidence that would arise from the Project and the total cumulative vertical subsidence predictions following the completion of extraction in the final Bowfield Seam. Any conventional subsidence beyond the areas shown in these figures predicted to be undetectable.

6.3.11 These figures demonstrate that except for the Edderton Road reserve, which would be relocated prior to longwall extraction in the Arrowfield Seam, the predicted conventional and vertical subsidence impacts of the Project would be entirely contained within Malabar owned land.

²⁷ Multi-seam mining operations with a similar or greater longwall width-to-depth ratio considered in the SA included North Wambo Underground Mine and Bulga Underground Mine (Blakefield South)

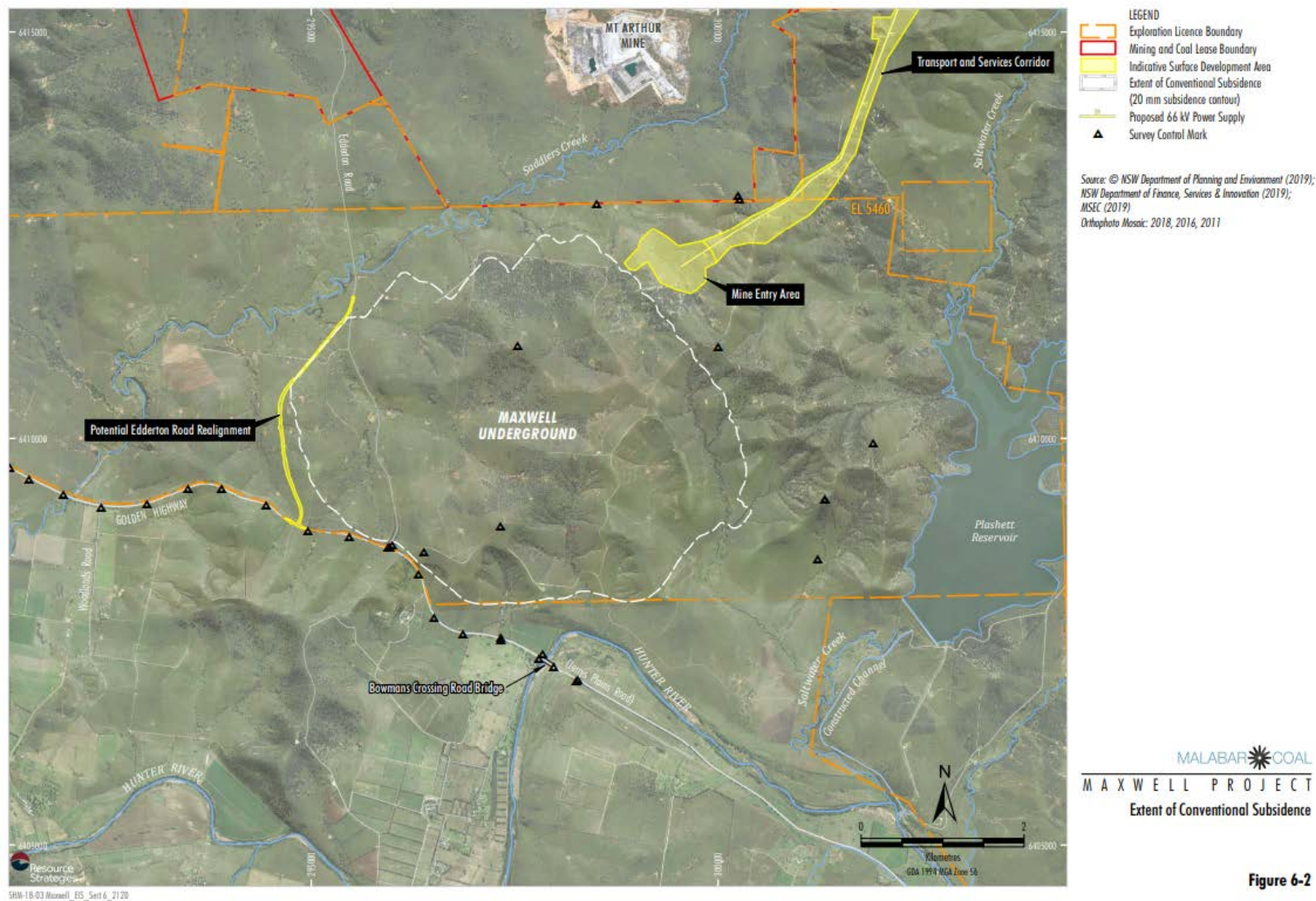


Figure 20 | Predicted extent of conventional subsidence

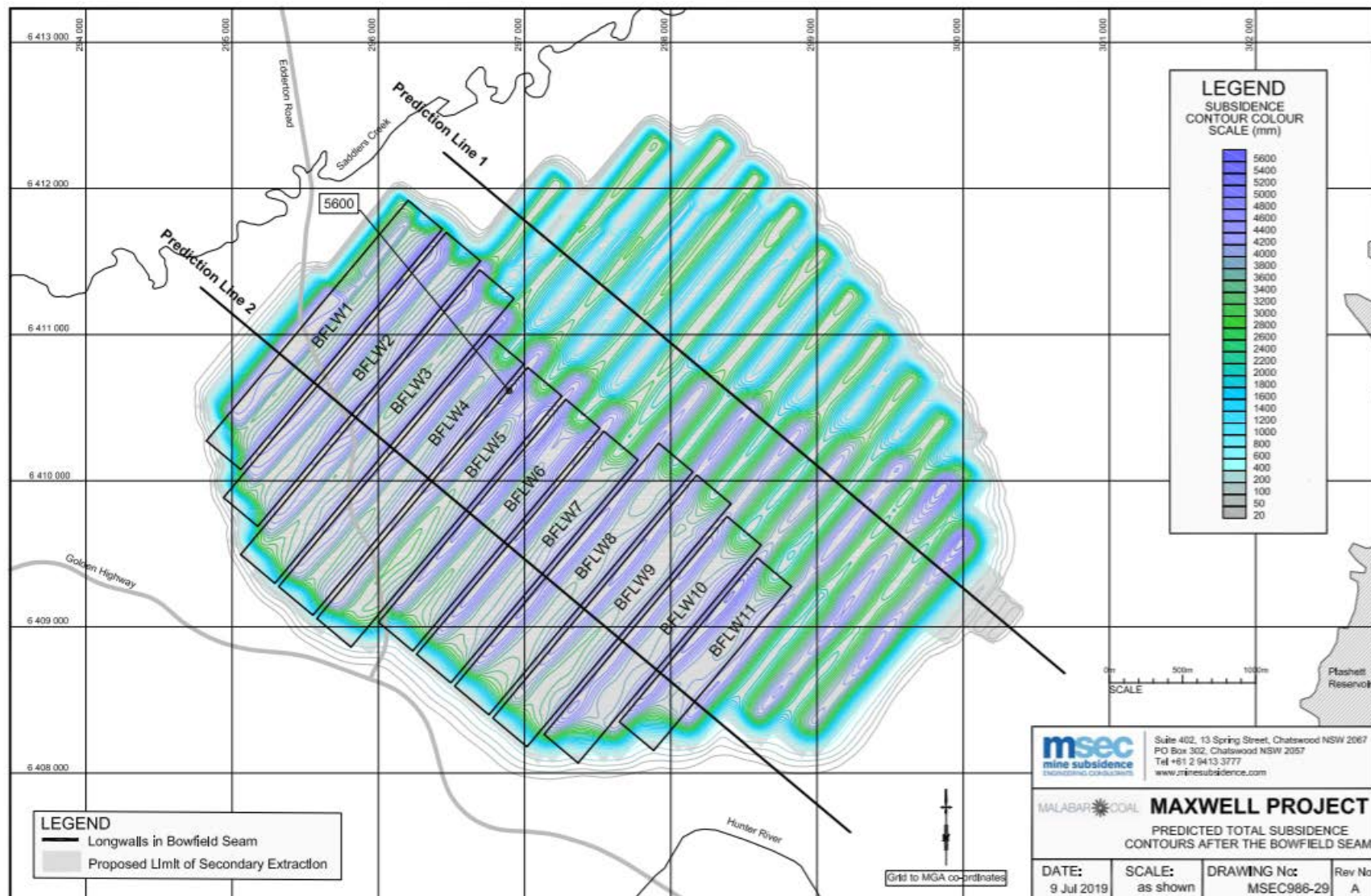


Figure 21 | Predicted total vertical subsidence contours following extraction of the Bowfield Seam

6.3.12 The maximum subsidence predictions for the progressive extraction of each target seam are shown in **Table 6-5**. These predictions are cumulative and represent the combined subsidence effects of associated with extraction in the target seam as well as overlying seams.

Table 6-5 | Maximum Cumulative Conventional Subsidence Predictions

Seam	Maximum vertical subsidence (mm)	Maximum tilt (mm)	Maximum hogging curvature (km ¹)	Maximum sagging curvature (km ¹)
Whynot	350	15	0.5	1.0
Woodlands Hill	3200	45	2.0	1.5
Arrowfield	5400	50	2.0	2.0
Bowfield	5600	50	2.0	2.0

6.3.13 In considering the cumulative subsidence impacts outlined in **Table 6-5**, the Department notes that **Figure 21** shows the maximum cumulative post-mining subsidence level of 5,600 mm as being focused towards the centre of the mine plan, where longwall extraction has occurred in each of the three deepest seams (see also **Figure 3** for the longwall layout). Significantly lower levels are predicted over the vast majority of the extraction area, with the lowest levels logically occurring toward the edges of the predicted extent of conventional subsidence.

6.3.14 In addition, the SA indicates that extraction of the target seams would generate strains generally ranging between 10 and 20 millimetres per metre (mm/m). The majority of surface cracking would be expected to remain relatively minor (ie under 100 mm wide), however selected areas of the site with steeper slopes and shallower depth of cover could develop cracks in excess of 300 mm wide.

Impacts on Natural Features

Impacts on Hunter River and Saddlers Creek

6.3.15 No measurable conventional subsidence impacts are predicted to occur for the Hunter River or Saddlers Creek (see **Figure 20**). At its closest point, longwall mining would be located more than 500 m from the centre-line of the Hunter River. The Hunter River and its associated alluvium are located completely outside the angles of draw for each of the four target coal seams.

6.3.16 Longwall mining in the Woodlands Hill seam would occur as close as 210 m from the high bank of Saddlers Creek, however the creek and its associated alluvium would also remain completely outside the angles of draw for mining in all four seams. Nevertheless, the SA indicates that very low levels of upsidence and valley closure (less than 20 mm) may occur within the Saddlers Creek channel. These effects are unlikely to cause fracturing in the bedrock underlying the creek and, if fracturing were to occur, the SA indicates that these impacts would not be expected to be visible at the surface due to the overlying alluvium.

Impacts on Minor Drainage Lines

- 6.3.17 Unnamed drainage lines within the underground mining area are predicted to experience subsidence impacts equal to or less than those outlined in **Table 6-5**. Tensile and compressive strains on these drainage lines are unlikely to exceed 8 mm/m and 9 mm/m, respectively, based on a 95 percentile confidence level model.
- 6.3.18 Subsidence impacts are expected to result in some localised areas of ponding within stream channels. Mining-induced tilts may also increase stream gradients and resulting flow velocities and increase the risk of scouring and erosion. The SA notes that this may require the implementation of erosion controls or the regrading of channel beds in affected areas.
- 6.3.19 The SA indicates that fracturing of the bedrock underlying stream channels is likely and this may also result in surface cracking in and around stream beds. The majority of surface cracks are likely to be less than 100 mm wide, however in approximately 5 percent of cases, cracks may occur in excess of 300 mm wide. In very rare cases (less than 1 percent), multiple cracks may lead to deformations over several metres.
- 6.3.20 The SA indicates that during periods of low rainfall, surface water flows could be diverted into the cracked and dilated rock strata below creek channels. These impacts would be remediated, either by infilling cracks or by regrading and recompacting affected stream beds.

Impacts on Land Stability and Capability

- 6.3.21 While there are no cliffs present within the proposed underground mining area, the mining area does contain some steep slopes ranging between 18 degrees and 26 degrees and isolated slopes of up to 47 degrees. These areas are primarily associated with unnamed drainage lines in the eastern and southern portions of the underground mining area. Tension cracks are expected to form along the top and sides of these slopes and, as curvature and strain causes downslope movement, compression ridges may form along the bottom of slopes.
- 6.3.22 Malabar has committed to engage a geotechnical engineer to undertake a detailed assessment of slope stability as part of future Extraction Plans. Malabar has also committed to undertake visual monitoring of steep slopes, remediate cracking and implement erosion controls where required, over the life of the Project.
- 6.3.23 Subject to the implementation of the proposed mitigation measures, the Project would not be expected to result in subsidence impacts greater than many other underground mines in the Hunter Valley that have been successfully managed or materially affect the long term land and soil capability classes present within the underground mining area or the agricultural productivity of this land (see also **Section 6.12**).

Impacts on Built Features

Impacts on Residences

- 6.3.24 There are no residences located within the predicted extent of conventional subsidence as shown in **Figure 20**. Consequently, the Project would not be expected to have any discernable subsidence impacts on private properties or structures. Notwithstanding, the potential for impacts on nearby historic homesteads is discussed further in **Section 6.12**.

Impacts on the Golden Highway

- 6.3.25 The proposed mine plan does not involve any secondary extraction within 150 m of the Golden Highway. Nevertheless, the Highway would still be partially located within the angle of draw for mining in the Bowfield Seam. Vertical subsidence in the vicinity of the Highway is predicted to be less than 20 mm at its closest point and no detectable tilts, curvatures or strains are predicted.
- 6.3.26 Further to this, the SA included an assessment of likely subsidence impacts on the Bowmans Crossing bridge, where the Highway crosses the Hunter River, approximately 800 m south of the underground mining area. Conventional subsidence impacts on the bridge are predicted to be negligible and, while very small far-field horizontal movements may occur, these movements are likely to be less than 7 mm and would generally be indistinguishable from natural movement.
- 6.3.27 Nonetheless, the SA recommended that an assessment of the bridge be undertaken by a structural engineer, in consultation with TfNSW, prior to undertaking any second workings within 1.2 km of the bridge. This is reflected in the Department's recommended conditions.

Impacts on Edderton Road

- 6.3.28 Maximum subsidence predictions for Edderton Road are shown in **Table 6-6** below. As extraction in the Whynot Seam would not undermine the road, subsidence impacts during bord and pillar extraction are predicted to be negligible. However, six of the longwalls (LWs 1 to 6) in Woodlands Hill, Arrowfield and Bowfield Seams would directly undermine Edderton Road.
- 6.3.29 The SA predicts up to 5100 mm of vertical subsidence and tilts of up to 45 mm/m along Edderton Road following the extraction of the Bowfield Seam. The SA also indicates that tensile and compressive strains directly above the longwalls would be expected to remain below 8mm/m and 9 mm/m, respectively (based on a 95 percentile confidence level model), but that tensile strains could reach up to 16 mm/m along Edderton Road.

Table 6-6 | Maximum Predicted Cumulative Conventional Subsidence Impacts on Edderton Road

Seam	Maximum vertical subsidence (mm)	Maximum tilt (mm/m)	Maximum hogging curvature (km ⁻¹)	Maximum sagging curvature (km ⁻¹)
Whynot	< 20	< 0.5	< 0.01	< 0.01
Woodlands Hill	2300	35	1.4	0.90
Arrowfield	4300	45	1.6	0.90
Bowfield	5100	45	1.6	0.90

*Note: Maximum values are shown in **bold** text*

- 6.3.30 The predicted maximum tilt (45 mm/m) would occur following the extraction of the Arrowfield Seam. This would equate to a 4.5 percent change in grade (1 in 22) and may result in cracking, heaving, stepping and localised areas of ponding along the affected length of Edderton Road (approximately 2.6 km). The greatest impacts would be expected to occur in the northwest of the underground mining area where the depth of cover is reduced.
- 6.3.31 The SA indicates that cracks in the road pavement would typically be less than 50 mm wide, but that isolated cracks could reach more than 300 mm wide. Similarly, any stepping in the road

pavement would typically be less than 50 mm high, with the potential for isolated steps to occur at heights of more than 100 mm.

- 6.3.32 Malabar has committed to ensure that Edderton Road remains safe and serviceable throughout the life of the Project. In the Project's EIS, Malabar sought flexibility to either realign Edderton Road to avoid the underground mining area (see **Figure 2**) or repair and maintain the road in its existing alignment.
- 6.3.33 The SA notes that subsidence impacts of a similar magnitude were successfully managed at Glencore's Bulga Complex near Singleton, during the undermining of public roads. This was achieved through a combination of visual monitoring and pavement repair during active subsidence. These repairs typically require temporary lane closures and speed restrictions.
- 6.3.34 The SA also indicates that while subsidence-induced pavement deformation typically occurs progressively, allowing maintenance to be planned outside of peak traffic times, rapid impacts may occur which require temporary repairs at short notice.
- 6.3.35 Following its review of the Submissions Report, MSC expressed a preference for the road to be realigned, on the basis that ongoing repairs of the road would create excessive disruption. The Department accepts MSC's view that the Project may have an adverse impact on the serviceability of the road in its current alignment. While these impacts would be temporary, given the importance of the road as a transport route for the Equine CIC, the Department considers that these impacts should be avoided if possible.
- 6.3.36 In response to these concerns, Malabar has committed to realign Edderton Road prior to commencing longwall mining in the Arrowfield Seam, which is expected to occur by 2032.
- 6.3.37 The Department considers that the proposed timing of the road realignment is reasonable, given the predicted cumulative impacts associated with mining of the shallower Whynot and Woodlands Hill Seams is significantly less than those predicted for the Arrowfield and Bowfield Seams (see **Table 6-6**).
- 6.3.38 Malabar has committed to undertake 24-hour monitoring of Edderton Road, with a road repair crew on stand-by, during the undermining of LWs 1 to 6 in the Woodlands Hill Seam. This would equate to approximately 10 weeks of monitoring and repair per longwall, over a two-year period.²⁸ Malabar would also publish advance notice in the local newspaper at least one month prior to undermining of the road and has indicated that any speed restrictions imposed during pavement repairs would result in no more than three minutes of increased travel time.
- 6.3.39 While MSC has not formally responded to Malabar's most recent commitments, the Department considers that Malabar's proposed approach to the management of Edderton Road is reasonable and appropriate. Consequently, the Department has reflected these commitments in its recommended conditions.

²⁸ Based on the indicative production schedule, this would occur between 2024 and 2025.

Impacts on other Infrastructure

- 6.3.40 An existing 11 kV powerline located within the Edderton Road reserve would be undermined by the Project and is predicted to experience maximum tilt in any direction of 50 mm/m and a horizontal movement of 500 mm at ground level or 1,250 mm at the top of power poles. This level of impacts may result in increased cable tension and lateral loads on the power poles.
- 6.3.41 Malabar has proposed mitigation measures to address these impacts, including the provision of cable rollers or installation of additional poles. Alternatively, the powerline may be realigned around the underground mining area, following the alternative Edderton Road alignment as shown in **Figure 2**.
- 6.3.42 The Department sought feedback from Ausgrid during its assessment of the Project, however no comments were provided. Notwithstanding, the Department notes that Ausgrid has previously indicated the ability to relocate powerlines of this nature in this locality and would need to be consulted regarding any treatment or relocation of this infrastructure during the underground operations.
- 6.3.43 The Maxwell Underground area is located approximately 2 km west of AGL's Plashett Reservoir. Vertical subsidence at the Reservoir is predicted to be negligible and far-field horizontal movements at the dam wall are likely to be less than 25 mm and remain undetectable. This conclusion was supported by Professor Hebblewhite's peer review, which noted that remote, far-field horizontal movements are typically associated with very low levels of strain, 'with negligible potential for any adverse impacts.'

Mitigation and Monitoring

- 6.3.44 The Department's recommended conditions impose subsidence impact performance measures for the Project. The recommended conditions would also require Malabar to prepare a detailed Subsidence Monitoring Program (SMP), WMP, Land Management Plan (LMP) and Built Features Management Plan (BFMP) as part of any future Extraction Plan for second workings.

Natural Features

- 6.3.45 The recommended performance measures would require Malabar to ensure that the Project has negligible subsidence impacts on Saddlers Creek and the Hunter River, and that impacts on unnamed watercourses within the mining area do not exceed predictions in the SA. These performance measures would also require that threatened species, populations or communities experience no greater subsidence impacts or environmental consequences than predicted in the BDAR and negligible impacts as a result of the remediation of subsidence cracking.
- 6.3.46 The SMP and WMP would include a detailed program to monitor and repair subsidence impacts on stream channels over the life of the Project. This would include the use of LiDAR surveys and annual visual inspections. In the event that the specified performance measures are exceeded, and it is not reasonable or feasible to remediate the impacts of the Project, Malabar would be required to demonstrate that it holds adequate water licences to account for surface water take and/or provide additional offsets in consultation with BCD and in accordance with the BC Act for any unforeseen impacts to threatened species, populations or communities.

6.3.47 Further to this, the LMP would detail mitigation and management measures for subsidence impacts on land stability and capability, informed by a detailed slope stability assessment.

Built Features

6.3.48 The Department's recommended performance measures would require Malabar to ensure that negligible subsidence impacts are experienced at nearby residences and historic homesteads. These performance measures would also ensure that all public infrastructure, including Edderton Road, the Golden Highway and affected transmission lines, remain safe and serviceable and that any damage to this infrastructure is fully repaired.

6.3.49 The Department's recommended conditions would require Malabar to complete the Edderton Road realignment prior to commencing secondary extraction in the Arrowfield Seam. Additionally, Malabar would be required to consult with key road users to ensure that any disruption is minimised to the greatest extent practicable.

6.3.50 Malabar would be required to prepare a BFMP in consultation with MSC, TfNSW and Ausgrid. The BFMP would need to include notification procedures, proposed remedial measures and clear commitments to repair or compensate for any damage to surface infrastructure within an agreed timeframe.

6.3.51 Finally, the recommended conditions would require Malabar to prepare an Exploration Activities and Minor Surface Infrastructure Management Plan, in consultation with infrastructure providers. This plan would manage impacts associated with any exploration activities associated with the ongoing management of the underground mine and ensure that these activities do not adversely affect key infrastructure in the locality.

Conclusion

6.3.52 The Department considers that the subsidence impacts of the Project have been appropriately assessed in the SA. The Department considers that Professor Hebblewhite's peer review provides added confidence in the robustness of the subsidence model and the conservatism of the subsidence predictions.

6.3.53 The Department considers that the most significant subsidence impacts of the Project would be avoided by the realignment of Edderton Road mid-way through the Project life. The Department is also of the view that the subsidence impacts of initial longwall mining can be appropriately managed, with minimal disruption to road users, until the realignment is completed.

6.3.54 In addition, the Department considers that predicted subsidence impacts on other key infrastructure, including the Golden Highway can be suitably managed under recommended conditions of consent and a detailed BFMP.

6.3.55 Furthermore, the Department considers that the subsidence impacts of the Project on the natural features of the underground mining area could be managed under a detailed WMP and LMP, to ensure that surface cracking is suitably repaired and the stability and capability of the site is maintained over the long-term.

6.3.56 Consequently, the Department is of the view that the subsidence impacts of the Project are acceptable and can be appropriately managed under recommended conditions which are consistent with the current regulatory approach for underground mines across NSW.

6.4 Biodiversity

- 6.4.1 The EIS included a BDAR prepared by Hunter Eco and an Aquatic Ecology and Stygofauna Assessment (AESAs) prepared by Ecological Australia.
- 6.4.2 The Project SEARs required the BDAR to be prepared in accordance with the BAM and relevant rules of the *NSW Biodiversity Offsets Scheme*. Contemporary flora and fauna surveys were conducted during the preparation of the BDAR between 2017 and 2019. The BDAR also drew on historical surveys undertaken in 2007, 2009, 2012 and 2015 in support of the previous Drayton South Coal Projects.

Existing Biodiversity Offset Requirements

- 6.4.3 MP 06_0202 requires the establishment of three biodiversity offset areas (see **Figure 25**, below) to mitigate the impacts of mining operations at the former Drayton Mine:
- the Drayton Wildlife Refuge, a 114 ha area of established woodland to the north of the Maxwell Infrastructure site;
 - the Northern Offset Area, a 12 ha area of established woodland in the northeast of the Maxwell Infrastructure site, adjacent to the Antiene Rail Spur; and
 - the Southern Offset Area, an 88 ha area of rehabilitated woodland and pasture to be established in the southwest of the Maxwell Infrastructure site, adjacent to the Mt Arthur Coal Complex.
- 6.4.4 Anglo American commenced planting within the Southern Offset Area in 2010, however vegetation establishment was affected by spontaneous combustion-related surface heating and further planting is needed to revegetate this area to properly rehabilitate this area and satisfy the offset obligations under MP 06_0202. Malabar has committed to undertake additional planting within the Southern Offset Area between 2020 and 2022 (see **Section 6.12**).
- 6.4.5 The Department's recommended conditions consolidate the requirements of MP 06_0202 into the development consent for the current Project, including securing these three offset areas. Malabar would therefore be required to continue to manage spontaneous combustion risks within the Project Area, monitor rehabilitated areas and where necessary, undertake further replanting, over the life of the Project (see **Appendix H**).

Impacts on Terrestrial Ecology

- 6.4.6 The Project Area has been extensively modified by previous mining operations and historical agricultural activity. The Project Area consists primarily of derived native grassland (DNG) used for grazing purposes, with scattered areas of remnant woodland.
- 6.4.7 Vegetation mapping of the Maxwell Underground and Maxwell Infrastructure sites is provided in **Figure 22** and **Figure 23**, respectively. **Table 6-7** summarises the Project's impacts on the various vegetation communities within the Project Area.

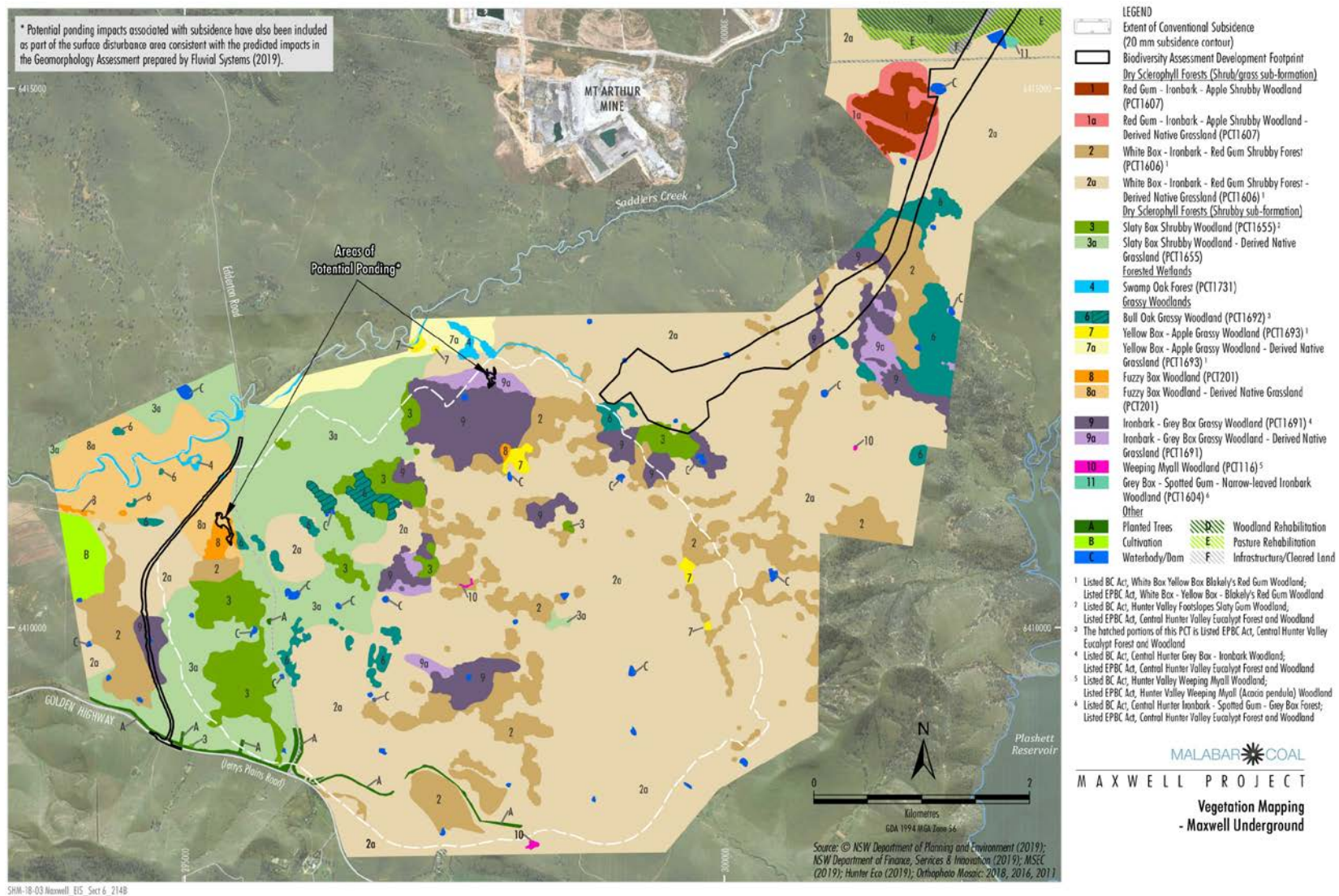


Figure 22 | Vegetation mapping - Maxwell Underground

Table 6-7 | Impacted vegetation communities

Plant Community Type (PCT)	Community Name	Form	Listing Status	Commensurate Ecological Community	Within Proposed Surface Disturbance Area (Ha)	Within Predicted Extent of Conventional Subsidence (Ha)
116	Weeping Myall Woodland	Woodland	CE – BC Act CE – EPBC Act	Hunter Weeping Myall Woodland in the Sydney Basin Bioregion (BC Act) <i>Hunter Valley Weeping Myall (Acacia pendula) Woodland</i> (EPBC Act)	-	0.4
201	Fuzzy Box Woodland	Woodland	-		0.5	7.7
201	Fuzzy Box Woodland	DNG	-		2.8	17.9
1604	Grey Box – Spotted Gum – Narrow-leaved Ironbark Woodland	Woodland	E – BC Act CE – EPBC Act	<i>Central Hunter Ironbark-Spotted Gum-Grey Box in the NSW North Coast and Sydney Basin Bioregions</i> (BC Act) <i>Central Hunter Valley Eucalypt Forest and Woodland</i> (EPBC Act)	1.3	-
1604	Pasture Rehabilitation	-	-		49.3	-
1604	Woodland Rehabilitation	-	-		15.2	-
1606	White Box – Ironbark – Red Gum Shrubby Forest	Woodland	CE – BC Act CE – EPBC Act	<i>White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions</i> (BC Act)	9.6	207.1
1606	White Box – Ironbark – Red Gum Shrubby Forest	DNG	CE – BC Act CE – EPBC Act	<i>White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i> (EPBC Act)	125.6	1,025
1607	Red Gum – Ironbark – Apple Shrubby Woodland	Woodland	-		0.4	-

1607	Red Gum – Ironbark – Apple Shrubby Woodland	DNG	-		4.9	-
1655	Slaty Box Shrubby Woodland	Woodland	V - BC Act CE – EPBC Act	<i>Hunter Valley Foothills Slaty Gum Woodland in the Sydney Basin Bioregion (BC Act) Central Hunter Valley Eucalypt Forest and Woodland (EPBC Act)</i>	1.2	103.8
1655	Slaty Box Shrubby Woodland	DNG	-		2.4	247.3
1691	Ironbark – Grey Box Grassy Woodland	Woodland	E – BC Act CE – EPBC Act	<i>Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (BC Act) Central Hunter Valley Eucalypt Forest and Woodland (EPBC Act)</i>	9.6	115.8
1691	Ironbark – Grey Box Grassy Woodland	DNG	-		0.3	17.3
1692	Bull Oak Grassy Woodland	Woodland	-		2.8	35
1693	Yellow Box – Apple Grassy Woodland	Woodland	-		-	7.4
1731	Swamp Oak Forest	Forest	-		0.2	<0.1
N/A	Planted Tree Screens		-		0.2	7.3
<i>V – Vulnerable E – Endangered CE – Critically Endangered</i>						

- 6.4.8 The total surface disturbance area for the Project (shown as the 'Biodiversity Assessment Development Footprint' in **Figures 25** and **26**) is approximately 311 ha and comprises:
- 26.6 ha of native woodland vegetation;
 - 136 ha of DNG vegetation;
 - 64.7 ha of rehabilitated woodland, pasture and planted trees; and
 - 94 ha of land that has been previously cleared for mining infrastructure.
- 6.4.9 The Project also has the potential to indirectly affect vegetation (at least to some extent) through subsidence impacts. The area predicted to be impacted by conventional subsidence impacts contains 1,784.7 ha of native vegetation, comprising 477.2 ha of woodland and 1,307.5 ha of DNG, along with 7.3 ha of planted trees.
- 6.4.10 As discussed in **Section 6.3**, the underground mining area is predicted to experience surface cracking ranging from 50 mm to more than 3 m in width. Minor drainage lines within the subsidence area are also predicted to widen and deepen, as discussed in **Section 6.2** and two areas of localised ponding may occur, as shown in **Figure 22**. Should works be required to remediate these impacts, some minor vegetation clearance may be required to remediate and rehabilitate these areas.
- 6.4.11 Minor surface infrastructure, such as service boreholes would also be constructed within the underground mining area. Any such infrastructure would require minimal surface disturbance and be located to avoid mature trees and fauna habitat. These works would be managed under an Exploration Activities and Minor Surface Infrastructure Management Plan (see **Appendix H**).
- 6.4.12 Other potential indirect biodiversity impacts resulting from the Project include vehicle strikes along the site access road, dust deposition, lighting impacts, the risk of introducing weeds and pests and increased bushfire risks.

Impacts on Endangered Ecological Communities (EECs)

- 6.4.13 The Project involves the clearance of up to 135.2 hectares of *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (Box Gum Woodland). This Box Gum Woodland is listed as a Critically Endangered Ecological Community (CEEC) under both the BC Act and the EPBC Act. Importantly, around 125 ha (ie 92%) of Box Gum Woodland proposed to be cleared is DNG and has been subject to livestock grazing for many decades.
- 6.4.14 The Project would also involve the clearance of 12.1 ha of *Central Hunter Valley Eucalypt Forest and Woodland* (Central Hunter Woodland). The woodland form of this community is listed as Endangered under the BC Act and Critically Endangered under the EPBC Act.
- 6.4.15 The predicted subsidence area also contains 1,239.5 ha of Box Gum Woodland and 231.6 ha of Central Hunter Woodland. One area of predicted ponding to the north of the underground mining area would impact both of these CEECs (see **Figure 22**). In addition, the subsidence area contains approximately 0.4 ha of *Hunter Valley Weeping Myall (Acacia pendula) Woodland*, which is listed as a CEEC under both the BC Act and EPBC Act.

6.4.16 BCD has advised that, subject to appropriate monitoring and remediation of surface cracking, it is unlikely that the CEECs located in these areas would be materially impacted by subsidence. However, BCD recommended that Malabar be required to monitor impacts on these CEECs and provide suitable additional offsets in the event that any unexpected impacts occur. This recommendation has been reflected in the Department's recommended conditions.

Impacts on GDEs

6.4.17 The proposed Edderton Road realignment would disturb approximately 0.2 ha of Swamp Oak Forest (PCT 1731), with the impacts of this clearing requiring an offset. An additional area of less than 0.1 ha of this PCT is located within the predicted subsidence area.

6.4.18 Potential groundwater drawdown impacts on the Swamp Oak Forest PCT growing along Saddlers Creek and Saltwater Creek is discussed in **Section 6.2**. The BDAR indicates that these areas of Swamp Oak are Type 2 GDEs but are not commensurate with any listed threatened species or ecological community under the BC Act or EPBC Act. The Department's recommended conditions would require Malabar to monitor, mitigate, and where necessary, offset the Project's impacts on these GDEs in consultation with BCD and in accordance with the BC Act.

Threatened Flora

6.4.19 No threatened flora species have been recorded within the proposed surface disturbance area during contemporary or historical surveys. However, *Cymbidium canaliculatum* and *Diuris tricolor* have been recorded within the predicted subsidence area (see **Figure 24**).²⁹ Both flora species are listed as 'endangered' under the BC Act.

6.4.20 In response to concerns raised by MSC (see **Section 5.3**), the Department requested that BCD undertake a further review of the flora survey methodology employed during the preparation of the BDAR. BCD subsequently advised that the contemporary flora surveys did not adhere to the specific requirements of the *NSW Guide to Surveying Threatened Plants* (OEH 2016),³⁰ which requires parallel field traverses of the Project Area, at spacings ranging between 5 and 40 m. BCD advised that the flora surveys previously undertaken by Hunter Eco were focused on a 7 ha area in which *Diuris tricolor* had previously been recorded, with meandering surveys undertaken throughout the remainder of the proposed surface disturbance area and areas containing potential habitat for threatened orchids.

6.4.21 BCD also expressed concern that the BDAR relied too heavily on historical surveys to limit the flora survey effort for the Project. On this basis, BCD concluded that flora surveys for 10 threatened species did not comply with the BAM and requested further information to inform its consideration of the Project. Following the provision of additional information by Malabar, BCD advised that it was satisfied that further survey efforts were not required for 3 species³¹ and revised the requested information on seven remaining flora species.

²⁹ *Diuris tricolor* was not detected during the contemporary flora surveys for the BDAR, however, it was previously identified during a 2015 survey

³⁰ The 2016 Guide was subsequently revised in 2020, but was in force at the time the surveys were conducted

³¹ BCD accepted that further surveys were not required for *Commersonia rosea*, *Lasiopetalum longistamineum* and *Monotaxis macrophylla*, on the basis that these species were unlikely to occur within the Project Area

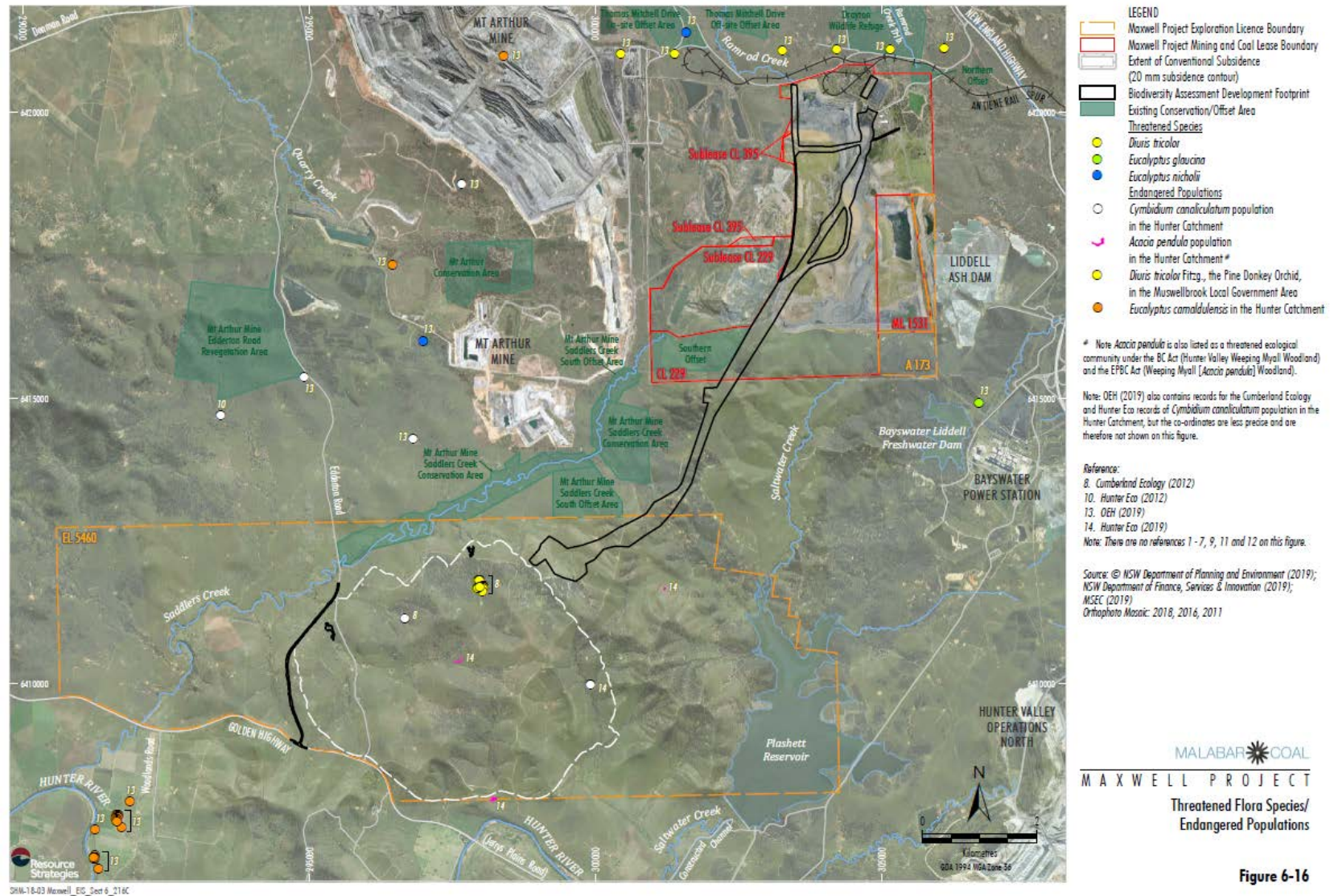


Figure 24 | Recorded locations of threatened flora species

- 6.4.22 Malabar subsequently commissioned additional flora surveys, which were completed to the satisfaction of BCD and identified that no Slaty Red Gum (*Eucalyptus Glaucina*) or Tiger Orchids (*Cymbidium canaliculatum*) plants would be directly impacted by the Project.
- 6.4.23 The Department notes that the remaining threatened flora species could not be adequately surveyed due to the timing of seasonal flora surveys. However, the BAM provides a degree of flexibility for circumstances like this, where the extent of threatened flora cannot be accurately determined by survey. In these circumstances, an Applicant may commission an expert report to determine the likelihood of presence within the Project Area, or alternatively may take a conservative approach and assume the presence of particular species and offset the impacts of the development accordingly.
- 6.4.24 For the purposes of its assessment, the Department has conservatively assumed the presence of the remaining five threatened flora species as outlined in **Table 6-8**. The Department's recommended biodiversity offset requirements for the Project are based on the maximum potential habitat for each flora species within the surface disturbance area, as advised by BCD.

Table 6-8 | Disturbance of Potential Flora Habitat

Species	Listing Status	Direct Disturbance of Potential Habitat (Ha) ^a
Pine Donkey Orchid (<i>Diuris tricolor</i> in the Muswellbrook local government area)	E (BC Act)	153.5
Tarengo Leek Orchid (<i>Prasophyllum petilum</i>)	E (BC Act) E (EPBC Act)	139.8
Rusty Greenhood (<i>Pterostylis chaetophora</i>)	V (BC Act)	11.1
Tesselate Everlasting (<i>Ozothamnus tessellatus</i>)	V (BC Act) V (EPBC Act)	12.3
Austral Toadflax (<i>Thesium australe</i>)	V (BC Act) V (EPBC Act)	45.5

Note:

^a Estimated total potential habitat is based on BCD's review of the BDAR

- 6.4.25 The Department considers this to be a conservative approach to the treatment of these species and has recommended conditions that provide flexibility for Malabar to undertake additional BAM-compliant surveys or commission an expert report prior to disturbance, to more accurately determine a more realistic extent of impacts on these threatened flora species, in consultation with BCD. These conditions would enable Malabar to seek a reduction of its offsetting obligations where flora species credits are found to have been overestimated.
- 6.4.26 Further to the above, it is noted that vertical subsidence ranging from 1 to 4 m is predicted in the vicinity of recorded locations of *Diuris tricolor* and *Cymbidium canaliculatum*. However, as no ponding is predicted in these locations, the BDAR concluded that subsidence is unlikely to impact the viability of these threatened flora species.
- 6.4.27 Malabar has committed to erect exclusionary fencing around previously recorded locations of *Diuris tricolor* within the predicted subsidence area and actively manage fenced areas under a Biodiversity Management Plan (BMP).

6.4.28 The Department's recommended conditions would require Malabar to gather additional baseline data regarding threatened flora within the subsidence area, including the species identified in **Table 6-8**. These conditions would also require Malabar to monitor the condition of threatened flora, remediate subsidence-related impacts, and where necessary, offset any unexpected impacts that may arise in relation to subsidence induced impacts, in accordance with the BAM.

6.4.29 The Department's recommended conditions have been developed in close consultation with BCD. The Department considers that these conditions represent a precautionary approach to the assessment, adaptive management and offsetting of impacts on all known and potentially occurring threatened flora within the Project Area.

6.4.30 Subject to the implementation of the Department's recommended conditions, the Project is unlikely to have a significant impact on threatened flora.

Threatened Fauna

6.4.31 The Project's direct impacts on threatened fauna habitat are summarised in **Table 6-9**.

Table 6-9 | Disturbance of Potential Fauna Habitat

Species	Listing Status	Direct Disturbance of Potential Habitat (Ha)	Significant Impact Predicted	Credit Type
Pink-tailed Legless Lizard (<i>Aprasia parapulchella</i>)	V (BC Act) V (EPBC Act)	38.7	Yes	Species
Striped Legless Lizard (<i>Delma impar</i>)	V (BC Act) V (EPBC Act)	152.8	Yes	Species
Squirrel Glider (<i>Petaurus norfolcensis</i>)	V (BC Act)	43	No	Species
Southern Myotis (<i>Myotis macropus</i>)	V (BC Act)	1.9	No	Species
Swift Parrot (<i>Lathamus discolor</i>)	E (BC Act) CE (EPBC Act)	25	Yes	Ecosystem
Regent Honeyeater (<i>Anthochaera phrygia</i>)	CE (BC Act) CE (EPBC Act)	22.2	Yes	Ecosystem
Painted Honeyeater (<i>Grantiella picta</i>)	V (BC Act) V (EPBC Act)	25.2	No	Ecosystem
Spotted-tailed Quoll (<i>Dasyurus maculatus</i>)	V (BC Act) E (EPBC Act)	161.1	No	Ecosystem
Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>)	V (BC Act) V (EPBC Act)	20.9	No	Ecosystem
Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	V (BC Act) V (EPBC Act)	24.5	No	Ecosystem
Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>)	V (BC Act) V (EPBC Act)	25	No	Ecosystem

- 6.4.32 In particular, the Department notes that the BDAR identifies that the Project may have a significant impact on four EPBC-listed threatened species: the Pink Legless Lizard, the Striped Legless Lizard, the Swift Parrot and the Regent Honeyeater.
- 6.4.33 The Project would involve clearing of suitable breeding and foraging habitat for the Pink Legless Lizard and the Striped Legless Lizard (see **Table 6-9**). Both species were identified within, or adjacent to, the Project Area during contemporary fauna surveys. The BDAR notes that the Striped Legless Lizard population identified within the Project Area represents a 'newly discovered range extension' for the species, located approximately 15 km northeast of the nearest known population.
- 6.4.34 Malabar has committed to offset the direct impacts of the Project on the Pink Legless Lizard and the Striped Legless Lizard in accordance with the BAM and the *Biodiversity Offsets Scheme*. Malabar has proposed a range of measures to minimise indirect impacts of the Project on both legless lizard species, as discussed further in this Section and in **Appendix G**. On this basis, the BDAR indicates that the Project is unlikely to significantly disrupt breeding cycles or result in a significant population decline for either species.
- 6.4.35 The BDAR conservatively assumed that the Project would have a significant impact on the Swift Parrot and the Regent Honeyeater, based on the advice of DAWE.³² However, given the availability of suitable foraging habitat for these species in the locality and the scarcity of recorded sightings within the Project Area, the BDAR indicates that these species are unlikely to be significantly impacted (see **Appendix G**).
- 6.4.36 The Project would also result in the direct clearance of 43 ha of potential habitat for the Squirrel Glider and 1.9 ha of potential habitat for the Southern Myotis. Both species are listed as 'vulnerable' under BC Act. Malabar has committed to offset the Project's impacts in accordance with the BAM and the *Biodiversity Offsets Scheme*.
- 6.4.37 The BDAR indicates that the remaining six species listed in **Table 6-9** are unlikely to be significantly impacted by the Project. Potential impacts on these species are discussed further in **Appendix G**. These species do not require a specific offset under the BAM, however loss of potential habitat is considered in the calculation of ecosystem credits for the related PCTs.
- 6.4.38 At present there are currently no defined woodland corridors within the Project Area, however the proposed transport and services corridor may result in some impacts on habitat connectivity for the threatened fauna species identified in **Table 6-9**. Despite this, no threatened fauna populations are expected to be fragmented by the Project and the Department notes that habitat connectivity would be improved over the long-term through the progressive establishment of a woodland corridor within the Maxwell Infrastructure site (see **Section 6.12**).

Aquatic Ecology and Stygofauna

- 6.4.39 The AESA was supported by aquatic ecology and stygofauna surveys undertaken in Autumn and Spring of 2018. Baseline aquatic ecology data was obtained from seven locations on the Hunter River, Ramrod Creek, Saddlers Creek and a tributary of Saltwater Creek. Stygofauna

³² The Commonwealth's Controlled Action Decision stated that the Project was likely to have a significant impact on these species

surveys were conducted at 13 groundwater bores within the underground mining area and along Saddlers Creek and the Hunter River. The AESA also drew on historical survey data from 2000 and 2015.

- 6.4.40 As the Hunter River is subject to continuous flow, it has a larger variety of aquatic habitat and better quality riparian habitat than its tributaries, which are typically dry, or limited to isolated pools. The AESA also indicated that potential aquatic habitat within Saddlers Creek and Ramrod Creek has been severely disturbed by agricultural activity and drought conditions.
- 6.4.41 Saddlers Creek, Ramrod Creek and the Hunter River are identified as key fish habitat,³³ however no State or Commonwealth-listed threatened fish species were identified in the vicinity of the Project Area. The Purple-spotted Gudgeon (*Mogurnda adspersa*), which is listed as 'endangered' under the *Fisheries Management Act 1994* (FM Act), is known to occur in the region. There is also potential for the Hunter River population of the Darling River Hardyhead (*Craterocephalus amniculus*), which is listed as an 'endangered population' under the FM Act, to occur in the vicinity of the Project Area. Neither species was detected during 2018 surveys.
- 6.4.42 Subject to the implementation of Malabar's proposed subsidence remediation and erosion control measures, the Project is not expected impede fish passage or diminish the quality of aquatic habitat in the vicinity of the Project Area. Consequently, the AESA concluded that the Project is unlikely to significantly affect threatened fish species, populations or ecological communities. The Department notes that DPI Fisheries did not provide any comment or raise any concerns regarding the Project.
- 6.4.43 Invertebrates were detected in six alluvial bores within the Hunter River, Saddlers Creek and a Saddlers Creek tributary during 2018 surveys. A known stygofauna taxon (*Notobathynella* sp. (Syncarida)) was confirmed at one such location on the Hunter River. The remaining five locations were considered likely to contain Cyclopoida or Ostracoda stygofauna taxa.
- 6.4.44 Drawdown of up to 8 m is predicted within the Saddlers Creek alluvium, which may have resulting impacts on stygofauna population in this location. However, the AESA notes that both Cyclopoida or Ostracoda stygofauna taxa are commonly found in the alluvium of the Hunter River and its tributaries between Singleton and Aberdeen. Furthermore, the AESA notes that alluvial habitat connectivity would be maintained between Saddlers Creek and the Hunter River, where groundwater drawdown and associated impacts on stygofauna are predicted to be negligible.
- 6.4.45 The Department's recommended conditions would require Malabar to monitor and adaptively manage potential subsidence, groundwater and surface water impacts on aquatic and riparian ecosystems under a comprehensive WMP for the Project. Recommended performance measures for the Project would require Malabar to ensure that there are negligible environmental consequences for aquatic ecosystems and GDEs beyond those predicted in the AESA. Subject to the implementation of these recommended conditions, the impacts of the Project on aquatic ecology and stygofauna are considered to be acceptable

³³ Based on mapping by DPI Fisheries

Avoidance, Minimisation and Mitigation

6.4.46 The Department considers that the Project has been designed to avoid impacts on threatened species and communities to the greatest extent practicable. As an underground mining project, which utilises established mining infrastructure, the Project has a considerably smaller disturbance footprint than a comparable open cut or greenfield mining project. The Department also notes that the proposed MEA was reduced by approximately 27 ha during the preparation of the EIS, leading to a substantial reduction in surface disturbance. The MEA, as it is now proposed, largely avoids remnant woodland and recorded locations of threatened flora.

6.4.47 In addition, Malabar has committed to:

- establish an “Environmental Protection Area” around known and previously recorded locations containing *Acacia pendula* and *Diuris tricolor*, comprising a 20 m buffer zone and stock-exclusionary fencing;
- establish an equivalent “Environmental Protection Area” around any *Prasophyllum petilum* or *Pterostylis chaetophora* plants if they are discovered within the underground mining area;
- engage a suitably qualified person to undertake pre-clearance fauna surveys and remain on-site during clearing of native vegetation and rocky areas to capture and release native fauna;
- develop a vegetation clearing protocol to avoid inadvertent impacts on habitat adjacent to approved disturbance areas;
- trim, rather than clear, native trees along electricity transmission corridors, where possible;
- salvage and re-use potential habitat features, including tree hollows and bush rock;
- implement a weed management program;
- erect fencing along the length of the site access road to minimise vehicle strikes;
- manage spontaneous combustion risks in accordance with an approved management plan; and
- develop and implement a bushfire management procedure.

6.4.48 The Department has recommended a range of conditions to ensure that biodiversity impacts are minimised and appropriately mitigated in line with commitments in the EIS and Submissions Report.

6.4.49 The Department’s recommended conditions would require Malabar to prepare an adaptive BMP as a component of any future Extraction Plan for second workings. The adaptive BMP(s) would need to:

- establish baseline data for existing habitat, vegetation condition and water table depth within the predicted subsidence area and along Saddlers and Saltwater Creeks;
- identify specific triggers for remedial action; and
- provide for adaptive management of subsidence-related impacts on CEECs, threatened flora and fauna populations and GDEs.

6.4.50 Malabar would need to ensure that its operations do not lead to subsidence impacts or environmental consequences greater than those predicted in the EIS. Should environmental impacts exceed those predictions, Malabar would be required to appropriately remediate the impact, or where necessary, provide a supplementary like-for-like offset in accordance with the *Biodiversity Offsets Scheme*.

- 6.4.51 BCD initially recommended that Malabar be required to assess and offset any indirect biodiversity impacts associated with the remediation of subsidence cracking in accordance with the BAM. Malabar subsequently advised that remediation-related impacts on threatened species could generally be avoided or minimised through the implementation of an adaptive BMP. Prior to infilling surface cracks, Malabar would undertake a review of potential environmental impacts and determine if active remediation measures are warranted, or if cracks are likely to naturally infill with sediment with minimal environmental impact. If active remediation is required, and those works are likely to impact threatened species or communities, Malabar would investigate alternative remediation methods to minimise impacts.
- 6.4.52 Following its review of the Submissions Report, BCD agreed with Malabar's proposed adaptive management approach. However, BCD maintained that in instances where biodiversity impacts cannot be adaptively managed, offsetting may still be required. This is reflected in the Department's recommended conditions.
- 6.4.53 Consistent with BCD's recommendations, the recommended conditions would also require Malabar to actively manage any plants that may out-compete *Diuris tricolor* within fenced "Environmental Protection Areas" and would also require Malabar to salvage and translocate threatened flora species identified during pre-clearance surveys.

Impacts on Matters of National Environmental Significance (MNES)

- 6.4.54 The Department has undertaken a detailed review of the Project's impacts on MNES, in consultation with BCD and in accordance with the requirements of the Bilateral Agreement between the NSW and Commonwealth Governments. The conclusions of this assessment are summarised in **Appendix G**.
- 6.4.55 The Bilateral Agreement was amended on 24 March 2020. This amendment included the Commonwealth Government's endorsement of the BAM and *NSW Biodiversity Offsets Scheme*, including the Biodiversity Conservation Fund (BCF).

Biodiversity Offset Strategy

- 6.4.56 The Department's recommended conditions require Malabar to offset the residual biodiversity impacts of the Project in accordance with the BAM and the *Biodiversity Offsets Scheme*. The applicable biodiversity credit requirements for the Project are outlined in **Table 6-10**.
- 6.4.57 Malabar proposes to retire the credits in **Table 6-10** in two stages. Stage One would account for the majority of proposed disturbance, including all clearing for the proposed transport and services corridor and MEA. Stage Two would account for clearing associated with the Edderton Road realignment, which would occur mid-way through the life of the Project.
- 6.4.58 Malabar is seeking flexibility to retire the credits in **Table 6-10** using one or a combination of mechanisms available under the *Biodiversity Offsets Scheme*. This could include the establishment of a Biodiversity Stewardship Site, payment into the BCF or mine site ecological rehabilitation.³⁴

³⁴ Use of mine site ecological rehabilitation for offsetting purposes would be subject to ancillary rules which are still in development

Table 6-10 | Biodiversity Offset Requirements for the Project

Credit Type	Credits Required	
	Stage 1	Stage 2
Ecosystem Credits		
PCT201 Fuzzy Box Woodland on Alluvial Brown Loam Soils mainly in the NSW South Western Slopes Bioregion (Woodland) ^c	15	-
PCT201 Fuzzy Box Woodland on Alluvial Brown Loam Soils mainly in the NSW South Western Slopes Bioregion (Derived Native Grassland)	14	26
PCT1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum Shrub – Grass Woodland of the Central and Upper Hunter ^c	44	-
PCT1604 Woodland Rehabilitation	214	-
PCT1606 White Box- Narrow-leaved Ironbark – Blakely’s Red Gum Shrubby Open Forest of the Central and Upper Hunter (Woodland) ^{a,c}	216	2
PCT1606 White Box- Narrow-leaved Ironbark – Blakely’s Red Gum Shrubby Open Forest of the Central and Upper Hunter (Derived Native Grassland) ^{a, c}	971	45
PCT1607 Blakely’s Red Gum – Narrow-leaved Ironbark – Rough-barked Apple Shrubby Woodland of the Upper Hunter (Woodland)	9	-
PCT1607 Blakely’s Red Gum – Narrow-leaved Ironbark – Rough-barked Apple Shrubby Woodland of the Upper Hunter (Derived Native Grassland)	59	-
PCT1655 Grey Box – Slaty Box Shrub – Grass Woodland on Sandstone Slopes of the Upper Hunter Valley and Sydney Basin (Woodland) ^{b,c}	21	2
PCT1655 Grey Box – Slaty Box Shrub – Grass Woodland on Sandstone Slopes of the Upper Hunter Valley and Sydney Basin (Derived Native Grassland)	-	24
PCT1691 Narrow-leaved Ironbark – Grey Box Grassy Woodland of the Central and Upper Hunter (Woodland) ^{b,c}	184	-
PCT1691 Narrow-leaved Ironbark – Grey Box Grassy Woodland of the Central and Upper Hunter (Woodland)	6	51
PCT1692 Bull Oak Grassy Woodland of the Central Hunter Valley (Woodland) ^c	45	-
PCT1731 Swamp Oak – Weeping Grass Grassy Riparian Forest of the Hunter Valley	-	4
Species Credits		
Pine Donkey Orchid (<i>Diuris tricolor</i>)	1,474	157
Tarengo Leek Orchid (<i>Prasophyllum petilum</i>) ^c	1,114	98
Rusty Greenhood (<i>Pterostylis chaetophora</i>)	229	57
Tesselate Everlasting (<i>Ozothamnus tesselatus</i>) ^c	217	5
Austral Toadflax (<i>Thesium australe</i>) ^c	34	0
Pink-tailed Legless Lizard ^c	382	41
Striped Legless Lizard ^c	1,126	99
Squirrel Glider	524	33
Southern Myotis	9	36

^a Commensurate with White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland under the EPBC Act

^b Commensurate with Central Hunter Valley Eucalypt Forest and Woodland under the EPBC Act

^c Species and related ecosystem credits for EPBC-listed species and communities must be retired on a like-for-like basis

6.4.59 Notwithstanding, Malabar has identified a potential Biodiversity Stewardship Site within EL 5460 to the northeast of the Maxwell Underground Site (see **Figure 25**). In April 2020, Malabar advised that based on the preliminary surveys undertaken to date, the potential offset area would provide 100 percent of the credits required for Stage 1 of the Project. This site would also satisfy MSC's request for local land-based offsets.

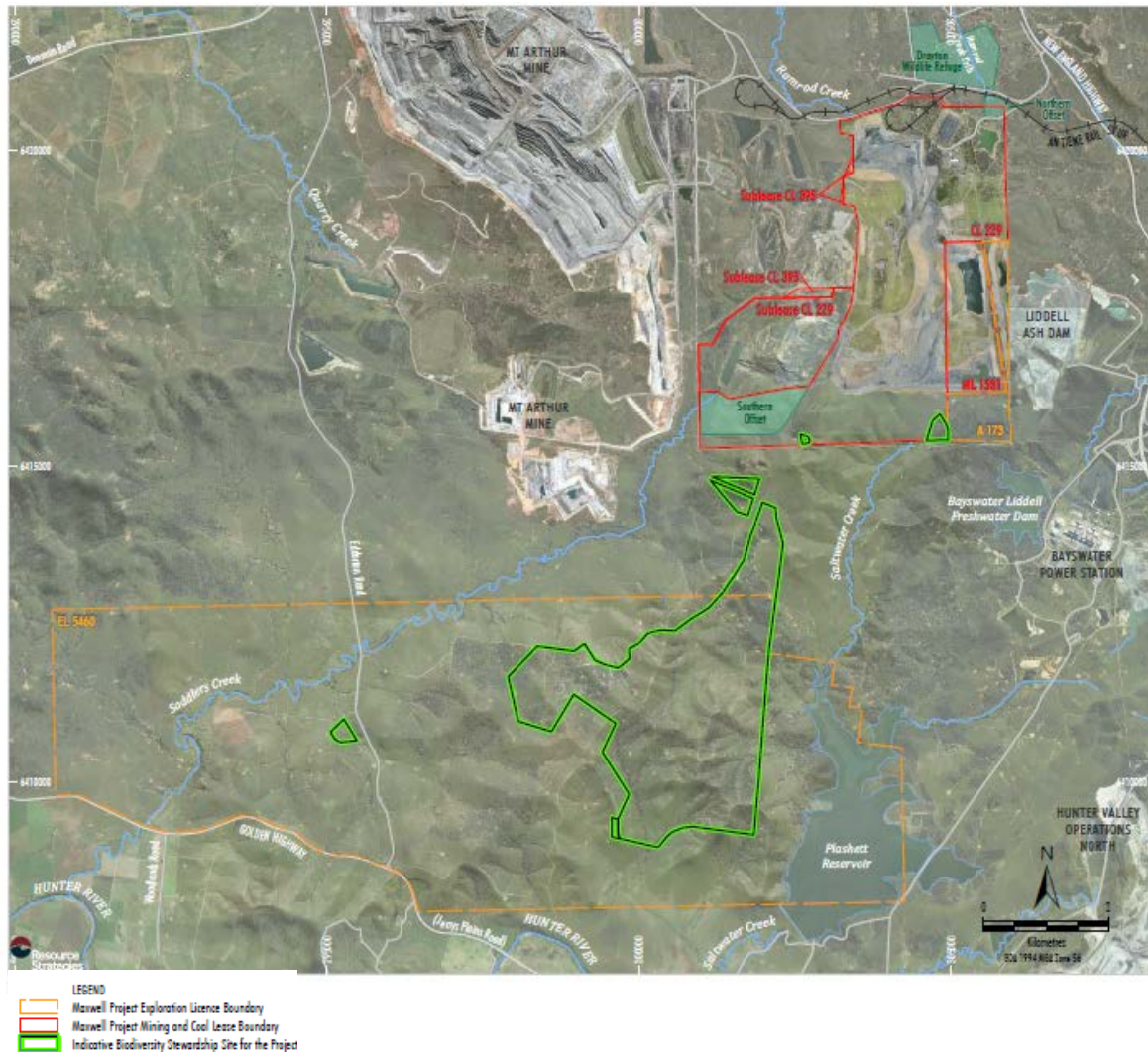


Figure 25 | Existing and potential biodiversity offset areas

6.4.60 It is currently unclear whether the potential offset area would provide the necessary species credits for the additional flora species listed in **Table 6-8**, as this will require additional surveys in accordance with the BAM. However, the Department notes that any credit shortfall could be met using one or a combination of mechanisms available under the Biodiversity Offsets Scheme.

Conclusion

6.4.61 Subject to the implementation of the recommended conditions, the Department considers that the Project would avoid, minimise and mitigate impacts on threatened species and communities, including MNES, to the greatest extent practicable. The Department is also satisfied that the residual biodiversity impacts of the Project can be appropriately offset in accordance with the *Biodiversity Offsets Scheme*.

6.5 Noise

- 6.5.1 The EIS includes a Noise Impact Assessment (NIA) undertaken by Wilkinson Murray Pty Ltd, in accordance with the *NSW Noise Policy for Industry* (NPfI), *Interim Construction Noise Guideline* (ICNG), the *NSW Road Noise Policy* (RNP), the *Rail Infrastructure Noise Guideline* (RING) and in consideration of the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP).

Existing Environment

- 6.5.2 Sensitive receivers in the vicinity of the Project Area are shown in **Figure 4** and **Figure 5**. Receivers are primarily located to the north of the Maxwell Infrastructure site and the Antiene Rail Spur and to the south of the Maxwell Underground site. Southern receivers include residences associated with the Coolmore and Woodlands Studs and Hollydene Estate.

Operational Noise Criteria

- 6.5.3 The NIA established Project Noise Trigger Levels (PNTLs) for the Project, based on observed Rating Background Levels (RBLs), in accordance with the NPfI. Adopted PNTLs for most sensitive receivers were generally set at the minimum levels applicable under the NPfI, being 40 dB(A) $L_{Aeq,15min}$ during the day and 35 dB(A) $L_{Aeq,15min}$ during the evening and night periods. However, slightly higher PNTLs were established for the evening and night periods for receivers located near the New England Highway to the north, to account for background traffic noise.³⁵

Environmental Noise Model (ENM)

- 6.5.4 An ENM has been developed for the Project, using five years of meteorological data from the Project Area. The NIA included a review of the available data, including the frequency of temperature inversions during the night period. Although temperature inversion conditions were shown to occur less than 30 percent of the time, the NIA conservatively assessed operational noise during the night period under both standard and noise-enhancing meteorological conditions.
- 6.5.5 As noise-enhancing winds were shown to occur in the vicinity of the northern receivers during the daytime, the NIA also assessed daytime noise impacts on the northern receivers under both standard and noise-enhancing meteorological conditions.³⁶

Operational Noise Impacts

- 6.5.6 The NIA assessed the operational noise impacts of the Project for three modelled scenarios (Year 1, 3 and 4), outlined in **Table 6-11**. As most construction activities would occur concurrently with, and be indistinguishable from, mining operations in the first three years of the Project, these activities have been included in the operational noise assessment.

³⁵ PNTLs for the evening/night period for receivers near the New England Highway and Golden Highway are 37 and 38 dB(A) $L_{Aeq,15min}$, respectively

³⁶ Dominant winds are from the south-east and north-west.

Table 6-11 | Summary of the NIA modelled scenarios

Indicative Project Year	Scenario Description
Year 1	<ul style="list-style-type: none"> • MEA under construction (proposed 24-hours per day) • Transport and services corridor under construction (daytime only) • Early ROM coal stockpiled at the MEA and trucked to Maxwell Infrastructure site via site access road • ROM coal processed at Maxwell Infrastructure • Product coal transferred to train loadout facility and loaded onto trains • ROM coal transport, processing and rail loading all occur during daytime only • Ongoing rehabilitation at the Maxwell Infrastructure area
Year 3	<ul style="list-style-type: none"> • Continued development of the transport and services corridor • Continued trucking of ROM coal • Construction of overland conveyor and plant upgrades at the Maxwell Infrastructure site (daytime only) • Bord and pillar mining under way • ROM coal transport, processing and rail loading occur 24-hours per day
Year 4	<ul style="list-style-type: none"> • Construction works complete • Overland conveyor, longwall machine and secondary sizer at the MEA all operational • All mine infrastructure operating 24-hours per day

6.5.7 The Department notes that while most construction works within the transport and services corridor have been included in the Year 1 and Year 3 scenarios outlined above, works at the northern-most end of the corridor were excluded from the operational noise assessment, and were assessed separately as construction noise. The NIA indicates that construction works at the northern end of the corridor would occur for less than 15 percent of the day period in the early years of the Project. Consequently, the NIA submits these activities are not representative of daytime operational noise.

6.5.8 However, the Department considers that the NPfI and ICNG should be applied consistently. As the majority of construction work within the transport and services corridor following the commencement of mining operations has been classified as operational noise for the purpose of the NIA, the Department considers that all such works should be assessed and regulated in accordance with the NPfI.

Noise Mitigation and Management

6.5.9 Malabar proposes to install enclosures and noise barriers around key infrastructure and purchase low-noise emitting plant, where possible. Malabar also proposes to establish a proactive noise management system combining predictive meteorological forecasting and real-time noise monitoring to guide its day-to-day operations. Where adverse meteorological conditions are predicted, Malabar would adjust its operations, for example, by suspending operation of dozers and front-end loaders, to minimise noise levels at nearby receivers.

6.5.10 Where the NIA predicted that privately-owned receivers to the north would experience exceedances of the noise criteria, Malabar has identified a range of proactive and reactive mitigation measures that can be implemented as part of its operations to mitigate and manage these impacts (eg noise barriers around key infrastructure, purchasing low-noise emitting plant and shutting down certain equipment during adverse conditions). The NIA identifies that these measures have the potential to reduce noise impacts at receivers by between 1-2 dB.

Impacts on Northern Receivers

6.5.11 The proposed activities to be undertaken at the Maxwell Infrastructure site represent a subset of those undertaken at the previous Drayton Mine. The Project would continue to utilise the existing CHPP, coal stockpiling areas, train load-out facility, rail loop, site access road and ancillary workshops, explosives storage facilities and administrative buildings.

6.5.12 As these activities have been occurring at the Drayton Mine since 1983, the Department notes that the Project would not materially change the nature of noise generation for residence to the north of the Project relative to what has been experienced over the last four decades. In fact, as mining has now ceased at the Drayton Mine, the nature and sources of noise generation would more focused towards the processing and rail facilities than active mining operations.

6.5.13 Notwithstanding the long history of noise impacts in this area, the NIA indicates that even with Malabar's proposed mitigation measures in place, noise levels are predicted to exceed the PNTLs for intrusive noise impacts at 15 privately-owned receivers within the Antiene rural-residential estate. **Table 6-12** below identifies all exceedances of the PSNLs that are predicted to occur due to the Project.

Table 6-12 | Worst case predicted exceedances of PNTLs at northern receivers

Receiver ID	Predicted Noise Level dB(A) $L_{Aeq,15min}$					Project Noise Trigger Level (dB(A)) Day / Evening / Night
	Year 1 Day	Year 3 Day	Year 3 Night	Year 4 Day	Year 4 Night	
390	44	43	39	42	39	40 / 37 / 37
398	44	42	39	42	39	40 / 37 / 37
399	42	41	-	-	-	40 / 37 / 37
400	41	-	36	-	36	40 / 35 / 35
402	44	43	39	42	39	40 / 35 / 35
403	44	44	40	43	40	40 / 35 / 35
411	45	44	41	42	40	40 / 37 / 37
418	44	43	39	-	38	40 / 37 / 37
419	42	41	38	-	-	40 / 37 / 37
420	42	-	38	-	-	40 / 37 / 37
421	41	-	38	-	38	40 / 37 / 37
423	42	41	39	-	39	40 / 37 / 37
424	41	-	38	-	38	40 / 37 / 37
538	42	41	38	41	38	40 / 35 / 35
539	42	41	38	-	38	40 / 37 / 37

Notes:

- Negligible exceedances of 1-2 dB shown in black text
- Marginal exceedances of 3-5 dB shown in red text
- Receivers eligible for noise mitigation are shaded in blue

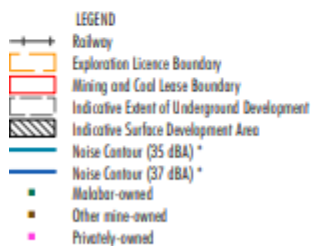
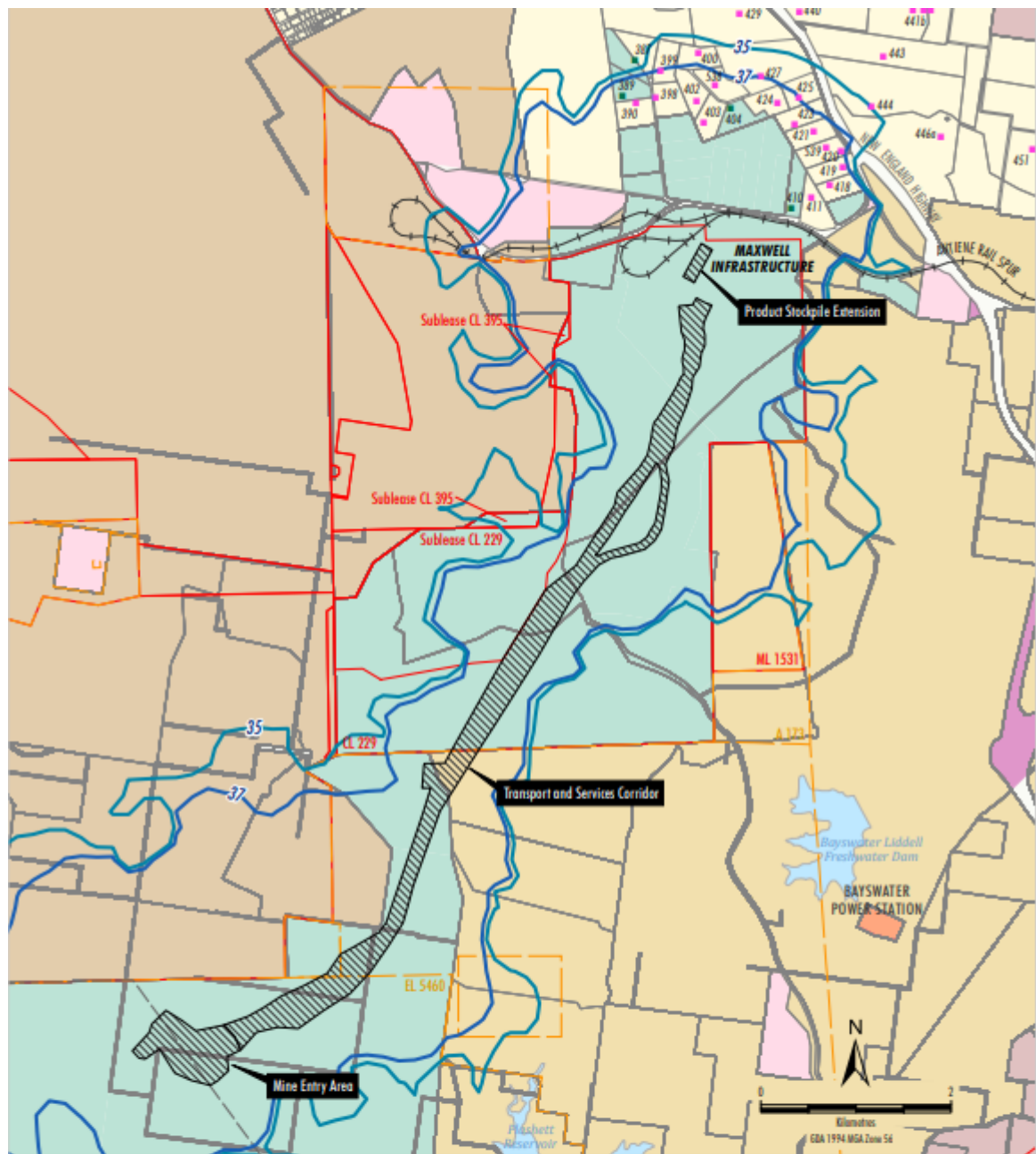
- 6.5.14 Importantly, despite these limited exceedances of the PSNLs for intrusive noise impacts from the Project, the total cumulative industrial noise impacts of the Project together with other industrial operations in the area would comply with applicable rural residential amenity criteria established in Table 2.2 of NPfl at all surrounding receivers.
- 6.5.15 The predictions in **Table 6-12** represent the maximum predicted noise exceedance at each receiver under either standard or adverse conditions. As illustrated, the largest number of exceedances above the PNTLs would occur during the day in the first three years of the Project, while construction and operational activities are occurring concurrently.
- 6.5.16 No exceedances of the PNTLs listed in the Noise Criteria column were predicted to occur during the night in Year 1 or the evening in any modelled year. However, operational exceedances of the night-time noise impacts would occur from Year 3 onwards, as indicated in **Figure 26**.
- 6.5.17 A total of seven receivers (390, 398, 402, 403, 411, 418 and 538) are predicted to experience marginal exceedances of 3 to 5 dB above the PNTLs, while a further eight receivers would experience negligible exceedances of 1 to 2 dB above the PNTLs.
- 6.5.18 Given that predicted noise levels in **Table 6-12** are heavily influenced by concurrent daytime construction activities during Years 1 and 3, the Department has taken a conservative approach to the general operational noise criteria for the Project. This includes an initial day time criterion that would apply for the first three years of the Project to account for concurrent construction and operational noise. As these initial elevated levels are predicted to reduce by Year 4, the Department has recommended a more stringent noise criteria be imposed from Year 4 onwards, to ensure that the noise generated by the development is maintained at appropriate levels for the remainder of the Project life.

Impacts on Southern Receivers and CICs

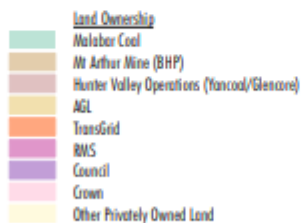
- 6.5.19 Given the presence of intervening topographic features, no exceedances of the noise criteria were predicted at any privately-owned southern receivers at any stage of the Project.
- 6.5.20 Project noise levels at the Coolmore and Woodlands Studs were predicted to remain at or below 27 dB(A) in Year 1 of operations and at or below 24 dB(A) at all other times during operations, while project noise levels at Arrowfield Estate were predicted to remain at or below 20 dB(A) at all times (see **Table 6-13**). These operational noise levels are expected to be inaudible above background noise (including road traffic on the Golden Highway).

Table 6-13 | Maximum predicted operational noise levels at southern CIC receivers

Receiver ID	Predicted Noise Level dB(A) $L_{Aeq,15min}$			
	Year 1 Day / Evening / Night	Year 3 Day / Evening / Night	Year 4 Day / Evening / Night	Noise Criteria Day / Evening / Night
Arrowfield Estate	20 / <20 / <20	<20 / <20 / <20	<20 / <20 / <20	40 / 35 / 35
Coolmore Stud	26 / <20 / 27	20 / <20 / 24	20 / <20 / 24	40 / 35 / 35
Woodlands Stud	22 / <20 / 20	<20 / <20 / 21	<20 / <20 / 21	40 / 35 / 35



* The night time Project Noise Trigger Levels for receivers in the north are either 35 or 37 dBA (refer to Table 4-6).



Source: © NSW Department of Planning and Environment (2019);
NSW Department of Finance, Services & Innovation (2019)

MALABAR COAL
MAXWELL PROJECT
Maximum Predicted Noise Level
All Assessable Meteorological Conditions
Year 3 – Night

Figure C-4a

Figure 26 | Maximum predicted noise levels at northern receivers (Year 3 Night Period)

6.5.21 These predictions included concurrent modelling of operational and construction noise during Year 1 of the Project, when limited construction activities, namely the construction of drift entries and ventilation shafts, may occur at the MEA during the evening and night periods.

Sleep Disturbance Impacts

6.5.22 The NIA includes consideration of potential sleep disturbance impacts in accordance with the NPfI. This indicates that night-time operations would not exceed 40 dB(A) $L_{Aeq,15min}$ or 52 dB(A) L_{AFmax} at any privately-owned receiver. The Department notes that L_{AFmax} predictions were at or near the 52 dB(A) L_{AFmax} criterion at a number of northern receivers, however, these are conservative predictions and Malabar would be required to proactively manage its night-time operations so as to not exceed the sleep disturbance criteria at any privately-owned receiver.

Consideration of the VLAMP

6.5.23 No significant exceedances of the noise criteria were predicted in the NIA and noise levels are not expected to exceed the Project amenity noise level over more than 25 percent of any privately-owned vacant land. Consequently, no voluntary acquisitions rights are applicable under the VLAMP.

6.5.24 While marginal exceedances are predicted at seven receivers (see **Table 6-12**), it is evident that exceedances at Receivers 390, 398 and 418 are driven primarily by construction noise along the transport and services corridor during the first three years of operations. The Department notes that these linear construction works would be transient and mainly limited to the day period, that no receiver would experience prolonged noise impacts and that noise levels would still fall below the recommended noise-affected management levels for rural residential land under the ICNG. On this basis, these receivers are not eligible for noise mitigation under the VLAMP.

6.5.25 Receivers 402, 403, 411 and 538 are predicted to experience exceedances of 3 to 5 dB(A) as a result of the Project, irrespective of construction noise. All four receivers already have existing mitigation rights under MP 06_0202 due to moderate exceedances of the PSNLs associated with the former Drayton Mine. Given the predicted noise impacts at these receivers would continue to meet the requirements for noise mitigation under the VLAMP, the Department has recommended conditions that continue to afford these receivers with noise mitigation rights for the life of the Project.

6.5.26 All other predicted exceedances of the PSNLs are classified as negligible impacts under the VLAMP. These 1 to 2 dB(A) exceedances are unlikely to be perceptible to the human ear and as such, the VLAMP identifies that no mitigation rights should be afforded in these circumstances. Nevertheless, the Department's recommended conditions would require Malabar to implement all reasonable and feasible measures to manage noise impacts on these receivers.

Cumulative Operational Noise Impacts

6.5.27 The NIA included a cumulative assessment of Years 1, 3 and 4 of the Project, operating concurrently with operations at the Mt Arthur Coal Complex. Cumulative noise impacts were conservatively modelled during the night period when the applicable amenity criterion is lowest.

6.5.28 With Malabar's proactive noise mitigation measures in place, no exceedances of the cumulative noise criterion were predicted at any privately-owned receiver at any stage of the Project. Nevertheless, the Department's recommended conditions would require Malabar to take all reasonable steps to minimise cumulative noise impacts by coordinating activities with neighboring mines, including the Mt Arthur Coal Complex.

Low Frequency Noise Assessment

6.5.29 The NIA included an assessment of low frequency noise in accordance with Fact Sheet C of the NPfI and based on observed noise characteristics from the operation of the former Drayton Mine and comparable mining operations elsewhere in the Hunter Valley.

6.5.30 The NIA identified that while the Project meet the first criteria in Table C1 of Fact Sheet C due to a predicted difference between C-weighted and A-weighted noise levels in excess of 15 dB at surrounding receivers to the north and south, the noise generated is likely to fall below the low frequency octave noise thresholds in Table C2 of the NPfI. Consequently, modifying factor corrections have not been applied to the predicted noise impacts at nearby receivers.

6.5.31 The Department and the EPA are both satisfied with the analysis provided in the NIA and agree that modifying factors should not be applied to the Project.

Construction Noise Impacts

6.5.32 The NIA also included an assessment of construction works which would occur prior to the commencement of mining operations or be geographically separated from mining operations on site. This includes the initial construction of the site access road, which would occur prior to Year 1 of the Project, and the proposed realignment of Edderton Road, which would occur mid-way through the life of the Project.

6.5.33 The NIA indicates that these discrete construction activities would comply with the 'noise affected' management level under the ICNG both during and outside standard construction hours at all privately-owned receivers. Construction noise levels at the southern receivers, including the Coolmore and Woodlands Studs, would remain well below 30 dB(A) at all stages of the Project.

6.5.34 The Department's recommended conditions would require Malabar to comply with strict noise criteria for the Project. This approach is consistent with most large coal mines throughout the Hunter Valley and ensures the timing of construction and operational noise impacts is adaptively managed to minimise the impacts of the development on nearby receivers.

Road Transport Noise Assessment

6.5.35 The NIA included an assessment of road transport noise in accordance with the RNP. This assessment focused on impacts along Thomas Mitchell Drive as the Project's contribution to traffic volumes and associated noise on all other roads is considered to be negligible.

6.5.36 Traffic noise was calculated at the nearest residence to Thomas Mitchell Drive, which is a mine-owned property known as Receiver 410. As the closest receiver to the road, this residence is considered to be representative of the worst case road traffic noise impacts.

- 6.5.37 Cumulative traffic noise levels were predicted for Years 6 and 13 of the Project to align with predicted traffic volumes in the Road Transport Assessment (see **Section 6.7**) and were found to comply with the relevant assessment criteria during both the day and night periods.
- 6.5.38 On this basis of complying with the relevant noise limits under the RNP at the nearest and most affected residential receiver location, the NIA concluded that the Project is expected to comply with relevant road noise criteria at all nearby residences. Given the above, the Department is satisfied that the road noise impacts of the Project would not significantly affect the amenity of local residents.

Rail Transport Noise Assessment

- 6.5.39 Malabar's use of the existing rail loop and the Antiene Rail Spur is authorised under DA 106-04-00 and does not form part of the Project. Nonetheless, the NIA included an assessment of rail noise impacts associated with Project-related train movements on the Antiene Rail Spur and Main Northern Railway in accordance with the RING.

Antiene Rail Spur

- 6.5.40 The NIA modelled rail noise for the night period, when the most stringent noise criterion of 40 dBA_{L_{Aeq,period}} applies. Consistent with DA 106-04-00, no more than 12 train movements would occur per day over the life of the Project. This equates to six trains arriving and departing within a 24-hour period. The NIA conservatively assumed that 10 of these movements would occur during the night period.
- 6.5.41 The NIA indicates that the combined rail noise generated by the Project and the Mount Arthur Coal Complex along the Antiene Rail Spur would remain well below the acceptable noise levels outlined in Appendix 3 of the RING at all stages of the Project.³⁷
- 6.5.42 Furthermore, the Department notes that DA 106-04-00 predates the RING and includes more stringent rail noise management obligations on the two operations sharing the Antiene Rail Spur than would now be applicable under the RING.
- 6.5.43 Under DA 106-04-00, should the combined operational and rail noise from the former Drayton Mine and the Mt Arthur Coal Complex exceed specified criteria, a formal noise investigation process is established and affected landowners may either enter into a negotiated agreement to accept higher noise levels or receive architectural mitigation treatments at their residences. Additionally, should cumulative noise levels exceed 45 dB(A)_{L_{Aeq,period}}, landowners would be eligible for voluntary acquisition by the contributing mines.
- 6.5.44 As Malabar is seeking to recommence rail transport under DA 106-04-00, it would continue to be subject to these separate approval requirements for rail transport until 2 November 2025. Beyond 2025, it would need a further planning approval for the continued use of the spur line.

Main Northern Railway

- 6.5.45 As rail traffic generated by the Project represents less than 5 percent of overall rail traffic on the Main Northern Railway, a detailed assessment of rail noise along the main corridor was not required in accordance with the RING.

³⁷ These predictions assume locomotives have low or medium wheel defects.

Mitigation and Management

6.5.46 The Department's recommended conditions would require Malabar to employ best practice noise management and to take all reasonable steps to manage the construction, operational, road and rail noise generated by the development, particularly during noise-enhancing conditions.

6.5.47 The recommended conditions would also require Malabar to:

- monitor compliance with the noise criteria using a combination of real-time and attended noise monitoring undertaken on at least a quarterly basis; and
- establish suitable protocols for receiving and handling community complaints and the investigation of any potential exceedances.

6.5.48 Malabar's noise management, monitoring and complaint-handling processes would be detailed in a comprehensive Noise Management Plan (NMP) for the Project.

Conclusion

6.5.49 The Department has carefully assessed the operational, construction, road and rail noise impacts of the Project, with a particular focus on the cumulative impacts of mining operations in the locality.

6.5.50 While the Project is predicted to result in exceedances of the operational noise criteria at 15 receivers to the north, the majority of these exceedances would be very minor and would be imperceptible at receivers. Marginal exceedances of between 3 and 5 dB(A) are predicted at seven northern receivers, which could be managed through proactive and reactive noise management on site, in combination with at-receiver mitigation treatments, upon request.

6.5.51 The Department considers that the noise impacts of the Project on southern receivers, including the Equine CIC, would be negligible and are unlikely to affect these receivers or their operations.

6.5.52 Overall, the Department considers that the noise impacts of the Project are acceptable and can be suitably managed under recommended conditions and a detailed NMP.

6.6 Air Quality and Greenhouse Gas

6.6.1 The EIS included an Air Quality and Greenhouse Gas Assessment (AQGGA) prepared by Todoroski Air Sciences. The AQGGA was prepared in accordance with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods, 2016).

6.6.2 **Table 6-14** below shows the applicable assessment criteria for the Project, having regard to the Approved Methods and the VLAMP.

Table 6-14 | Air Quality Assessment Criteria

Pollutant	Averaging Period	Criterion	
Particulate matter < 10 µm (PM ₁₀)	Annual	25 µg/m ³ (Cumulative)	
	24-hour	50 µg/m ³ (Project Alone)	
Particulate matter < 2.5 µm (PM _{2.5})	Annual	8 µg/m ³ (Cumulative)	
	24-hour	25 µg/m ³ (Project Alone)	
Total suspended particulate (TSP) matter	Annual	90 µg/m ³ (Cumulative)	
Deposited dust	Annual	2 g/m ² /month (Project Alone)	4 g/m ² /month (Cumulative)

Existing Environment

- 6.6.3 Dominant winds in the locality are known to occur along a northwest to southeast axis. During the drier spring and summer months, when ambient PM₁₀ levels are typically at their highest, the dominant winds are from the southeast. Conversely, in winter, when PM_{2.5} levels are typically elevated, dominant winds are from the northwest.
- 6.6.4 The AQGGA included a review of all air quality monitoring data from the Maxwell Infrastructure site, the Mt Arthur Coal Complex, Spur Hill, and the State Government's Upper Hunter Air Quality Monitoring Network (UHAQMN) from 2013 to 2017. This data showed that background PM₁₀ concentrations remained below the annual average criterion of 25 µg/m³ at all monitoring stations in the vicinity of the Project Area.
- 6.6.5 The AQGGA indicates that 24-hour average PM₁₀ concentrations exceeded 50 µg/m³ at each of the monitoring locations on several occasions between 2013 and 2017. Notably, there were 14 exceedances recorded at the UHAQMN monitor at Jerrys Plains during that period. These events typically coincided with regional dust events and bushfires, although it is recognised that agricultural activity and open cut mining operations likely contributed to these exceedances.
- 6.6.6 Annual average PM_{2.5} concentrations in Muswellbrook consistently exceeded the annual average criterion of 8 µg/m³ between 2013 and 2017, however the AQGGA noted that these exceedances can be largely attributable to particles emitted from vehicle exhausts and wood heaters within the Muswellbrook township. Exceedances of the 24-hour average PM_{2.5} criterion were also recorded in Muswellbrook on ten occasions and at Spur Hill on six occasions, within the review period.
- 6.6.7 Monitoring data from the Maxwell Infrastructure site indicates that Total Suspended Particulate matter (TSP) and deposited dust levels in the vicinity of the Project Area remained below the relevant criteria between 2013 and 2017.
- 6.6.8 The Department notes that mining operations at the former Drayton Mine ceased in 2016. As there has been little detectable change at nearby monitoring stations following the mine's closure, the AQGGA suggests that previous open cut mining operations at the site had minimal influence on ambient air quality in the locality.

Air Quality Model

6.6.9 The AQGGA included dispersion modelling for three operational scenarios, as shown in **Table 6-15**. Years 1 and 3 represent the early stages of mining operations and concurrent construction activities. Year 4 represents the worst-case operational impacts of the Project, with underground mining operations at maximum capacity.

Table 6-15 | Summary of Modelled Scenarios in AQGGA

Modelled Year	Scenario Description
Year 1	<ul style="list-style-type: none">• MEA and transport and services corridor under construction• Early ROM coal stockpiled at the MEA and trucked to Maxwell Infrastructure site via site access road (to be sealed by the end of Year 1)• ROM coal processed at Maxwell Infrastructure site• Product coal transferred to train loadout facility and transported by rail
Year 3	<ul style="list-style-type: none">• Transport and services corridor still under development (including construction of overland conveyor)• New and extended stockpiling areas at Maxwell Infrastructure site under construction• ROM coal stockpiled at the MEA• Increased trucking of ROM coal to Maxwell Infrastructure site for processing• Product coal transferred to train loadout facility and transported by rail
Year 4	<ul style="list-style-type: none">• Construction works complete• Overland conveyor and longwall machine both operational• Underground mining operations at maximum extraction rate (8 Mtpa)• Product coal transferred to train loadout facility and transported by rail

6.6.10 Malabar has committed to a range of proactive dust management measures, including the installation of enclosures and water sprays at unloading and transfer points at the CHPP as well as water spraying of stockpiles and progressive rehabilitation of disturbed areas. These proactive measures were incorporated into the modelled predictions discussed below.

6.6.11 The AQGGA incorporated predicted emissions from the Mount Arthur Coal Complex, Hunter Valley Operations North and the Bengalla Mine to enable an assessment of the cumulative air quality impacts of the Project. The modelled predictions assume that the Liddell Power Station would continue to operate over the life of the Project. However, Malabar notes that AGL plans to close the power station in 2023, meaning that the air quality predictions in the AQGGA are likely to be conservative from 2024 onwards.

Air Quality Impacts

Particulate Matter, TSP and Deposited Dust

6.6.12 The maximum predicted PM₁₀ and PM_{2.5} levels, which occur in Year 4 of the Project, are shown in **Figure 27** and **Figure 28** below. These figures represent the worst-case operational air quality impacts of the Project under any of the three modelled scenarios.

6.6.13 As illustrated in these figures, no exceedances of the air quality criteria in **Table 6-14** were predicted to occur at any privately-owned receivers, or over more than 25 percent of any

privately-owned land, in the vicinity of the Project Area. Consequently, no mitigation or acquisition rights are applicable under the VLAMP.

- 6.6.14 The Department notes that consistent with the VLAMP, the AQGGA has assessed compliance with 24-hour average criteria for particulate matter on a project-alone basis, rather than a cumulative basis. Nevertheless, as submissions raise concerns about potential cumulative 24-hour particulate matter levels, the Department has sought to address this issue. In particular, it is noted that the AQGGA indicates that cumulative regional air quality levels over the proposed Project life would continue to experience occasional days where PM₁₀ levels exceed 50 µg/m³. However, these impacts are almost exclusively driven by background air quality levels.
- 6.6.15 The Project itself would contribute a very minor (0.6 µg/m³ or less) amount of additional PM₁₀ at any privately-owned receiver and is not predicted to result in any additional days where cumulative PM₁₀ levels exceed 50 µg/m³ at any receiver. The Department is therefore satisfied that the Project contribute a negligible amount to cumulative 24 hour PM levels and that no further treatment are required in accordance with relevant NSW Government policies.

Nitrogen Dioxide (NO_x) Emissions

- 6.6.16 The AQGGA included dispersion modelling of NO_x emissions from diesel plant under each of the scenarios in **Table 6-15** above. Under each modelled scenario, impacts at the nearest receivers remained well below the relevant EPA assessment criteria.
- 6.6.17 The Project would also involve gas drainage from the underground workings. Gases (primarily carbon dioxide and methane) would be drained via an underground collection system to centralized gas management infrastructure at the MEA. Gases would then be flared or used for power generation (if methane content is sufficient) or vented to the atmosphere from a height of approximately 9 m.
- 6.6.18 NO_x emissions associated with the flaring or venting of gases were not modelled in the AQGGA, however the EIS indicates that given the distance between the gas management infrastructure and nearest receivers, NO_x contributions from the flaring or venting of gases at those receivers are likely to be minimal.

Spontaneous Combustion

- 6.6.19 The former Drayton Mine targeted the Greta Coal Measures, which are susceptible to spontaneous combustion. Spontaneous combustion events have occurred sporadically at the Maxwell Infrastructure site since the 1980s.
- 6.6.20 Malabar currently manages spontaneous combustion risks at the Maxwell Infrastructure site through compaction, capping and ongoing monitoring (including the use of thermal imagery). Malabar would continue to implement these measures over the life of the Project.
- 6.6.21 By comparison, the current Project targets coal seams within the Wittingham Coal Measures. These coal seams have a low sulphur content and as such are considered to represent a low risk of spontaneous combustion at the Maxwell Underground site. Nevertheless, gases within the underground workings would need to be managed to the satisfaction of the Resources Regulator and in accordance with the *Work Health and Safety (Mine and Petroleum Sites) Regulation 2014*.

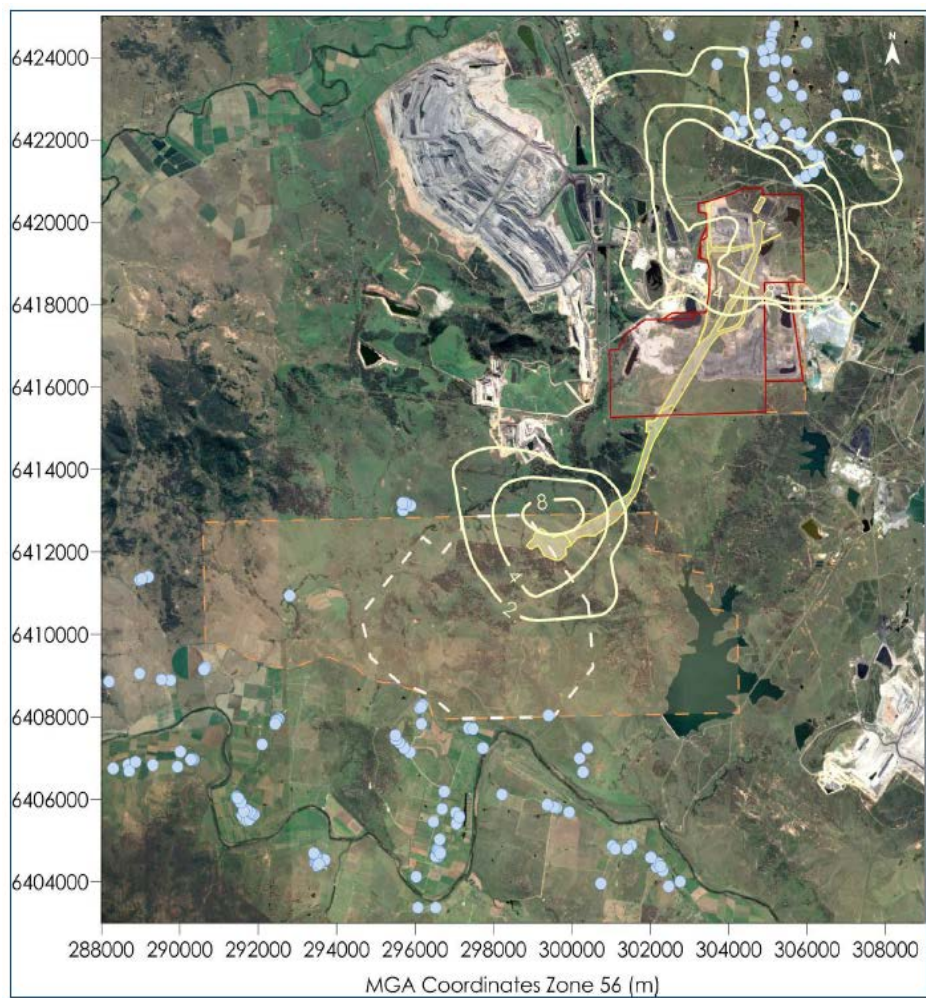


Figure E-24: Predicted maximum 24-hour average PM₁₀ concentrations due to emissions from the Project in Scenario 3 (µg/m³)

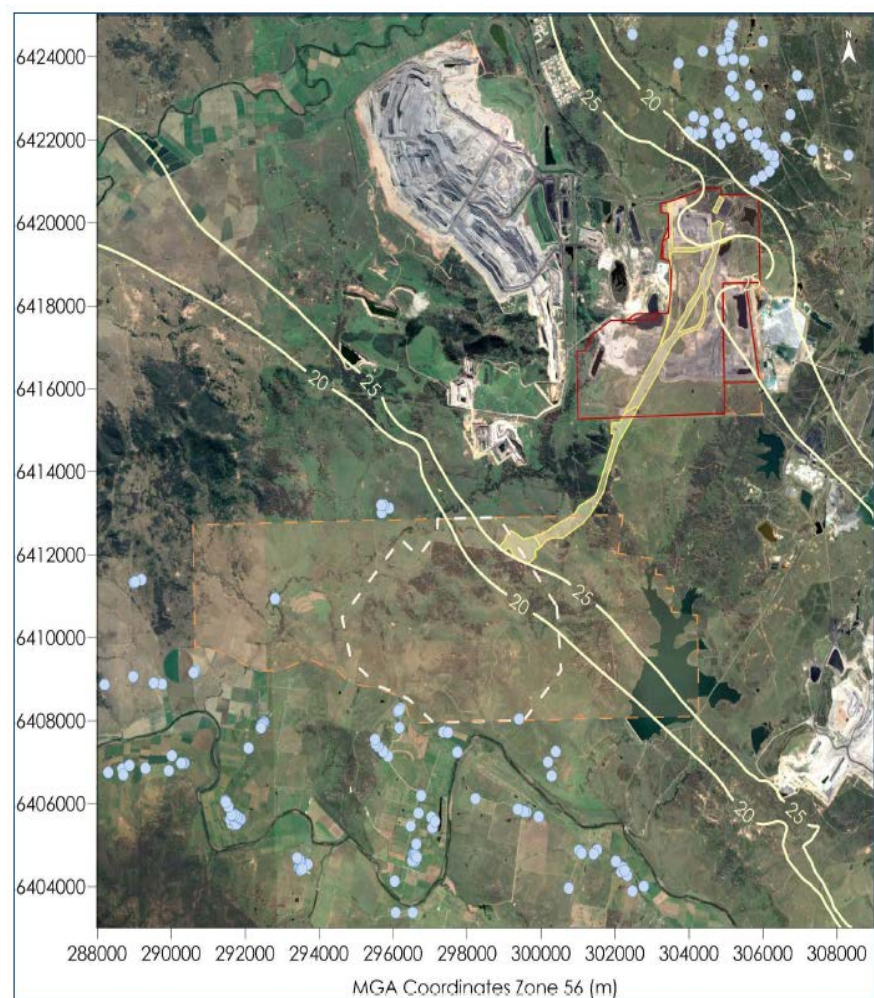


Figure E-26: Predicted annual average PM₁₀ concentrations due to emissions from the Project and other sources in Scenario 3 (µg/m³)

Figure 27 | Predicted 24-hour average (incremental) and annual average (cumulative) PM₁₀ concentrations in Year 4

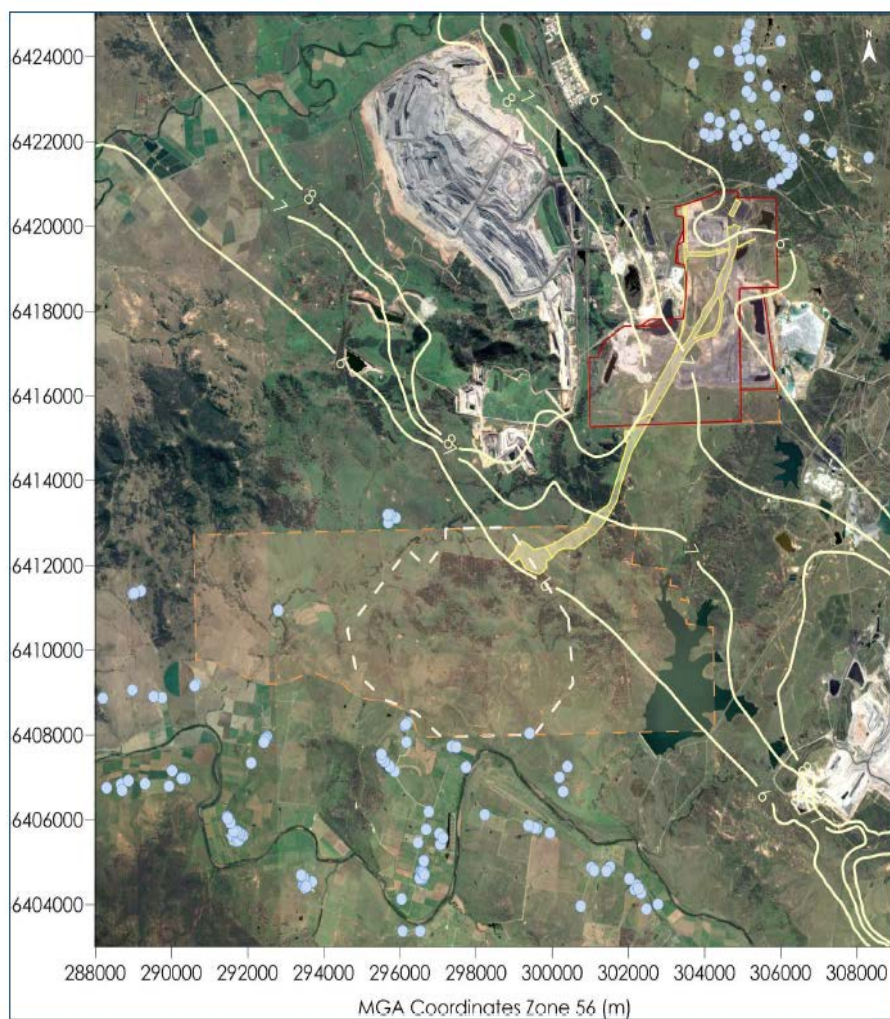


Figure E-23: Predicted annual average PM_{2.5} concentrations due to emissions from the Project and other sources in Scenario 3 (µg/m³)

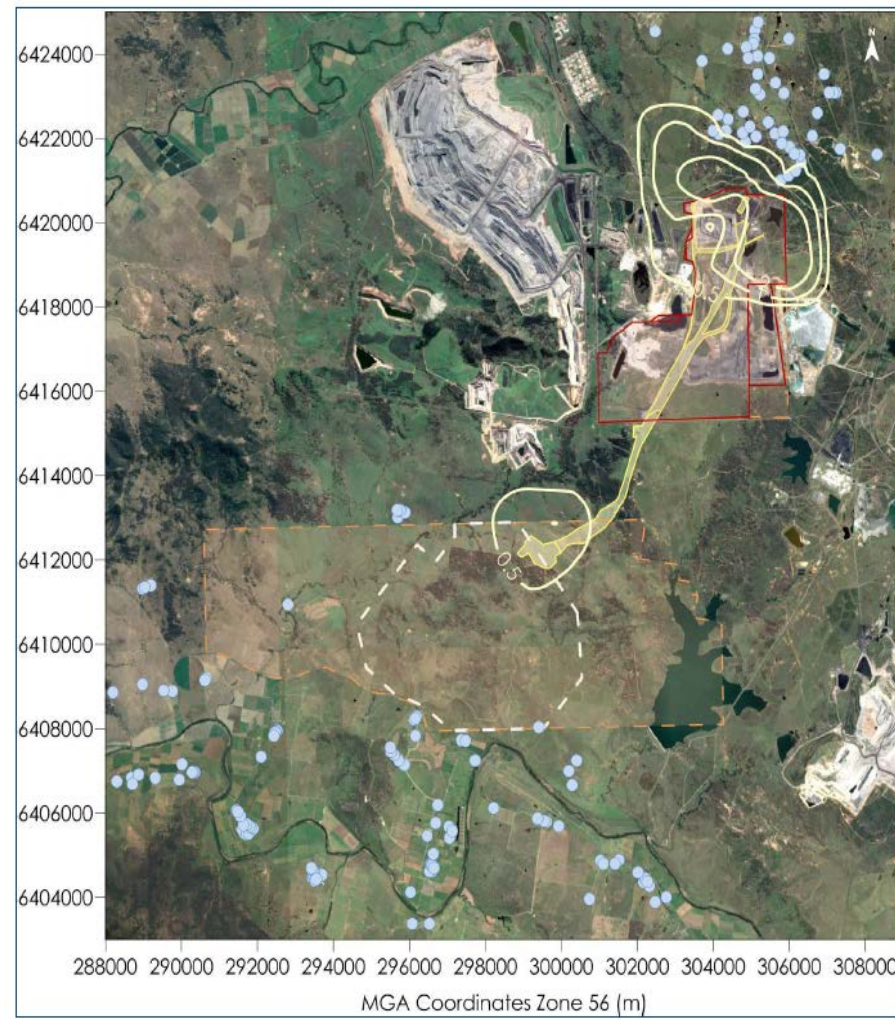


Figure E-21: Predicted maximum 24-hour average PM_{2.5} concentrations due to emissions from the Project in Scenario 3 (µg/m³)

Figure 28 | Predicted 24-hour average (incremental) and annual average (cumulative) PM_{2.5} concentrations in Year 4

Air Quality Impacts on CICs

- 6.6.22 The AQGGA has considered the likelihood of impacts on the adjacent equine and viticulture CICs. This assessment indicates that the Project's contribution to 24-hour average PM_{2.5} and PM₁₀ concentrations at the Coolmore and Woodlands Studs and at Hollydene Estate would be less than 0.1 µg/m³ and 0.5 µg/m³, respectively. Similarly, the Project is predicted to cause a negligible increase in dust deposition levels at each of these properties of less than 0.05 g/m²/month.
- 6.6.23 Given the separation distance between dust generating activities at the MEA and the thoroughbred studs (at least 4.5 km at the closest point), as well as the intervening terrain and the dominant wind direction in the area, the Department considers that dust emissions from the Project are likely to have a negligible impact on CICs.
- 6.6.24 Furthermore, the Department notes that dust emissions associated with the proposed underground operations would not generate the same scale of visible dust impacts seen at some open cut operations in the Hunter Valley. Consequently, the Project is not considered to represent any genuine risk to the visual landscape or reputation of these enterprises. Impacts on equine health and the amenity of the CICs are discussed further in **Section 6.11**.

Mitigation and Management of Air Quality Impacts

- 6.6.25 The Department's recommended conditions would require Malabar to develop a comprehensive air quality management system, utilising predictive meteorological forecasting and real-time monitoring to inform its day-to-day operations and ensure compliance with the air quality criteria.
- 6.6.26 Malabar would also be required to implement all reasonable and feasible measures to minimise the dust emissions of the Project, as detailed in an Air Quality and Greenhouse Gas Management Plan (AQGGMP) for the site. The AQGGMP would also include a Centralised Gas Management Plan (CGMP) which includes detailed measures to minimise the impacts of gas venting and flaring on nearby receivers.
- 6.6.27 In addition, the recommended conditions would require Malabar to prepare an updated Spontaneous Combustion Management Plan, to ensure that combustion risks at the Maxwell Infrastructure site continued to be managed in an appropriate manner.
- 6.6.28 The EPA has also recommended that all non-road diesel plant used on-site be required to comply with the US EPA's Tier 4 final or equivalent emissions standard. This requirement is reflected in the Department's recommended conditions.

Greenhouse Gas Emissions (GHGs)

Assessment of Impacts

- 6.6.29 The AQGGA includes an assessment of GHGs over the life of the Project. **Table 6-16** provides a combined emissions estimate for the construction and operational aspects of the development. These estimates are based on Malabar's proposed production schedules as outlined in the EIS.

Table 6-16 | Estimated GHGEs over the life of the Project (Mt CO₂-e)

Period	Scope 1	Scope 2	Scope 3
Sources	Fugitive gases from exposed coal seams & on-site diesel consumption	On-site electricity consumption	Purchase of diesel and electricity and the transport and consumption of product coal (75% coking / 25% thermal)
Annual average	0.37	0.04	12.1
Total	9.9	1.1	326

Note: Mt CO₂-e = Million tonnes of carbon dioxide equivalent

- 6.6.30 The majority of Scope 1 GHGEs (more than 90 percent) would be fugitive gas emissions associated with underground mining. The emissions identified in **Table 6-16** conservatively assume that no greenhouse abatement, such as flaring or beneficial use, occurs for the Project. However, as discussed below, this is unlikely to occur in practice and the actual Scope 1 emissions from the Project would be expected to be less than this figure.
- 6.6.31 Scope 3 emissions account for approximately 94 percent of the Project's total GHGEs, with the majority of these emissions (approximately 97 percent) arising from the consumption of coal for steel making and power generation by end consumers.
- 6.6.32 The Scope 3 emissions estimates in **Table 6-16** assume that 100 percent of product coal is transported to the Port of Newcastle for export, primarily to the Asian market. Malabar has indicated that potential export destinations include Japan, India, South Korea, China, Taiwan, Vietnam, Indonesia, Malaysia and Brazil.
- 6.6.33 Additionally, Malabar is seeking flexibility to sell small quantities of thermal coal domestically to the Bayswater and Liddell Power Stations. Malabar submits that any domestic coal sales would replace supplies from existing sources and would already be reflected in Australia's GHGE accounting. Consequently, these emissions have not been quantified in the AQGGA.

Consideration of Climate Policy Frameworks

- 6.6.34 Under clause 14 of the Mining SEPP, the consent authority must consider the findings of the AQGGA, including its assessment of downstream emissions, in determining the Project. In making its determination, the consent authority must have regard to any applicable State or national policies, programs or guidelines, and where necessary, consider imposing conditions to ensure that GHGEs are minimised to the greatest extent practicable.
- 6.6.35 The Department has considered the findings of the AQGGA (including predicted Scope 3 emissions), having regard to both national and State-level commitments made under the 2016 Paris Agreement and *NSW Climate Change Policy Framework (CCPF)*.
- 6.6.36 Under the Paris Agreement, each country must identify its own post-2020 climate actions to achieve a balance between anthropogenic emissions and removal by GHGE sinks in the latter half of this century. These actions are referred to as Nationally Determined Contributions (NDCs).

- 6.6.37 Australia's NDC includes a commitment to reduce national GHGEs by between 26 and 28 percent from 2005 levels by 2030. Australia has committed to achieve this target through initiatives to expand renewable energy sources, support low emissions technologies, improve energy efficiencies and provide corporate incentives to reduce emissions. The CCPF outlines the State's long-term aspirational objectives of achieving net-zero emissions by 2050 and making NSW more resilient to a changing climate.
- 6.6.38 It is important to note that the established national and State policy frameworks do not seek to restrict private development in order to meet Australia's commitments under the Paris Agreement. Nor do these frameworks impose any prescriptive emissions criteria which can be applied in development assessments.
- 6.6.39 The EIS includes consideration of GHGEs, having regard to climate change projections and principles of ecologically sustainable development (ESD), including inter-generational and intra-generational equity. The environmental, social and economic costs of GHGEs generated by the Project have been considered in the cost benefit analysis in the EIS. Malabar has also proposed a range of mitigation measures to manage the residual costs of the Project. The proposed measures have been reflected, and in some cases strengthened, in the Department's recommended conditions.
- 6.6.40 The Department also notes that there are clear environmental benefits associated with the Project's location. As the Project would use existing processing and transport infrastructure, it would have a significantly smaller environmental footprint than a new facility established elsewhere (either in NSW, other States or Territories in Australia or internationally).

International Climate Policy and Coal Demand

- 6.6.41 With the exception of Taiwan, each of the potential consumer countries identified by Malabar are signatories to the Paris Agreement. The EIS includes a review of the current NDC's for each of the signatory countries, noting that these commitments are due to be updated in 2020. While it is not a signatory to Paris Agreement, Taiwan has committed to reduce GHGEs by 50 percent by 2050. Taiwan has also established a GHGE reporting scheme and a Greenhouse Gas Reduction Accreditation System in preparation for a future cap-and-trade program.
- 6.6.42 Malabar submits that Scope 3 emissions from the Project would be factored into GHGE accounting for each of the nine consumer countries. The consumer country would need to trade off the resulting Scope 1 emissions from the Project through its own emissions reductions schemes in order to meet their respective targets.
- 6.6.43 The Department recognises that recent years have seen an increased demand for renewably generated energy sources and that renewable energy sources are playing an increasing role in the overall energy mix. With the continued development of these resources there is even the potential for the development of coal-free steel making technologies over the long term. However, Malabar contends that coal-free steel making technologies are unlikely to be available on a commercial scale during the life of the Project.
- 6.6.44 This view is supported by the NSW Government's *Strategic Statement on Coal Exploration and Mining in NSW* (2020), which identified that in the medium term there will still be a strong global demand for both thermal and metallurgical coal for power generation and steel making.

6.6.45 Malabar also submits that the broad trend toward a 'decarbonised' global economy has been factored into the Economic Assessment of the Project (see **Section 6.10**). This assessment considered the potential impact of a sustained decrease in export coal prices and included the social cost of carbon emissions. Malabar contends that, even when these factors are considered, the Project would generate a significant net benefit to NSW.

Mitigation and Management of GHGs

6.6.46 Despite providing a conservative worst case estimate of the Project's GHG emissions in the absence of greenhouse abatement measures, Malabar has committed to implement a range of measures to minimise the Project's potential Scope 1 and 2 emissions. In particular, fugitive gas emissions from underground workings would be minimised through a combination of:

- storing gases underground within the goaf (where safe and practicable);
- flaring; and/or
- beneficial re-use for power generation.

6.6.47 Malabar has also committed to reduce on-site energy consumption through the selection and design of equipment and processes, maintaining plant and equipment and monitoring consumption of fuel and electricity. Malabar would also report annually on its energy consumption and GHGs through the *National Greenhouse and Energy Reporting Scheme*. Malabar has also committed to source electricity from renewable sources, such as the Maxwell Solar Project, where this is available and economically reasonable and feasible to obtain.

6.6.48 The Department has recommended conditions requiring Malabar to implement all reasonable and feasible measures to optimize energy efficiency and maximise the beneficial re-use of methane on site. These measures would be detailed in the AQGGMP and CGMP.

Conclusion

6.6.49 The Department has carefully considered the potential air quality impacts of the Project, paying particular attention to cumulative air quality issues in the locality and potential impacts on CICs. While the Department recognises that these issues are of significant concern for the local community, the weight of evidence provided in the EIS indicates that the proposed underground mine would have minimal impacts on air quality and adjacent agricultural operations.

6.6.50 The Department considers that any impacts associated with the Project can be effectively managed through a combination of proactive and reactive dust management measures outlined in a comprehensive AQGGMP.

6.6.51 The Department has also considered the likely GHGs associated with the Project. The Project is projected to generate 337 Mt CO₂-e over its lifespan, comprising 11 Mt CO₂-e of Scope 1 and 2 emissions and 326 Mt CO₂-e of Scope 3 emissions. While this impact may seem significant, the Department notes that these emissions levels should be considered relative to the global impacts that would arise from the recovery of alternative coal resources for power generation and steel making, and weighed against the potential economic and social benefits of the Project.

6.6.52 To ensure these impacts are appropriately addressed, the Department has recommended a range of conditions to minimise the Project's GHGs to the greatest extent practicable. On balance, the Department considers that the residual impacts of the Project are acceptable.

6.7 Traffic and Transport

- 6.7.1 The EIS included a Road Transport Assessment (RTA) prepared by The Transport Planning Partnership.

Existing Traffic Conditions

- 6.7.2 The Maxwell Infrastructure site is accessed via an existing access road off Thomas Mitchell Drive. Thomas Mitchell Drive is a local road maintained by MSC. It is accessible from Denman Road to the west and from the New England Highway to the east.³⁸
- 6.7.3 In addition to the Maxwell Infrastructure site, Thomas Mitchell Drive provides direct access to the Mt Arthur Coal Complex and the Muswellbrook Industrial Estate, and accommodates through-traffic to the Mangoola, Bengalla and Mt Pleasant Mines.
- 6.7.4 The RTA included a review of historical traffic data, supplemented by traffic surveys undertaken in 2018. The RTA indicates that more than 75 percent of vehicles travelling on Thomas Mitchell Drive are light vehicles. Peak traffic flows occur on weekdays from 5:00 am to 7:00 am and from 3:00 pm to 6:00 pm, aligning with shift changes at the nearby mines.
- 6.7.5 The RTA also observed that while most of the key intersections in the vicinity operate at Level of Service (LOS) A, the intersection of Thomas Mitchell Drive and Denman Road appears to be nearing capacity. During the evening peak hour, observed delays for vehicles turning right on to Denman Road were consistent with the upper range of LOS C.

Planned Changes to Road Network

- 6.7.6 In 2015, the Department commissioned the *Thomas Mitchell Drive Contributions Study, May 2015* (TMD Contributions Study).³⁹ The purpose of this Study was to assess the contribution of each mining operation to traffic generation on Thomas Mitchell Drive. Each mine is required pay a proportionate contribution for the upgrading and maintenance of the road, consistent with the findings of the Study, under the conditions of their respective development consents.

Upgrade of Thomas Mitchell Drive and Denman Road Intersection

- 6.7.7 As the largest contributor to mine-related traffic flows in the area, HVEC is required to upgrade the intersection of Thomas Mitchell Drive and Denman Road under Condition 47 of MP 09_0062. This condition requires HVEC to complete the upgrade by December 2017 or other timeframe agreed by the Planning Secretary. Following a significant downturn in production at the Mt Arthur Coal Complex in 2013, HVEC sought to defer the upgrade on the basis that the intersection had sufficient capacity to accommodate traffic generation by the reduced workforce at the Complex, as well as that of surrounding mining operations.
- 6.7.8 In May 2016, the Planning Secretary granted a conditional extension of time to complete the upgrade by December 2022, provided that HVEC could demonstrate that the existing intersection had sufficient capacity to operate at an acceptable Level of Service (LoS) until December 2023. In March 2019, HVEC provided an updated traffic study indicating that,

³⁸ Denman Road is a State road which is funded by TfNSW and maintained by MSC

³⁹ This study was subsequently amended in 2018, to consider the proportionate impact of the Mt Pleasant Mine and to reflect that Drayton Mine had ceased operations

provided workforce numbers at the Mt Arthur Coal Complex remained at approximately 1,500, the intersection would not exceed its design capacity until 2028.

- 6.7.9 While HVEC is required to undertake or provide initial funding for the upgrade, the existing Mangoola, Bengalla and Mt Pleasant Mines must pay HVEC a proportionate contribution toward the upgrade costs, consistent with the TMD Contributions Study. As major mining operation on Thomas Mitchell Drive, should the Project be approved, Malabar would also be required to pay HVEC a proportionate contribution toward the upgrade.
- 6.7.10 In April 2020, HVEC advised the Department that it had commenced initial scoping and design work for the upgrading of the intersection, with a view to complete the upgrade by December 2022. HVEC also indicated that it will establish a committee of representatives from the other mining complexes to coordinate the necessary funding arrangements.
- 6.7.11 The Department notes that it would not be feasible for Malabar to upgrade this intersection any earlier than the December 2022 timeframe already proposed to be achieved by HVEC. In the interim, the Department has recommended conditions requiring Malabar to avoid use of this intersection, where practicable, until the intersection upgrade is completed (as discussed below).

Northern Realignment of Edderton Road

- 6.7.12 Under MP 09_0062, HVEC is also required to realign the northern portion of Edderton Road and its intersection with Denman Road, approximately 2.5 km to the west to allow the western expansion of open cut mining at the Mt Arthur Coal Complex (shown conceptually in **Figure 29** and **Figure 30**). Importantly, this realignment is separate from and unaffected by the Project.
- 6.7.13 Nevertheless, as the Project would realign a 3.2 km section of Edderton Road and its southern intersection at the Golden Highway, the Department has considered that the relative timing and cumulative effect of these upgrades.
- 6.7.14 In this regard, the Department notes that HVEC has already constructed the northern realignment and intends to open the road in the near future, in accordance with an approval granted in July 2020 by the Muswellbrook Shire Council. As part of this process, some minor works would be required to allow traffic to transition to this new road by the end of 2020.
- 6.7.15 Given that Malabar would only be constructing the southern realignment of Edderton Road prior to commencing longwall mining in the Arrowfield Seam (ie around 2032), the Department is satisfied that these separate road construction activities would not overlap or cause undue delays to road users.

Strategic Context

- 6.7.16 In 2015, MSC adopted a *Mine Affected Roads Network Plan* (MARNP) to assess and mitigate the impacts of mine-related traffic on the Council's local road network. MSC has recently commissioned update to this study, known as the draft *Mine Affected Roads Network Plan Review* (MARNP Review), which was placed on public exhibition in April 2020.

- 6.7.17 The key recommendations of MARNP and MARNP Review as they relate to the Project include MSC's proposed re-classification of Thomas Mitchell Drive as a State road and the potential to upgrade Edderton Road, including the Saddlers Creek crossing.⁴⁰ Additionally, the MARNP Review identifies broader opportunities to improve network connectivity in the LGA through the establishment of link roads (see **Figure 29**).
- 6.7.18 Importantly, the Department notes that these recommendations have not been endorsed by the State Government and represent MSC's view on its desired operation of the local road network. Consequently, while these studies may be considered as informative of MSC's views, they cannot be considered to represent State Government's policies or positions on the management of road impacts for State significant developments.
- 6.7.19 Notwithstanding, the Department notes that the Project is not inconsistent with MSC's broader road network plans as set out in the MARNP Review and would address an identified issue with the existing condition of the Saddlers Creek crossing on Edderton Road.

Proposed Traffic Arrangements

- 6.7.20 All Project-related traffic would enter and exit the site via the existing access point off Thomas Mitchell Drive. Workers based at the MEA would travel through the Maxwell Infrastructure site and along the new site access road within the transport and services corridor.
- 6.7.21 No operational vehicular access or deliveries would be permitted from the Golden Highway or Edderton Road, exception where access is required for land management purposes, environmental monitoring or works associated with the realignment of Edderton Road.

Assessment of Traffic Impacts

- 6.7.22 The RTA modelled the traffic impacts of the Project during the following scenarios:
- Initial construction phase (approximately 2020);
 - Year 6 (approximately 2026); and
 - Year 13 (approximately 2033).
- 6.7.23 The initial construction phase and Year 6 scenarios represent the peak construction and operational traffic impacts of the Project, respectively. Year 13 represents longer-term operational traffic, with a slightly reduced workforce.
- 6.7.24 The RTA conservatively assumed that the construction of the Maxwell Solar Project would occur in 2020. It also assumed that the Mt Arthur, Bengalla, Mt Pleasant and Mangoola Mines operate in line with the traffic projections in their respective traffic impact assessments.⁴¹ This included a projected workforce of 2,429 at the Mt Arthur Coal Complex.
- 6.7.25 The modelled performance of the three key intersections affected by the Project is shown in **Table 6-17**. The location and geometry of these intersections are shown in **Figure 30**.

⁴⁰ The MARNP Review indicates that segments of Edderton Road, including the Saddlers Creek crossing are currently in 'poor' condition

⁴¹ Under their existing development consents, mining operations at the Mt Arthur Complex and Mount Pleasant Mine are permitted until 2026, consequently, these operations were omitted from the Year 13 (2033) modelling

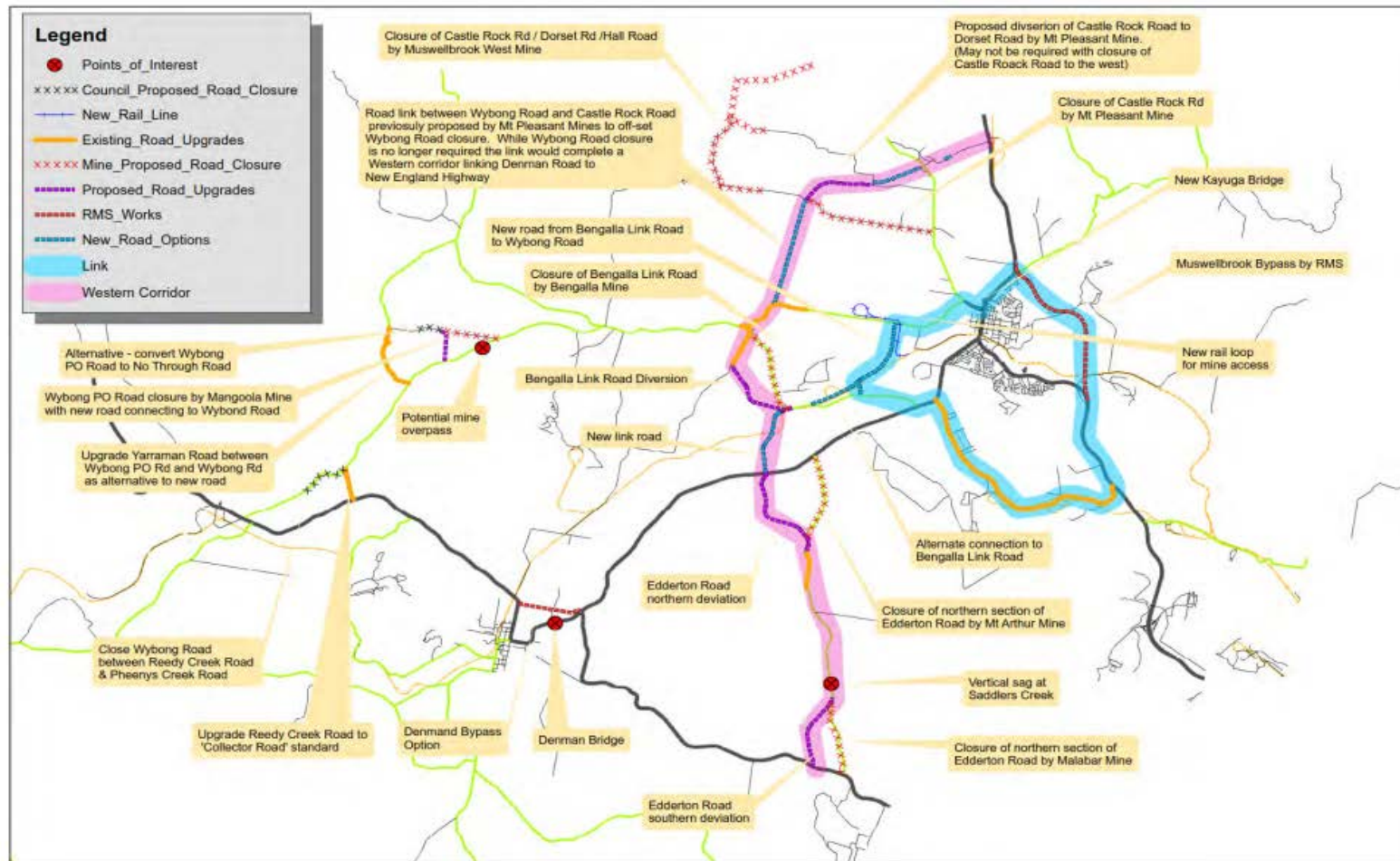


Figure 4.1: Road Network Changes and Opportunities

Figure 29 | Road network changes and opportunities – Draft Mine Affected Roads Network Plan Review (MSC, 2020)

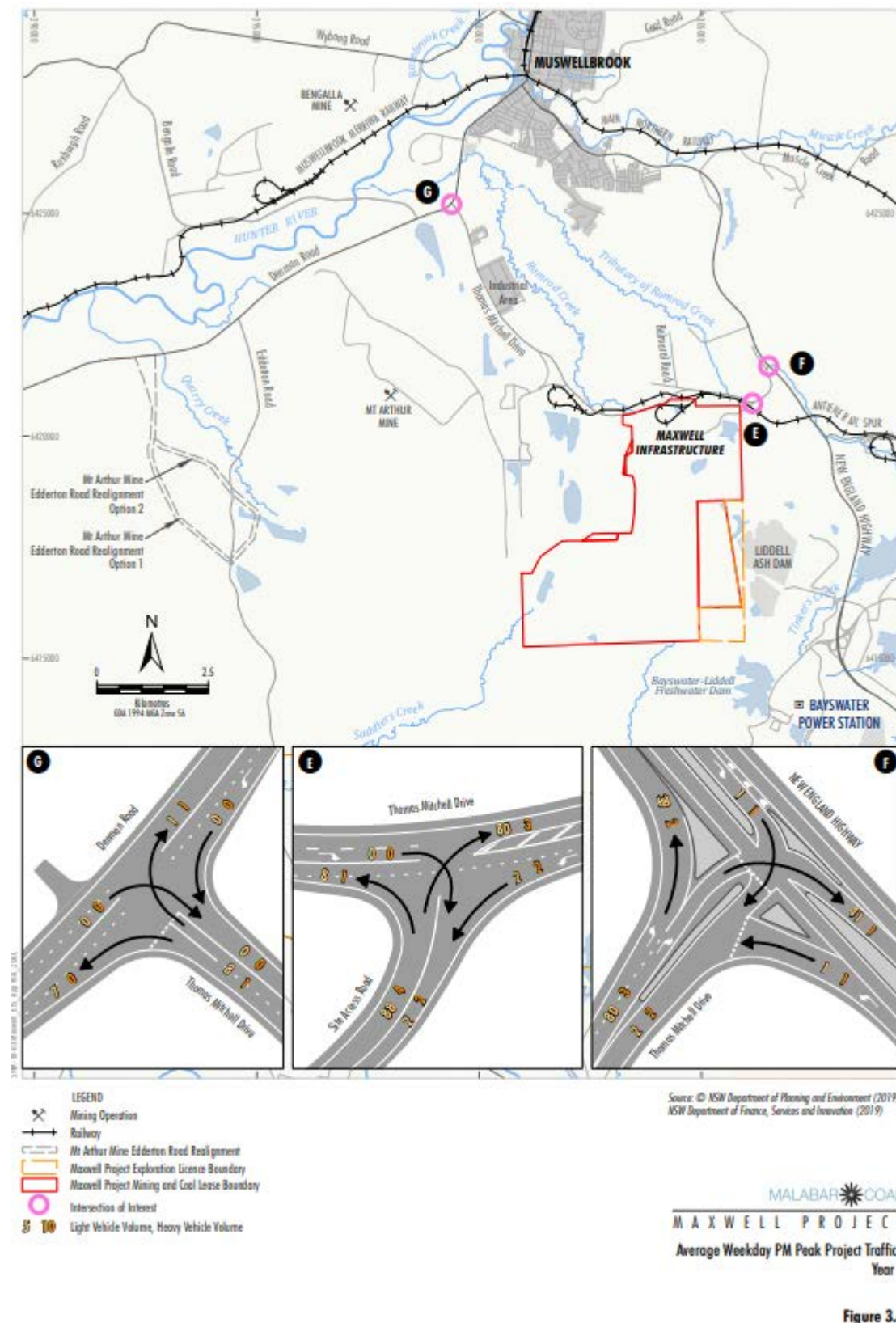


Figure 30 | Project-related traffic contributions during PM peak at key intersections – Year 6

Table 6-17 | Modelled Intersection Performance - RTA

Intersection	Peak Period	Average Delay (seconds)				Level of Service			
		Existing conditions	2020	2026	2033	Existing conditions	2020	2026	2033
Maxwell Site Access Road & Thomas Mitchell Drive (see inset “E” on Figure 30)	AM	12.3	17.4	16.2	13.4	A	B	B	A
	PM	9.2	10.1	9.4	8.7	A	A	A	A
Thomas Mitchell Drive & New England Highway (see inset “F” on Figure 30)	AM	12.7	13.6	13.2	13.0	A	A	A	A
	PM	13.8	14.8	14.0	14.3	A	B	B	B
Thomas Mitchell Drive & Denman Road (see inset “G” on Figure 30)	AM	29.2	30.5	29.1	42.6	C	C	C	D
	PM	>70	>70	>70	49.0	F	F	F	D

Table 6-18 | Modelled Intersection Performance – Supplementary Assessment with revised workforce numbers

Intersection	Peak Period	Average Delay (seconds)				Level of Service			
		2020 Without Project	2026 Without Project	2020 With Project	2026 With Project	2020 Without Project	2026 Without Project	2020 With Project	2026 With Project
Thomas Mitchell Drive and Denman Road (right-turn movement only)	PM	27.0	24.9	28.0	25.4	B	B	B	B

Notes:

- The AM Peak is between 6:00 am to 7:00 am
- The PM Peak is between 5:00 pm to 6:00 pm
- The projected delays and LoS in **Table 6-17** and **Table 6-18** are based on the existing treatment at the Thomas Mitchell Drive and Denman Road. Following HVEC's planned upgrades, this intersection is projected to operate at LoS A under all modelled scenarios.

Intersection of Thomas Mitchell Drive and Denman Road

- 6.7.26 The initial modelling in the RTA was based on the maximum workforce numbers associated with all mining operations using Thomas Mitchell Drive and indicated that all intersections would continue to operate at LOS A or B at all stages of the Project, except the intersection of Thomas Mitchell Drive and Denman Road, which was shown to be already operating at a LOS F during the PM peak hour (see **Table 6-17**). The RTA noted that this predicted failure would occur irrespective of the Project and that HVEC was already required to upgrade this intersection to a LOS A intersection under the separate project approval for the Mount Arthur Coal Complex.
- 6.7.27 However, TfNSW raised concerns that the RTA appeared to be relying on HVEC upgrading this intersection prior to the commencement of the Project. TfNSW advised that HVEC's intersection design is yet to be finalised and therefore advised that there was potential for traffic generation from the Project to occur before the completion of this intersection upgrade.
- 6.7.28 In considering TfNSW's advice, the Department noted that the intersection performance predicted in the RTA varied substantially from recent traffic studies that had been commissioned by HVEC and submitted to the Department to inform the timing of the required upgrade of the Thomas Mitchell Drive and Denman Road intersection.
- 6.7.29 The key apparent discrepancy between these reports was the RTA's adoption of conservative assumptions that all mining operations in the locality would be operating at full capacity, and HVEC's more contemporary traffic studies which reflected the workforce levels currently employed at these mines. Accordingly, the Department requested that Malabar undertake supplementary modelling regarding the current performance of the intersection.
- 6.7.30 Malabar's supplementary modelling took into account the substantially reduced workforce at the Mt Arthur Coal Complex⁴² between 2020 and 2026, along with potential construction traffic associated with the proposed Mangoola Continued Operations Project. These updated predictions are shown in **Table 6-18** and demonstrate that at current operational workforce levels the intersection is performing and would continue to perform at a LOS B.
- 6.7.31 As shown in **Table 6-18** and **Figure 30**, the Project's contribution to right-turning movements at the intersection would be very low (one light vehicle and one heavy vehicle only during the PM peak), with the majority of workers and delivery vehicles for the Project being expected to travel to and from the site via the New England Highway to the east. Accordingly, the current intersection would appear to have limited capacity to accommodate minor traffic flows from the Project, noting that HVEC has already commenced the process of seeking a Works Authorisation Deed with TfNSW for the upgrade of this intersection by the end of 2022.
- 6.7.32 Nonetheless, the Department has recommended conditions to ensure that Project-related traffic avoids use of this intersection, where possible, until the scheduled upgrades are complete.

⁴² HVEC's 2019 Annual Review reported that the current workforce at the Mt Arthur Complex has increased from approximately 1,500 FTE in 2018 to approximately 1,900 FTE. The supplementary modelling therefore assumed a total Mt Arthur workforce 15 percent less than original predictions in 2020 and 30 percent less in 2026.

Road Safety Audit

- 6.7.33 The RTA included a Road Safety Audit (RSA) of the key Project transport routes. The RSA identified potential areas of risk on Thomas Mitchell Drive and its intersections with Denman Road and the New England Highway. These issues relate primarily to line-marking and signage and the RTA notes that many of these issues would likely be addressed by planned upgrades. The RTA also recommended that a dedicated cycle lane be established at the New England Highway intersection, however, Malabar noted that this is a matter for consideration by TfNSW.
- 6.7.34 Notably, no recommendations were made in relation to the existing Maxwell Infrastructure site access, or the associated intersection.

Edderton Road Realignment

- 6.7.35 As discussed in **Section 6.3**, Malabar has committed to manage subsidence impacts on Edderton Road by:
- repairing the road in its current alignment during the extraction of the first two coal seams; and
 - realigning the southern portion of the road prior to commencing secondary extraction in the third seam (the Arrowfield Seam).
- 6.7.36 The realignment would affect a 3.2 km long section of Edderton Road, beginning at its current intersection with the Golden Highway (see **Figure 2**) and would be constructed to achieve a two-way, sealed rural road standard, with a newly constructed highway intersection, comprising a channelised right-turn lane and auxiliary left-turn lane.
- 6.7.37 Malabar has also agreed to upgrade the existing Saddlers Creek crossing, which is currently in a sub-optimal condition and subject to load limits, even though this crossing falls outside of the Project Area and would be unaffected by the Project.

Impacts on Equine CIC

- 6.7.38 As discussed in **Section 3.1**, Edderton Road forms part of the key transport route for the Equine CIC, linking Jerrys Plains with Scone and Aberdeen to the north.
- 6.7.39 The RTA indicates that the southern realignment would increase travel time along the transport route by 66 seconds. Together with HVEC's northern realignment the total combined additional travel time associated with the two alignments would be 2 minutes and 39 seconds. To minimise traffic delays associated with the construction of the new road alignment, the existing alignment of Edderton Road would remain open until the new alignment is fully constructed.
- 6.7.40 MSC's MARNP Review notes that equine transportation increases during breeding season, from July to December each year. During this time, each of the thoroughbred studs may make up to three trips along Edderton Road per day.
- 6.7.41 However, the MARNP Review also notes that maintaining the road in its current alignment for the duration of the Project would pose a significant risk to the road network, with resulting impacts on the Equine CIC. MSC concludes that while the proposed realignment would marginally increase travel time, it would involve less risk to the road network and users.

6.7.42 The Department also considers that such a minor increase in travel time is unlikely to cause significant distress to horses during transport or substantially increase risk in the event of an emergency. Furthermore, the Department considers that the minor increase in travel time associated with the southern realignment would be more than offset by the overall improvement in pavement condition, road safety and the upgrade of the Saddlers Creek crossing.

Transportation of Product Coal

6.7.43 As noted in **Table 2-1**, Malabar is seeking flexibility to allow a small proportion of product coal to be transported to the Bayswater and/or Liddell Power Stations, either by rail or by conveyor. No detail has been provided in the EIS regarding the construction of a new conveyor or any potential infrastructure sharing arrangement with HVEC. On this basis, the Department's recommended conditions would allow Malabar to transport product coal by rail only. Malabar would need to seek a modification or separate approval in future, should it wish to pursue a conveyor option.

Conclusion

6.7.44 The Department has carefully assessed the traffic impacts of the Project, having regard to issues raised in submissions as well as MSC's future plans for the local road network.

6.7.45 The Department considers that subject to the proposed subsidence management and realignment works being undertaken, the Project would not result in unacceptable impacts to road users or conflict with the MSC's future planning of the wider local road network.

6.7.46 The Department has recommended conditions requiring Malabar to construct the Edderton Road realignment and associated intersection in accordance with Austroads requirements and in consultation with MSC and TfNSW.

6.7.47 The recommended conditions would also require Malabar to:

- contribute to the upgrading and maintenance of Thomas Mitchell Drive, and the upgrading of its intersection with Denman Road, in accordance with the TMD Contributions Study;
- minimise disruption to road users during the ongoing repair and eventual realignment of Edderton Road;
- prepare and implement a Traffic Management Plan (TMP) for the Project, in consultation with MSC and TfNSW, which:
 - includes a protocol to avoid use of the intersection of Thomas Mitchell Drive and Denman Road until the upgrade is completed; and
 - minimises, to the greatest extent practicable, cumulative traffic impacts during the AM and PM peak periods, for example, by staggering shifts and avoiding concurrent shift changes with neighbouring mines.

6.7.48 The Department considers that the traffic impacts associated with the construction and operational phases of the Project can be appropriately managed under the recommended conditions and a detailed TMP.

6.8 Visual Impacts

- 6.8.1 The EIS included a Landscape and Visual Impact Assessment (LVIA) prepared by VPA Visual Planning and Assessment. This LVIA considered impacts on each of the Maxwell Underground and Maxwell Infrastructure sites separately, given their distinct and different visual settings.

Existing Visual Character

- 6.8.2 The Maxwell Infrastructure site is located in a highly industrialised landscape, comprising the existing open cut mining area and the approved but not commissioned Maxwell Solar Project, and is flanked by the Mt Arthur Coal Complex to the west and Liddell Power Station to the east.
- 6.8.3 The proposed extension of stockpiling areas, upgrading of mine infrastructure and installation of a new transmission line would largely occur within existing disturbance areas. Views of the Maxwell Infrastructure site from Thomas Mitchell Drive, receivers to the north and the Lake Liddell Recreation Area are screened by dense vegetation. Consequently, this area has low sensitivity to visual change and visual impacts on northern receivers are likely to be negligible.
- 6.8.4 On this basis, the Department's assessment has focused primarily on views of the Maxwell Underground site and associated impacts on southern receivers.
- 6.8.5 The broad landscape to the south and west of the Maxwell Underground site constitutes the Muswellbrook-Jerrys Plains Landscape Conservation Area (MJPLCA) (see **Figure 31**), which was listed by the National Trust of Australia in 1985 in recognition of its aesthetic significance.
- 6.8.6 The aesthetic values which are central to the MJPLCA are also central to the Equine and Viticulture CIC. Consequently, the Department's assessment of the impacts of the Project on the visual landscape and the Department's recommended conditions simultaneously address impacts to the landscape values of the area as well as from vantage points at particular receiver locations. Further consideration of the MJPLCA is discussed in **Appendix F**.
- 6.8.7 The Maxwell Underground site is located directly north of the rural landscape of Jerrys Plains and stretches of the Hunter River floodplains associated with the Equine and Viticulture CICs. Given the presence of rich farming land and manicured agricultural operations in this area, it is considered high sensitivity to visual change. Key sensitive receivers to the south include the Coolmore and Woodlands Studs, Hollydene Estate, Jerrys Plains village and other rural residences to the west, southwest and southeast (see **Figure 31**).
- 6.8.8 The MEA is located approximately 4.5 km north and northeast of the Coolmore and Woodlands Studs, respectively. **Figure 32** shows the physical relationship between the Project Area and the thoroughbred studs. The Coolmore and Woodlands Studs comprise a mixture of low-lying alluvial plains and rolling hills and ridgelines. The low-lying areas would have limited views of the Project, as the MEA would be located at the base of a valley and be separated from Coolmore and Woodlands Studs by intervening terrain. However, elevated vantage points at both properties would have distant, partial of the views of the Project.
- 6.8.9 The Project would not be visible from Hollydene Estate or the Golden Highway. However, the MEA would be visible from one location on Edderton Road at a distance of approximately 3 km.

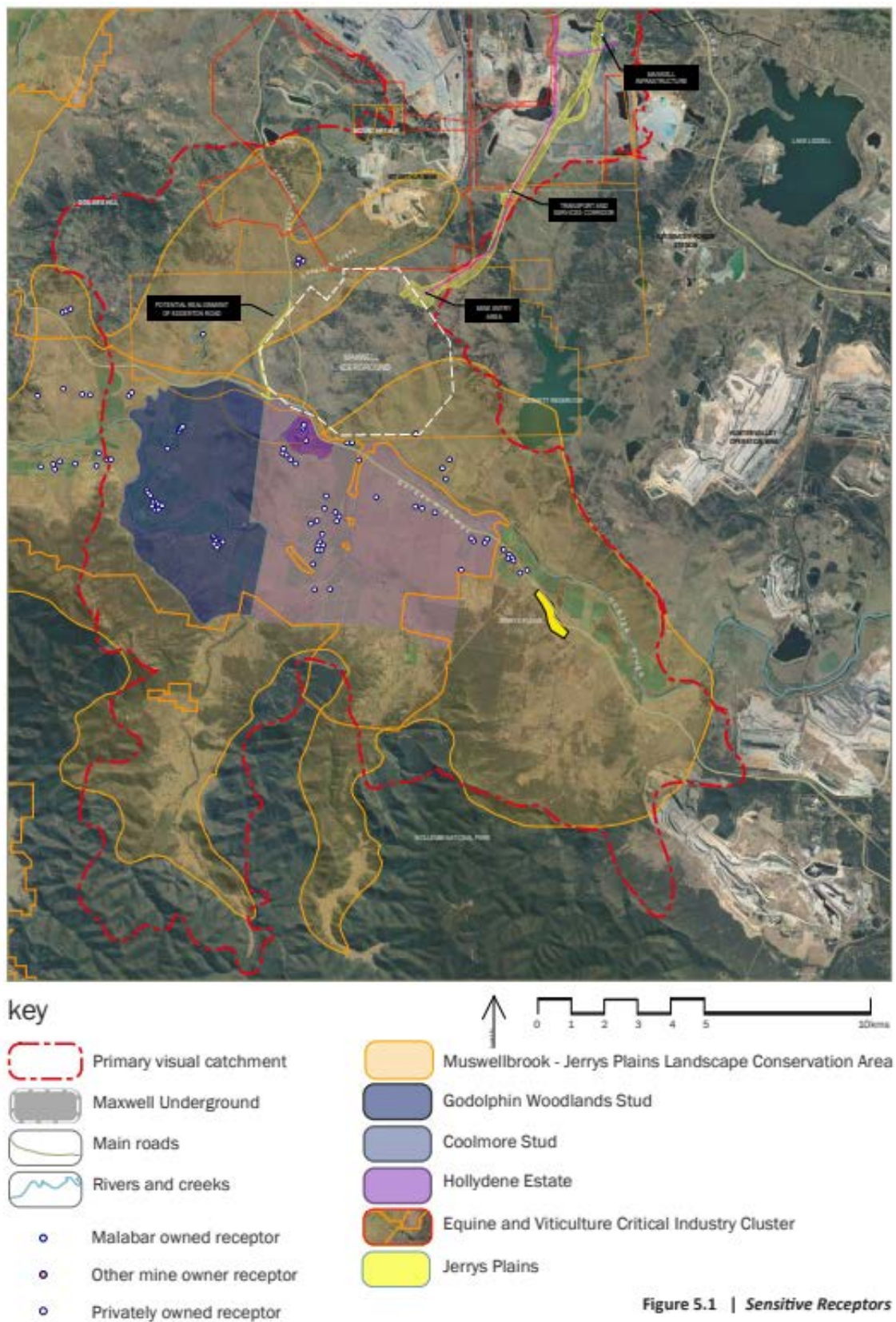


Figure 31 | Key sensitive visual receivers

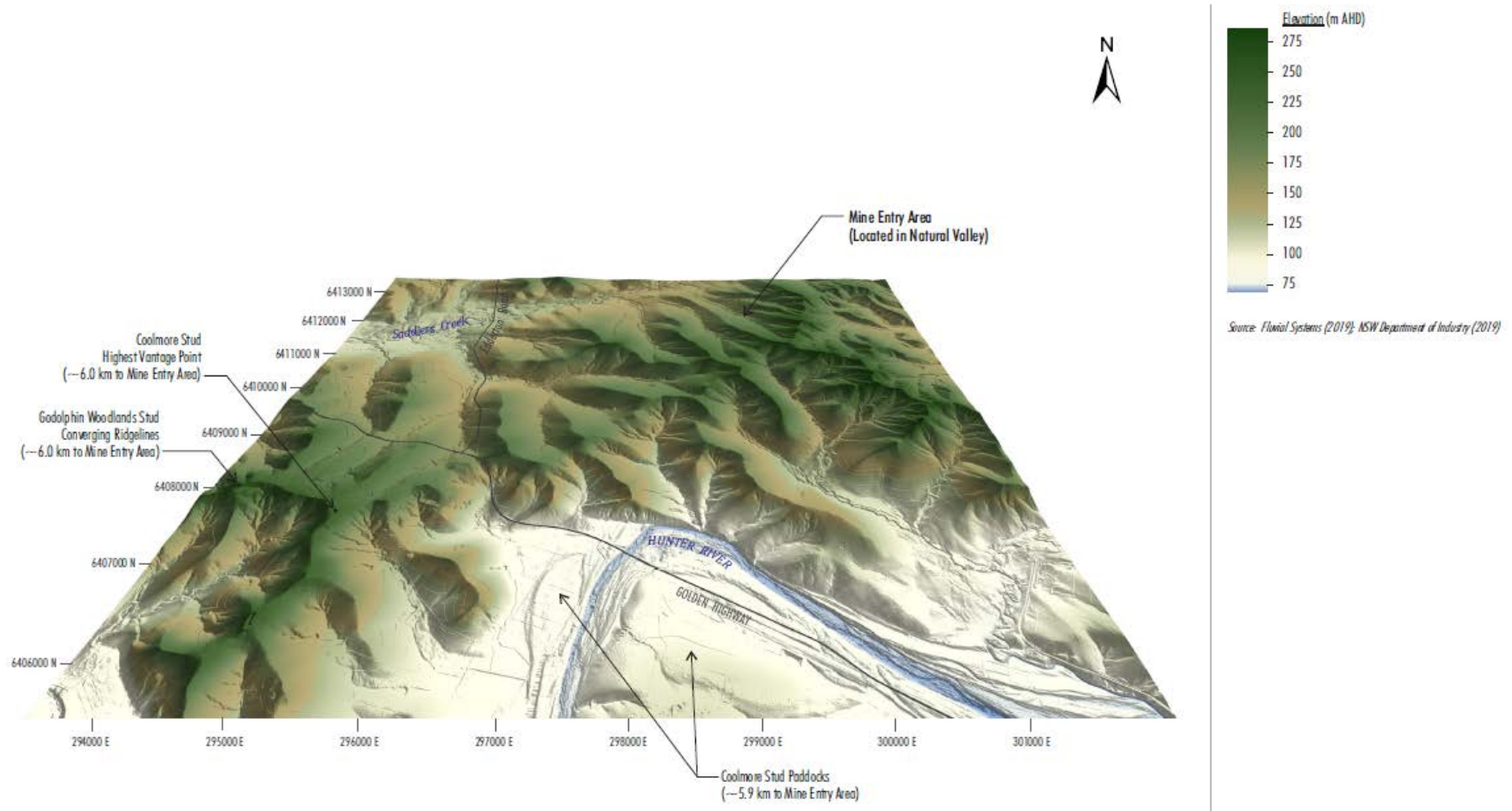


Figure 32 | Topographical context - Maxwell Underground MEA

- 6.8.10 Rural residences of particular note include the historic village of Jerrys Plains, located approximately 10 km southeast of the MEA, as well as a number of privately-owned historic homesteads to the south of the MEA. Many of these homesteads are associated with the Equine CIC and include Arrowfield Cottage, Randwick Homestead, Woodlands Homestead, Plashett Homestead and Strowan Homestead. Due to the presence of intervening topography and vegetation, the Project would not be visible from the village or any of these homesteads.
- 6.8.11 However, there are two mine-owned historic homesteads that would have limited views of the Project. These homesteads include the Edderton Homestead, located approximately 3 km northwest of the MEA and owned by HVEC, and the Bowfield Homestead, located approximately 6 km west of the MEA and is owned by Malabar.

Visual Impacts

Visual Components of the Project

- 6.8.12 The key visual components of the Project are the proposed MEA at the Maxwell Underground site and the transport and services corridor.
- 6.8.13 The MEA would include coal handling infrastructure and ROM coal stockpiles up to 25 m high, as well as laydown and assembly areas, administration facilities, workshops, parking areas for heavy vehicles, machinery and employee vehicles.
- 6.8.14 The transport and services corridor would contain a two-lane sealed road, overland ROM coal conveyor with supporting towers, water pipelines and a 66 kV electricity transmission line, linking the MEA to the Maxwell Infrastructure site.
- 6.8.15 As the construction of the transport and services corridor would necessitate the clearing of native vegetation and cutting into hillsides, the LVIA indicates that visual impacts would be greatest during the first two years, views would be softened as exposed banks gradually revegetate. In addition, built aspects of the transport and services corridor would be painted in subdued colours to better blend into the landscape.
- 6.8.16 Additionally, there is potential for night-lighting impacts associated with the 24 hours per day operation of the Project, including headlight glare from vehicles travelling along the transport and services corridor and night-time glow from fixed and mobile lighting equipment.
- 6.8.17 Visual impacts associated with the proposed Edderton Road realignment are considered to be minimal, as construction-related impacts would be of limited duration and, once complete, the new road alignment would remain in keeping with the visual character of the area.

Assessment of Visual Impacts

- 6.8.18 In order to assess the visual impacts of the Project, the VLIA included a detailed assessment of various representative viewing points surrounding the Maxwell Underground site. These sites are shown in **Figure 33** and include:
- three locations within the Coolmore Stud, including the highest vantage point, the main internal road (Oak Range Road) and a horse paddock with views of the property and surrounding landscape;

- three locations within the Woodlands Stud, including the highest vantage point, a separate lookout area and the Manager's residence; and
 - the existing and proposed alignments of Edderton Road.
- 6.8.19 The LVIA indicates that the Project would not be visible from Oak Range Road (VP1) or the horse paddock at the Coolmore Stud (VP2). However, a small section of the transport and services corridor would be visible from the highest vantage point (VP3) at a distance of approximately 7.5 km (see **Figure 34**).
- 6.8.20 Similarly, the LVIA indicates that the Project would not be visible from the lookout (VP5) or the Manager's residence (VP6) at the Woodlands Stud. However, the transport and services corridor would be partially visible from the highest vantage point (VP4) a distance of approximately 6.8 km (see **Figure 35**).
- 6.8.21 The MEA would not be visible at any of the Equine CIC locations assessed in the LVIA, as views would be shielded by a series of intervening ridgelines. In total, the visible components of the Project would occupy less than 1 percent of the overall view from the highest vantage points at each of the properties and are unlikely to be distinguishable from the surrounding landscape.
- 6.8.22 Given that residences and horse paddocks within the Coolmore and Woodlands properties are typically located at lower elevations, light spillage from the MEA and the transport and services corridor is unlikely to impact these locations. Nevertheless, the Department has recommended conditions to mitigate potential glow from fixed and mobile plant.
- 6.8.23 The MEA and transport and services corridor would both be visible from Edderton Road, near the Saddlers Creek crossing (VP11), at a distance of approximately 3.8 km (see **Figure 36**). Views would be fleeting, as vehicles would typically be travelling at approximately 80 km/h along this section of the road.
- 6.8.24 In particular, the Department notes that views along Edderton Road would be substantially more affected by views of the approved open cut mining at the Mt Arthur Coal Complex.
- 6.8.25 While the incremental visual impacts of the Project would be negligible, the Department has sought to minimise cumulative visual impacts along the key transport route for the Equine CIC. The Department's recommended conditions would require Malabar to establish and maintain suitable tree screens to shield views of the MEA from the Saddlers Creek Crossing. The Department notes that Malabar has already commenced screen planting in this location.

Mitigation and Management

- 6.8.26 The Department's recommended conditions would require Malabar to take all reasonable steps to minimise the visual impacts on the Project, including:
- ensuring that all fixed and mobile lighting equipment is directly downward, except where required for safety purposes; and
 - ensuring that all new works and structures are designed to blend in with the surrounding landscape.



Key:

Coolmore Locations

VP1 – Oak Range Road

VP2 – Horse paddock

VP3 – Highest vantage point

Godolphin Locations

VP4 – Highest vantage point

VP5 – Lookout

VP6 – Manager's house

Other Locations

VP7 – Jerry's Plains Village

VP9 – Golden Highway

VP11 – Edderton Road at Saddlers Creek

VP12 – Edderton Road realignment

Note: VPs 8 and 10 are not shown on this figure

Figure 33 | Maxwell Underground viewpoints assessed in LVIA

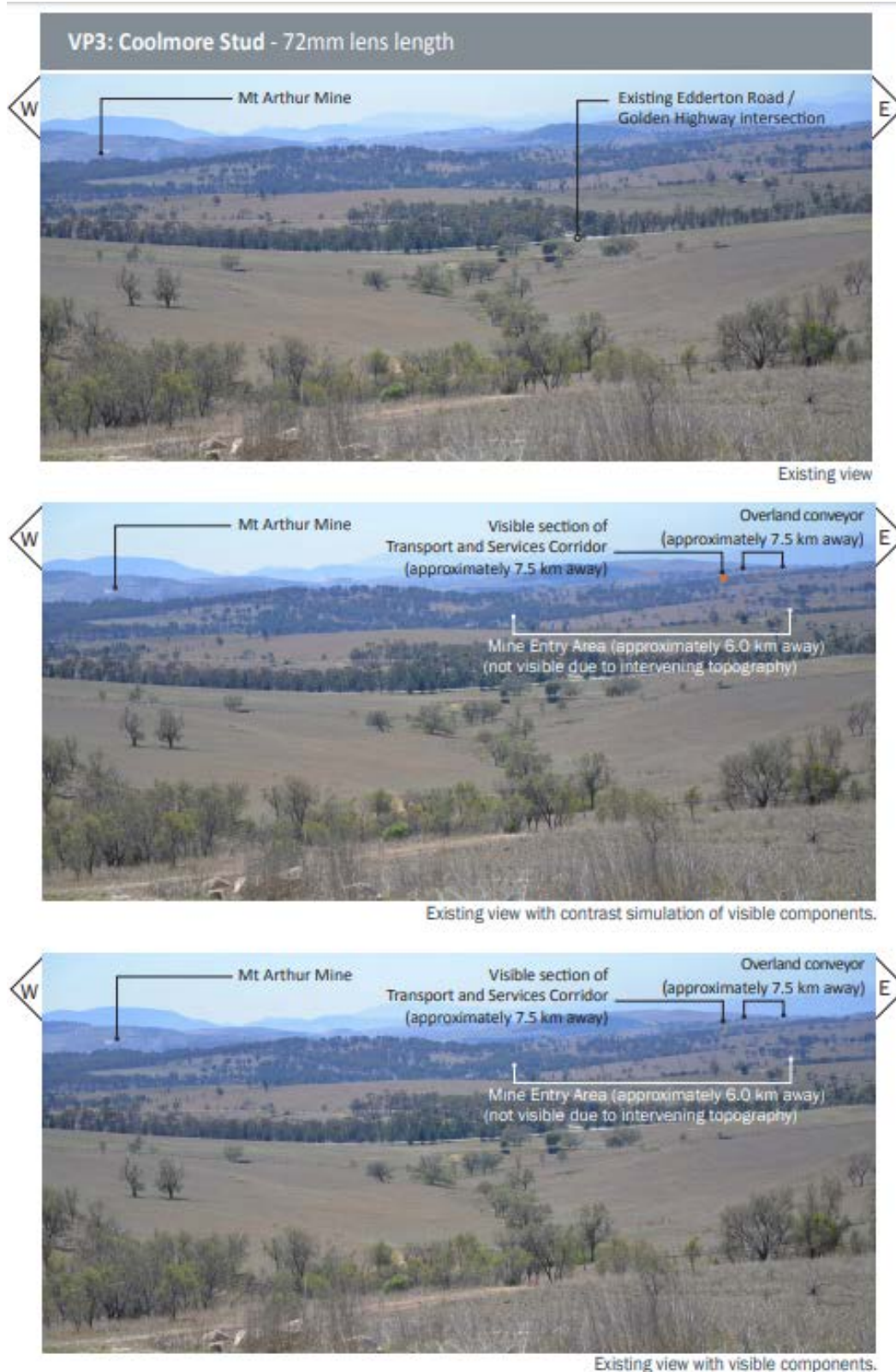


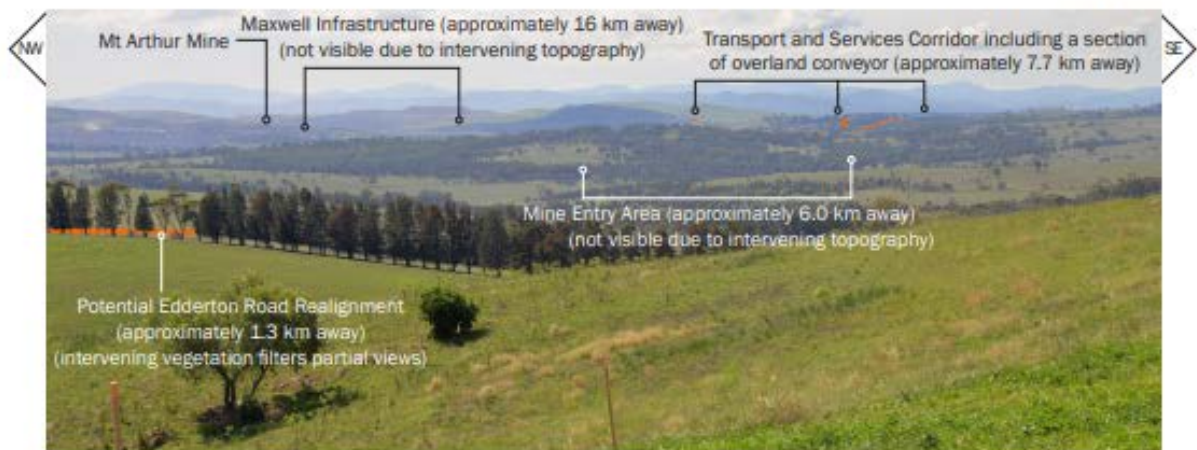
Figure 6.4c | Photomontage VP3 - Coolmore Stud - view towards Mine Entry Area

Figure 34 | Photomontage from highest vantage point at Coolmore Stud

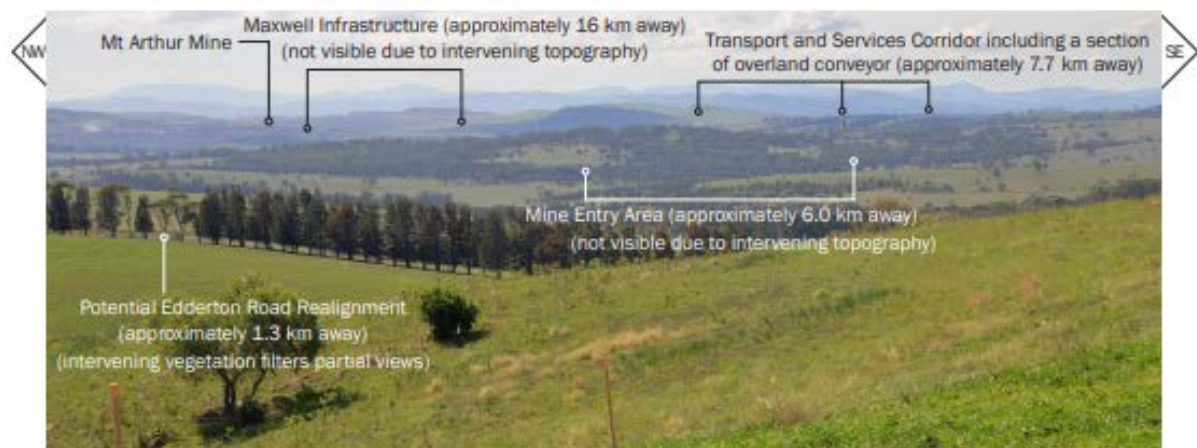
VP4: Godolphin Woodlands Stud - Converging Ridgelines | E 150°47'16.82" / S 32°27'28.24"



Existing view.



Existing view with contrast simulation of visible components.



Existing view with Project components.

Figure 6.5 | Photomontage VP4 - Godolphin Woodlands Stud - Converging Ridgelines to Mine Entry Area

Figure 35 | Photomontage from highest vantage point at Woodlands Stud

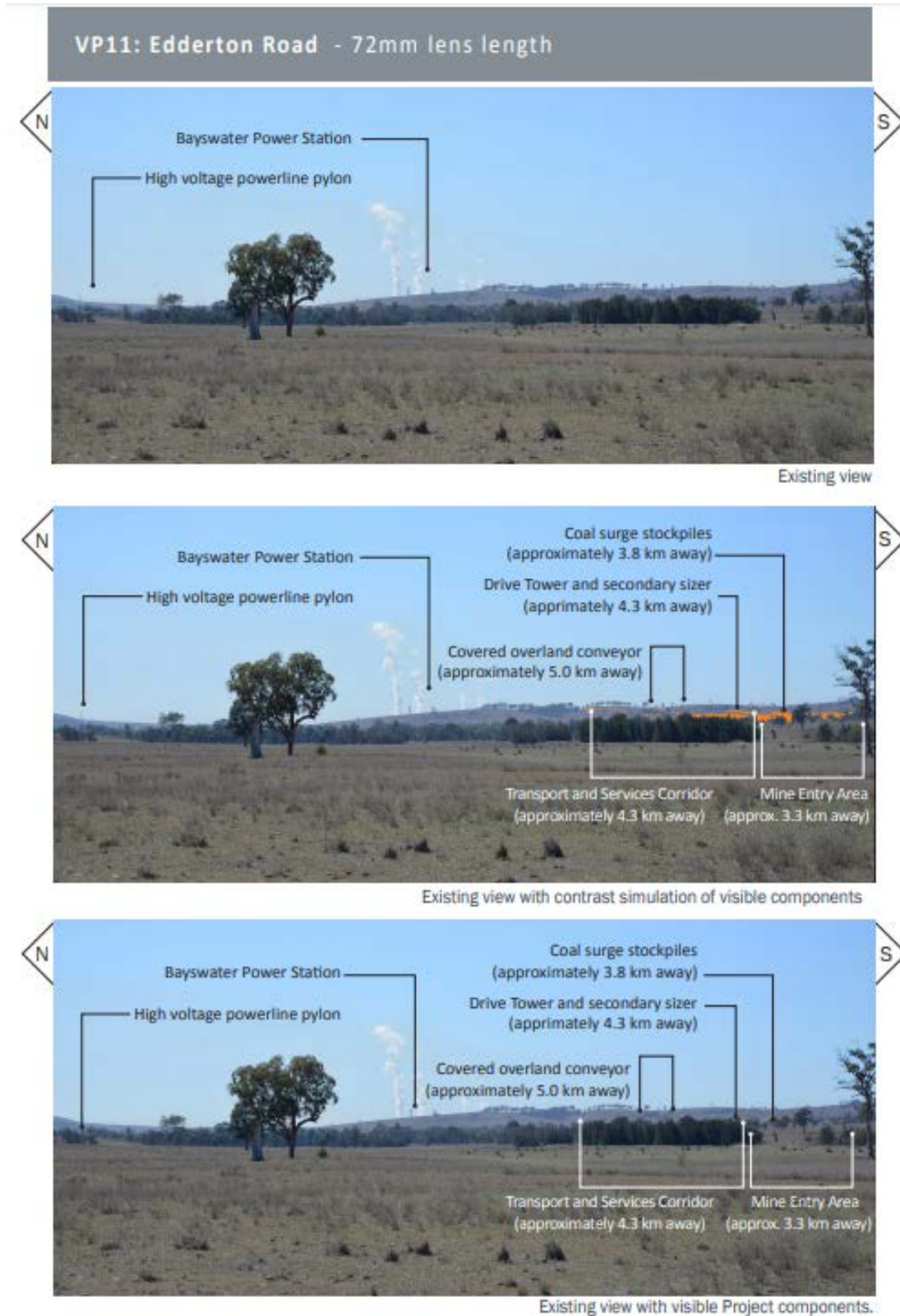


Figure 6.13c | Photomontage VP11 - Edderton Road to Mine Entry Area

Figure 36 | Photomontage from Edderton Road

6.8.27 Malabar would also be required to prepare a detailed Visual Impact Management Plan (VIMP) for the Project. The VIMP would need to include detailed measures to minimise visual impacts, including potential night-lighting impacts, during the construction and operational phases of the Project. The VIMP would also need to include a landscaping strategy to establish and maintain tree screens which minimise views of the Project from key vantage points, including Edderton Road and Edderton Homestead, to the greatest extent practicable.

Conclusion

6.8.28 Overall, the Department considers that the Project has been designed to minimise potential visual impacts on the surrounding locality. Given the underground nature of the Project, and the undulating nature of surrounding topography, the Project's surface infrastructure would not be visible from most locations in the private and public domains.

6.8.29 While components of the proposed transport and services corridor are expected to be visible from the highest vantage points at the Coolmore and Woodlands Studs, and from a selected location on Edderton Road, given the considerable separation distance, these components would be difficult to discern and are unlikely to materially alter the visual character of the landscape. Consequently, the Department considers that the visual impacts of the Project are likely to be negligible.

6.9 Social Impacts

6.9.1 The EIS included a Social Impact Assessment (SIA) prepared by Elliott Whiteing, in accordance with the Department's *Social impact assessment guideline for State significant mining, petroleum production and extractive industry* (SIA Guideline). Key stakeholders, including Coolmore and Godolphin, nearby residents, Registered Aboriginal Parties, local social infrastructure providers and MSC were consulted during the preparation of the SIA.

Existing Social Environment

6.9.2 The SIA indicates that both Denman and Muswellbrook rank in the bottom 20 percent of all suburbs in NSW in terms of socio-economic disadvantage. This is reflective of higher unemployment rates and lower rates of education attainment in Muswellbrook and an aging population in Denman. This also indicates that Denman and Muswellbrook may be less resilient in dealing with change and adverse economic circumstances. By contrast, employment and education levels in Jerrys Plains are generally consistent with regional averages across the Hunter Valley.

6.9.3 Residents in Jerrys Plains and Denman enjoy a quiet, rural way of life, with local social events and recreational activities based around outdoor activity, appreciation of the environment and celebration of cultural history. The SIA notes that mining families have become a key component of the local community, leading to higher employment and income levels.

Assessment of Social Impacts

6.9.4 The SIA identified a range of both positive and negative social impacts which may result from or be exacerbated by the Project. The key positive impacts of the Project relate to employment

opportunities and flow-on benefits associated with increased wages. The SIA also notes that the Project could help to offset the loss of approximately 600 direct jobs arising from the planned closure of the Liddell and Bayswater Power Stations by 2023 and 2035, respectively.

6.9.5 The key negative social impacts of the Project may include:

- potential stress and anxiety for nearby residents regarding the environmental, health and amenity impacts of the Project;
- negative perceptions regarding the Project's impacts on the Equine CIC, including potential:
 - damage to groundwater and surface water resources;
 - air quality impacts, noise, blasting and visual impacts (including lighting impacts); and
 - loss of customer confidence and damage to reputation due to the proximity of mining to the thoroughbred studs; and
- impacts associated with the influx of workers to the region, including increased demand for rental housing and potential strain on medical services, schools and childcare facilities.

6.9.6 The Project is predicted to comply with applicable assessment criteria, policies and guidelines with respect to water resources, air quality, noise, blasting and visual impacts. The Department's assessment also indicates that the impacts of the Project would be either negligible or virtually imperceptible at the Coolmore and Woodlands Studs.

6.9.7 The NSW Land and Environment Court has consistently held that when evaluating perceptions or fears regarding adverse impacts on health and amenity, a consent authority must consider the reasonableness of those perceptions, based on evidence. In the absence of a rational or justified foundation, these perceptions and fears can be given little weight in the Department's assessment of the Project.⁴³

6.9.8 In relation to the Project, the Department considers that the negative perceptions held by many submitters and anxieties over the certainty of planning outcomes for the region could be managed through suitable engagement strategies.

6.9.9 Malabar has proposed a range of measures to strengthen its relationship with surrounding landowners, and provide greater confidence for the equine industry, including:

- holding six-monthly neighbour meetings for at least the first three years of the Project;
- establishing a 24-hour complaints line; and
- undertaking improvements within Malabar-owned land, including fencing and road-side planting, to provide greater visual consistency with the nearby studs.

6.9.10 The SIA indicates that in the absence of significant environmental or amenity impacts, and with suitable engagement strategies in place, negative perceptions and anxieties regarding the Project and its effects on the 'clean, green and serene image' of the Equine CIC, are unlikely to persist. Impacts on the Equine CIC are considered further in **Section 6.11**.

⁴³ *Telstra Corporation Ltd v Hornsby Shire Council* [2006] NSWLEC 285

Voluntary Planning Agreement

6.9.11 In order to address any residual social impacts of the Project, Malabar has offered to enter into a Voluntary Planning Agreement with MSC. While Malabar has engaged in extended negotiations with MSC regarding the terms of this agreement, the final terms have not yet been agreed. The terms proposed by Malabar and MSC are outlined in **Table 6-19** below.

Table 6-19 | Summary of VPA terms proposed by Malabar and MSC

Funding Type	Malabar's Initial Offer	MSC's Offer	Malabar's Revised Offer	
			Pre-Longwall Mining	During Longwall Mining
Community Contribution	\$350,000 p/a	\$500,000 p/a	7 cents per tonne of product coal sold ^a	\$350,000 per year, plus 7 cents per tonne of product coal in excess of 5 Mt transported from the site ^a
Road & Infrastructure	Contributing to maintenance of Thomas Mitchell Drive in accordance with TMD Contributions Study	Annual contribution based on tonnage of coal extracted	No change – contributions as per TMD Contributions Study	
Contribution towards engagement of MSC Environmental Officer	\$10,000 p/a	\$20,000 p/a	\$20,000 p/a	
Training & Employment	Employing at least one apprentice and two trainees at all times	Malabar to use its best endeavours to engage at least four apprentices per year, over the Project life	Employ 2 two apprentices per year ^b	Employ four apprentices per year ^b

Notes:

^a Payments would be subject to CPI adjustments

^b The Applicant must use all reasonable and feasible endeavours to engage apprentices who are permanent residents of the Muswellbrook Shire LGA

6.9.12 The NSW Government's *Draft Planning Agreement Guidelines for State Significant Mining Projects July 2015* (PA Guidelines) apply an acceptability test for all VPAs for mining projects.⁴⁴ An acceptable agreement must:

- be directed towards proper or legitimate planning purposes;
- provide for public benefits that bear a relationship to development;
- provide outcomes that meet the general values and expectations of the public and protect the overall public interest; and
- protect the community against planning harm.

⁴⁴ The 'acceptability test' is also outlined in the *Development Contributions – Practice Note* (DIPNR, 2005)

- 6.9.13 The PA Guidelines provide that the value of any contributions made under a proposed VPA 'must be fair and reasonable, considering the impacts of the mine on the local community.' However, there is no prescribed methodology for determining the quantum of community contributions under a VPA. While these agreements are relatively routine in the context of mining projects, they remain voluntary and the precise quantum may vary considerably depending on the scope of a Project's impacts. As such, the PA Guidelines provide flexibility for Councils and Applicants to negotiate a mutually agreeable outcome.
- 6.9.14 The quantum is generally based on a percentage of the Project's CIV (typically in the order of 1 percent) or a fixed rate per tonne of coal produced. However, the Department notes that neither approach necessarily reflects the scope of a Project's impacts, particularly in the case of an underground mining project, in which the CIV is often high, and amenity impacts per tonne of product coal are relatively low.
- 6.9.15 Following negotiations between the parties, Malabar has agreed to MSC's proposed contributions for training and employment and the engagement of an Environmental Officer. Malabar has also increased its community contribution to include a supplementary payment per tonne, where annual output exceeds 5 Mtpa (see **Table 6-19**).
- 6.9.16 In considering Malabar's revised offer, the Department agrees that an annual contribution to local road maintenance is not warranted, on the basis that:
- the Project does not involve product transport by road;
 - with the exception of Thomas Mitchell Drive, the key transport routes to and from the site would occur via the State road network;
 - MSC has recently upgraded the majority of Thomas Mitchell Drive to accommodate mining traffic and has existing funding arrangements in place to complete these works, with contributions paid by mining operators in accordance with the TMD Contributions Study;
 - Malabar would be required to make separate contributions for the maintenance of Thomas Mitchell Drive as outlined in the TMD Contributions Study;
 - any subsidence induced impacts to Edderton Road would need to be fully repaired and paid for by Malabar; and
 - Malabar would pay for the realignment of Edderton Road and upgrade of Saddlers Creek crossing to Austroads Standards prior to secondary extraction in the Arrowfield Seam.
- 6.9.17 Based on Malabar's indicative production schedule for the Project, the total value of proposed payments under **Table 6-19** would be in the order of \$9.6 million over the life of the Project. This equates to 1.89 percent of CIV. This figure does not include the value of the apprenticeship program, which is difficult to quantify. In addition to the VPA payments outlined in **Table 6-19**, Malabar would also contribute \$47,300 to MSC for the MARNP and continue to support various local charities and sporting groups.
- 6.9.1 The Department considers that the revised terms proposed by Malabar are fair and reasonable notes that the total contributions proposed by Malabar over the life of the Project are considerably higher than is typical for a Project of this nature and scale. Additionally, these total contributions would be well in excess of the 1% levy cap used to guide development contributions to Councils under Section 7.12 of the EP&A Act and under MSC's *Muswellbrook Shire Council Section 94A Development Contributions Plan 2010*. Consequently, the Department considers that the proposed VPA, if agreed by MSC, would meet community expectations and deliver material community benefits over the life of the project.

- 6.9.2 MSC has advised that it is 'generally supportive' of the revised terms in **Table 6-19**. However, MSC has stressed that it has not made a final decision on Malabar's VPA offer and has reiterated its concerns regarding the Project's impacts on the local road network. While the Department considers that a fair agreement can be reached between the two parties, this is unlikely to occur prior to the determination of the Project.
- 6.9.3 The PA Guidelines provide that in the event that negotiations are stalled, a mediator may be appointed. However, both parties would need to enter into a mediation process voluntarily and agree to be bound by the outcome. Moreover, this process may significantly delay the determination of the Project.
- 6.9.4 Alternatively, the Department may, in some circumstances, commission an independent review of a VPA offer made by an Applicant. However, this option would typically only be exercised where there is some doubt as to whether the Applicant's offer is adequate. In this case, Malabar's offer is considered fair and reasonable and a peer review may well lead to an outcome which is less favourable to the community than that which is currently proposed.
- 6.9.5 Importantly, in accordance with Section 7.7 of the EP&A Act, a consent authority cannot refuse to grant development consent on the ground that a VPA has not been entered into in relation to a proposed development. However, a consent authority can require a VPA to be entered into as a condition of a development consent, provided the VPA being required is in the terms offered by the Applicant in connection with the development application.
- 6.9.6 The Department's recommended conditions would require Malabar to make all reasonable efforts to enter into a VPA with MSC within six months of commencing construction. This VPA would need to, as a minimum, reflect the terms in Malabar's revised offer in **Table 6-19**. If the VPA is not entered into within the timeframe, then within a further 3 months, Malabar would be required to make a Section 7.12 of the EP&A Act contribution to Council commensurate to 1% of the capital investment value of the Project (ie \$5.09 Million), to be paid in annual installments over a 10 year period. These payments would be directed towards projects in the Muswellbrook area and would be made in accordance with Section 7.12 of the EP&A Act and the provisions of the *Muswellbrook Shire Council Section 94A Development Contributions Plan 2010*.

Mitigation and Monitoring

- 6.9.7 In addition to its proposed VPA offer, Malabar has committed to:
- prioritise recruitment of employees from the Muswellbrook, Singleton and Upper Hunter LGAs;
 - establish partnerships with Muswellbrook and Singleton High Schools to initiate training and apprenticeship programs;
 - promote workplace diversity, with a target of:
 - 50 percent of the operational workforce to be drawn from the non-mining sector; and
 - 20 percent female and 10 percent indigenous employees; and
 - provide agistment opportunities to local farmers on Malabar-owned land.
- 6.9.8 Malabar has also committed to mitigation measures to ease potential strain on social infrastructure and rental housing, including:

- advising MSC, Singleton Council and health and education providers of scheduled increases to the Project's operational workforce to inform local planning decisions;
- quarterly monitoring of the supply of housing for the first three years of the Project and encouraging incoming workers to seek accommodation in localities where supply is highest; and
- developing an engagement program with MSC, Upper Hunter Community Services and Aboriginal community leaders to identify any changes in housing availability for vulnerable social groups.

6.9.9 The Department has recommended conditions requiring Malabar to prepare a Social Impact Management Plan (SIMP). The SIMP would be developed in consultation with MSC, local affected communities and key stakeholders, including Coolmore and Godolphin. The SIMP would outline adaptive strategies to avoid, minimise and mitigate negative social impacts associated with the Project, as well any future negative impacts following mine closure. It would also identify opportunities to enhance the Project's positive impacts, for example, by supporting community services and facilities. Finally, the SIMP would include a program to monitor, review and report on the effectiveness of the plan over the life of the Project.

Conclusion

6.9.10 The Project has potential to create both positive and negative social impacts within the local community. On balance, the Department considers that the Project represents a net social benefit for the community, provided that the recommended conditions are implemented and any negative impacts are appropriately managed.

6.10 Economic Impacts

Costs and Benefits to NSW

6.10.1 The EIS included an Economic Assessment (EA) prepared in accordance with the NSW Government *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (2015). The EA estimated that the Project would generate incremental benefits to NSW in the order of \$1.034 billion, in net present value (NPV) terms. This includes:

- a net producer surplus of \$524 million;⁴⁵
- royalties of \$342 million; and
- company income tax (attributable to NSW) of \$168 million.

6.10.2 The CBA estimated that the environmental, social and transport costs of the Project would be in the order of \$65 million (NPV). Of this, approximately \$24 million would be attributable to NSW. The majority of these costs (approximately 80 percent) relate to GHGs generated by

⁴⁵ Net producer surplus includes dividend payments and future earnings for shareholders, as 48 percent of Malabar's total shareholding is held within NSW

the Project.⁴⁶ The remaining costs relate to air quality, noise and traffic impacts, including potential delays on Edderton Road.

- 6.10.3 The Project would also sterilize potential grazing land owned by Malabar, including land to be occupied by surface infrastructure and land to be secured in perpetuity for biodiversity offsetting purposes.
- 6.10.4 The CBA did not identify any costs associated with impacts on water resources, as the Project is not predicted to change the beneficial use category of groundwater in the vicinity and make good provisions would be applied where drawdown exceeds 2 m at privately-owned bores.
- 6.10.5 Consistent with the EA Guidelines, the CBA did not provide a quantitative assessment of the Project's potential visual and subsidence impacts or impacts on Aboriginal and historic heritage. Rather, these costs were assessed qualitatively. The EA concluded that these impacts would need to generate costs of \$105 million per year, in real terms, over the life of the Project, in order to negate the projected net benefits. Based on the Department's assessment of these impacts, this is considered highly unlikely.
- 6.10.6 Overall, the Project is expected to generate net benefits to NSW of over \$1 billion (NPV). This estimate assumes a discount rate of 7 percent, however the CBA also included a sensitivity analysis, applying alternative discount rates (ie 4 percent and 10 percent) and accounting for sustained decreases in export coal prices and the possibility of future carbon pricing.⁴⁷ Under all modelled scenarios, the Project is expected to result in a net benefit for NSW.
- 6.10.7 The EA also estimates that the Project would increase the Gross State Product by \$3.33 billion, and the Regional Gross Product by \$3.10 billion (NPV) over the life of the Project.

Local Economic Effects

- 6.10.8 The Project is expected to generate up to 250 full-time equivalent (FTE) jobs during construction. The operational workforce is projected to peak at 430 FTE jobs in approximately 2023, with an average of 350 FTE jobs between 2021 and 2030. The average workforce is then expected to decline to an average of 270 between 2031 and 2040, and to an average of 190 between 2040 and 2046.
- 6.10.9 The LEA provided an assessment of both positive and negative impacts within the "locality", which for the purposes of the EA, includes both the Muswellbrook and Upper Hunter LGAs.⁴⁸ The local costs of the Project, including traffic and air quality impacts, are estimated at \$300,000 per year during the establishment phase (Years 1 to 6) and \$400,000 during operations (Years 3 to 26).⁴⁹

⁴⁶ The CBA only considered Scope 1 and Scope 2 GHGEs, consistent with the *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals (April 2018)*

⁴⁷ The CBA sensitivity analysis included a scenario in which export coal prices are reduced by 25 percent

⁴⁸ The LEA did not consider economic effects within the neighbouring Singleton LGA, however, the EA indicates that flow-on effects within the Singleton LGA are likely as the Project workforce would be drawn from the broader Hunter region

⁴⁹ Note that the establishment and operational phases overlap as construction and operations would occur concurrently during the early years of the Project

6.10.10 The LEA estimates that the Project would employ, on an average basis:

- 42 local residents (FTE) per year throughout the establishment phase; and
- 121 local residents (FTE) per year throughout the operational phase.

6.10.11 The Project is predicted to increase net income in the locality by \$2.7 million per year in the establishment phase and \$7.6 million per year during operations, relative to average incomes in the area. The Project is also predicted to have local non-labour expenditure effects in the order of \$2 million per year during the establishment phase and \$43 million per year during operations.

Conclusion

6.10.12 The Department considers that the EA provides an appropriate assessment of the likely economic impacts of the Project. The Department considers that the Project would yield significant benefits to the local, regional and State economies, which would heavily outweigh its potential costs.

6.11 Land Use Compatibility

6.11.1 The Department has assessed the Project's potential impacts on the Equine and Viticulture CICs throughout this assessment report. This section provides a summary of potential impacts on these regionally significant industries.

Amenity Impacts

Air quality Impacts

6.11.2 As discussed in **Section 6.6**, the Project's predicted contribution to 24-hour average PM_{2.5} and PM₁₀ concentrations at the Coolmore and Woodlands Studs and Hollydene Estate would be less than 0.1 µg/m³ and 0.5 µg/m³, respectively. The Project is predicted to increase dust deposition levels at each of the three properties by less than 0.05 g/m²/month. Consequently, the air quality impacts on the Project are considered negligible and unlikely to impact horse health or the operation and reputation of the studs.

Noise Impacts

6.11.3 As discussed in **Section 6.5**, the construction and operational noise generated by the Project would remain well below the relevant assessment criteria under the NPfl and ICNG at the Coolmore and Woodlands Studs and at Hollydene Estate. Predicted noise levels at these locations are predicted to remain below 30 dB(A) at all stages of the Project.

6.11.4 Consequently, Project-related noise is unlikely to be discernable over background traffic noise along the Golden Highway and would be considered to result in negligible impacts.

Blasting Impacts

6.11.5 The Project would involve small-scale blasting during the initial construction of the MEA and transport and services corridor. These blasts would occur at least 4.5 km from the boundary of the Coolmore and Woodlands Studs and would be considerably smaller than those typically

used in open cut mining. Consequently, construction-related blasts are predicted to remain well below ANZEC overpressure and vibration criteria at privately-owned receivers and would be virtually undetectable at the Coolmore and Woodlands Studs.

- 6.11.6 Consistent with MP 06_0202 and Final Void Management Plan for the former Drayton Mine, Malabar has also sought to undertake limited blasting of final void highwalls at the Maxwell Infrastructure site in order to improve their slope and stability. These blasts would occur at least 10 km from the closest boundary of the Coolmore and Woodlands Studs and are not expected to have any discernable impact on the Equine CIC.
- 6.11.7 The Department's recommended conditions establish blast performance measures for the Project. These measures set strict overpressure and vibration limits for blasting activities at nearby sensitive receivers, including the Hollydene Estate and any residence at the Coolmore or Woodlands Thoroughbred Studs. The recommended conditions would also require Malabar to prepare a Blast Management Plan in consultation with Coolmore and Godolphin and establish appropriate notification and complaints systems.

Visual Impacts

- 6.11.8 As discussed in **Section 5.4**, the scenic character of the Equine CIC is central to its international reputation and economic viability. This scenic character is derived from its green hills, clean air and water and productive soil and is enhanced by the area's quiet rural amenity (see **Figure 37**). This scenic character extends beyond the boundaries of the individual thoroughbred studs and encompasses the overall experience of visitors travelling to and from those properties.
- 6.11.9 Visitors travel to the site along Edderton Road and the Golden Highway. Visitors to the Coolmore property may also travel by private plane or helicopter, with expansive views of the surrounding locality.
- 6.11.10 In recognition of the importance of these landscape values to the thoroughbred operations, the LVIA identified representative viewing locations at both the Coolmore and Woodlands studs where visitors would likely be taken to view the area.
- 6.11.11 As discussed in **Section 6.8**, the Project would not be visible from the majority of the Coolmore and Woodlands properties, however, the highest vantage points at both studs are expected to have partial views of the transport and services corridor from distances of approximately 7 km. Visible surface infrastructure would occupy a very small proportion of the overall viewshed at these elevated locations and would be difficult to discern.
- 6.11.12 As views of the Project are restricted to these elevated areas, it is unlikely that sensitive receivers within the Coolmore and Woodlands Studs would be adversely impacted by night lighting from the Project. Furthermore, night-time glow emanating from the Project is likely to be indistinguishable from surrounding mining and industrial operations, including the Mt Arthur Coal Complex and the nearby power stations (see **Figure 38**). Nevertheless, the Department has recommended conditions to mitigate potential night-lighting impacts, including the preparation of a VIMP (see **Section 6.8**).
- 6.11.13 The Department also considers that aerial views of the studs from planes and helicopters are unlikely to be significantly altered by the Project. The construction of surface infrastructure associated with the Project represents a relatively minor change to the landscape, when compared with the various open cut mining operations in the surrounding locality.

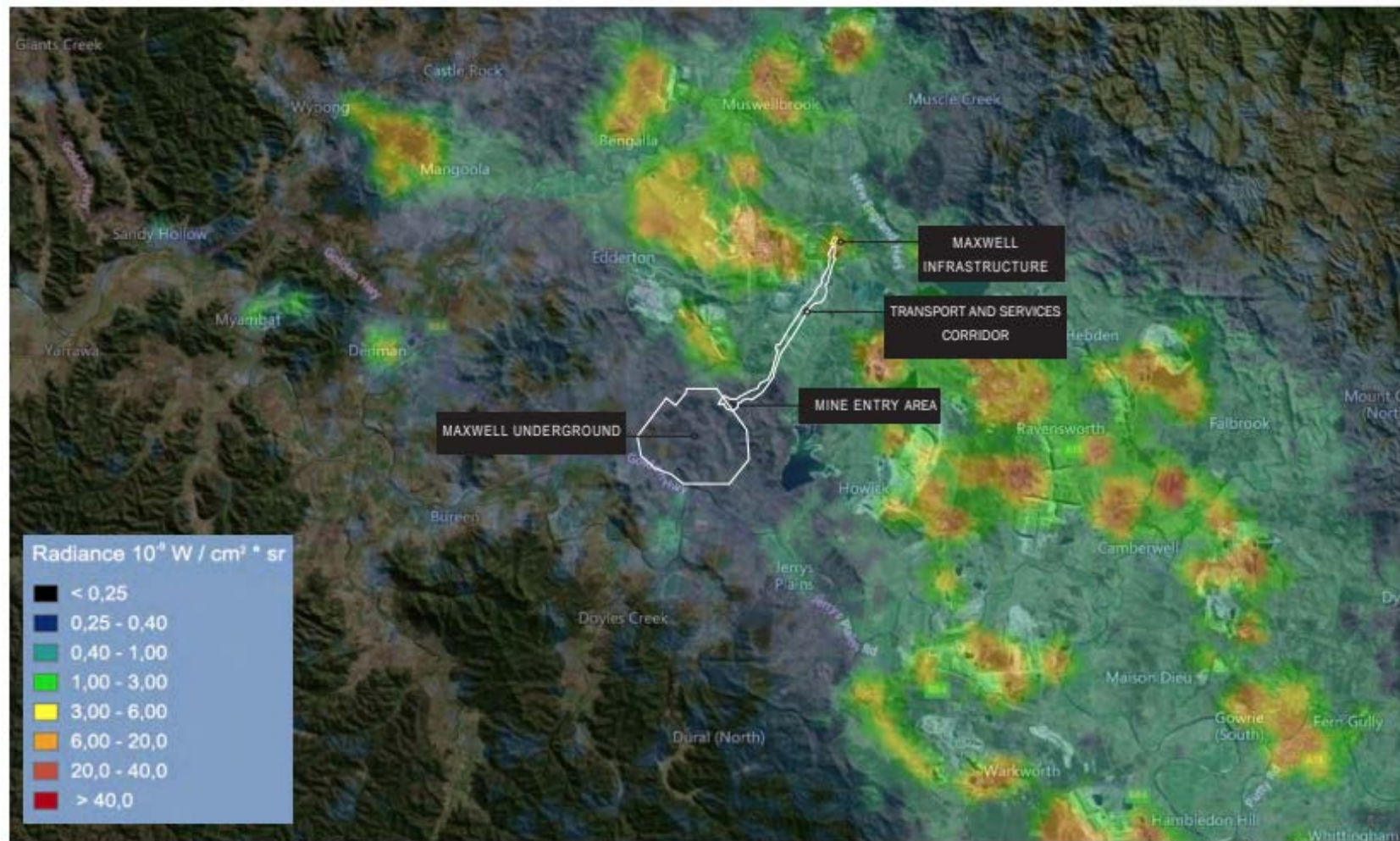


Godolphin Woodlands Stud



Coolmore Stud paddocks

Figure 37 | Views of Woodlands and Coolmore Studs



Source: <https://www.lightpollutionmap.info/> 2018 layer-

Figure 7.1 | Light pollution map - Hunter Valley region

Figure 38 | Night-time glow in the vicinity of the Project Area

6.11.14 Similarly, the Project is not expected to impact views from key transport routes for the Equine CIC. While the MEA and transport and services corridor would be visible from one vantage point on Edderton Road, Malabar has committed to undertake screen planting to shield views from this location (see **Figure 39**). The Department notes that screen planting at this location has already commenced. Measures to maintain and enhance this screen planting, if required, would be detailed in the VIMP.

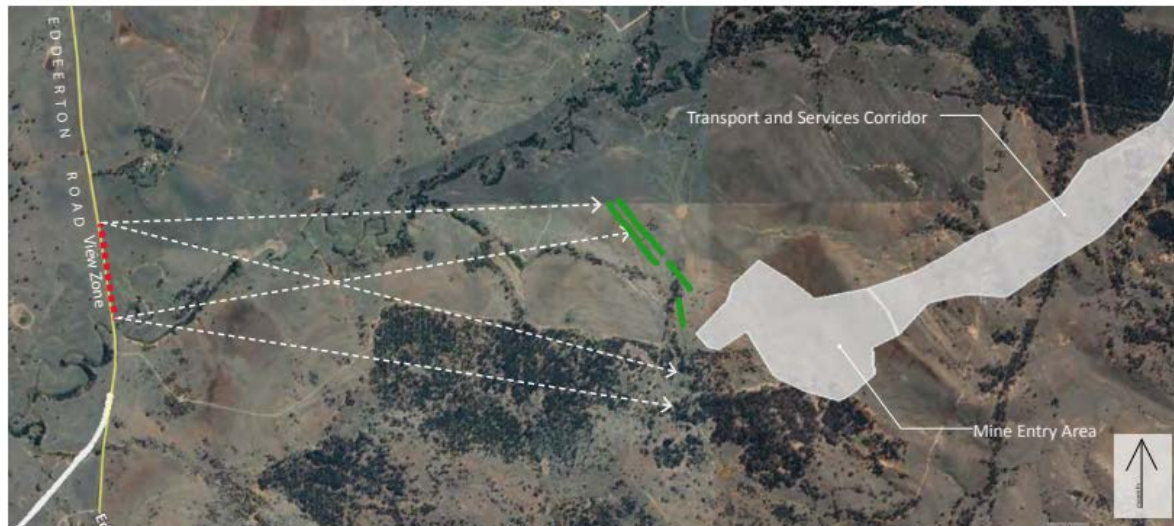


Figure 39 | Proposed screen planting near Edderton Road

Impacts on Equine Health

6.11.15 The impacts of coal mining operations on equine health were considered extensively during the assessment of the two previous Drayton South Coal Projects. An *Equine Health Impact Assessment* prepared by Associate Professor Nicholas Kannegieter in 2015 indicated that:

- dust generated by coal mining operations does not contain any significant endotoxins, moulds, bacteria or allergens that would be harmful to horses;
- an incremental $2 \mu\text{g}/\text{m}^3$ increase in annual average PM_{10} concentrations at the nearby thoroughbred studs would have a no detectable impact on equine health;
- overpressure associated with large blast events (for open cut operations) would have less impact on horses than thunderstorms or helicopters landing at the Coolmore or Woodlands Studs, and any blast-related vibration was unlikely to be detectable by horses at those properties;
- horses are more likely to be startled by thunderstorms, farm machinery or even the operation of lawnmowers than by blasting or operational noise from a distant coal mine; and
- light spillage from distant mining operations are unlikely to adversely impact breeding cycles.

6.11.16 On this basis, the Department concluded that an open cut mining proposal within EL 5460 was unlikely to have a significant adverse impact on equine health. As outlined above, Malabar's proposed Project substantially reduces the air quality, blasting and light pollution levels compared with the previous open cut proposals to negligible or virtually undetectable levels.

6.11.17 Consequently, the Department is of the view that the potential for impacts to horse health have been substantially reduced and satisfactorily addressed by the underground nature of the current proposal.

6.11.18 The Department's recommended conditions include a range of measures to mitigate potential air quality, noise, blasting and lighting impacts on human health in the surrounding locality. The Department considers that these measures would also serve to protect equine health.

Impacts on Water Supply

6.11.19 Submissions from Coolmore and Godolphin stressed the importance of maintaining the quality and quantity of water resources for stock watering and irrigation.

6.11.20 The Department recognises the importance of secure clean water supplies for the operation of the adjacent thoroughbred studs, but notes that the Project would not involve any direct water extraction from the Hunter River, is predicted to result in drawdown of less than 0.5 m in the Hunter River alluvium and would result in negligible baseflow losses to the Hunter River.

6.11.21 While the Project is predicted to result in depressurisation of the Permian coal measures and localised areas of drawdown in the alluvium associated with Saddlers Creek and Saltwater Creek and their tributaries, these impacts would largely be localised around the underground mining area, with minimal impacts to the majority of groundwater users in the locality.

6.11.22 Cumulative drawdown of more than 2 m is predicted at only one functional, privately-owned bore in the vicinity of the Project Area. The Department's recommended conditions include appropriate 'make good' provisions in this regard.

6.11.23 The Department has recommended a range of conditions to avoid, minimise and manage the Project's potential impacts on the quantity and quality of water available to downstream users. These conditions impose strict performance measures and require the development of detailed monitoring programs and Trigger Action Response Plans.

6.11.24 The Department is of the view that the Project's potential impacts on water resources can be appropriately managed under these conditions.

Conclusion

6.11.25 The Department has carefully assessed the impacts of the Project on the Equine and Viticulture CICs, particularly with respect to air quality, noise, blasting and visual impacts. Overall, the Department's assessment indicates that these potential impacts would be either negligible or virtually imperceptible at the Coolmore and Woodlands Studs.

6.11.26 The Department is of the view that Malabar has sufficiently demonstrated that the Project would not significantly alter amenity or landscape values in the vicinity of the Equine and Viticulture CICs and considers that the Project is likely to have a negligible impact on equine health.

6.11.27 With respect to interactions with the viticulture CIC, the Department notes that the operators of Hollydene Estate have expressed support for the Project and identified that Malabar's proposal to move to underground mining methods effectively resolved their concerns regarding compatibility and sustainable co-existence with previously proposed open cut mining operations.

6.11.28 The Department has recommended stringent conditions that require Malabar to implement best practice management of dust, noise, blasting and visual impacts over the life of the Project and to engage with Coolmore and Godolphin through the Project's Community Consultative Committee and during the preparation of key management plans.

6.11.29 Subject to the implementation of these conditions, the Department considers that the Project is unlikely to have any demonstrable impact on the reputation and viability of Equine and Viticulture CICs.

6.12 Rehabilitation and Final Landform

Approved Final Landform

6.12.1 The Maxwell Infrastructure site contains three existing open cut voids that are approved to be retained following the conclusion of mining operations under MP 06_0202.

6.12.2 The Department notes that the Environment Assessment for the Drayton Mine Extension Project identified opportunities for the backfilling of two of these voids (the North and East Voids), with the South Void to be retained as shown in **Figure 40**. However, the backfilling of the North and East Voids was dependent upon commercial agreements.

6.12.3 The East Void was intended to be backfilled with fly ash from the Bayswater and Liddell Power Stations, subject to agreement with AGL. Similarly, Anglo American indicated that the North Void could be utilised by HVEC for coarse reject emplacement, subject to separate agreements and approvals. As neither of these backfilling arrangements eventuated, the existing approval MP 06_0202 for Drayton Mine allows for the retention of three final voids as water storages.

6.12.4 Further to this, the conceptual final landform for the former Drayton Mine incorporated a woodland biodiversity corridor (shaded dark green in **Figure 40**) to provide a linkage between remnant woodland to the northeast and southwest of the site, as well as connecting with biodiversity corridors within the post-mining landform at the Mt Arthur Coal Complex.

Proposed Final Landform

6.12.5 As part of the Project, Malabar is seeking to amend certain aspects of the final landform for the Maxwell Infrastructure site and provide clear objectives for the rehabilitation of the Maxwell Underground site. The proposed conceptual final landform for the current Project is shown in **Figure 41** and **Figure 42**, along with a representative cross-section of the partially backfilled East Void at **Figure 43**.

Maxwell Underground

6.12.6 Subsidence impacts within the underground mining area would be progressively remediated over the life of the Project as discussed in **Section 6.3**, with subsidence monitoring and remediation continuing beyond the conclusion of mining until the area is stabilised.

6.12.7 Following the realignment of Edderton Road, the existing road alignment would be closed. If the road pavement cannot be beneficially re-used, Malabar has advised that it would be removed and the disused road corridor would be re-seeded to pasture.

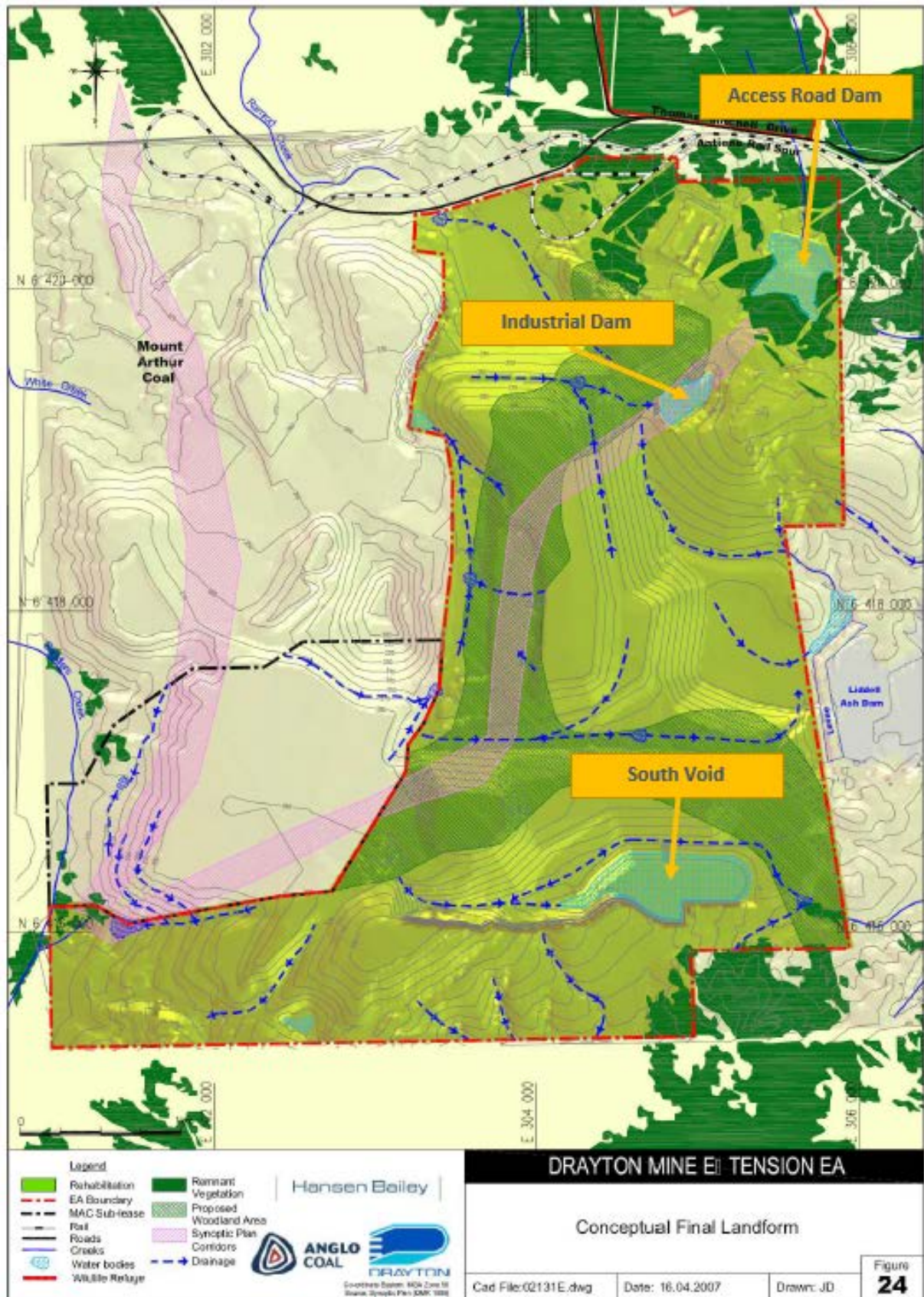


Figure 40 | Approved conceptual final landform (single void scenario)

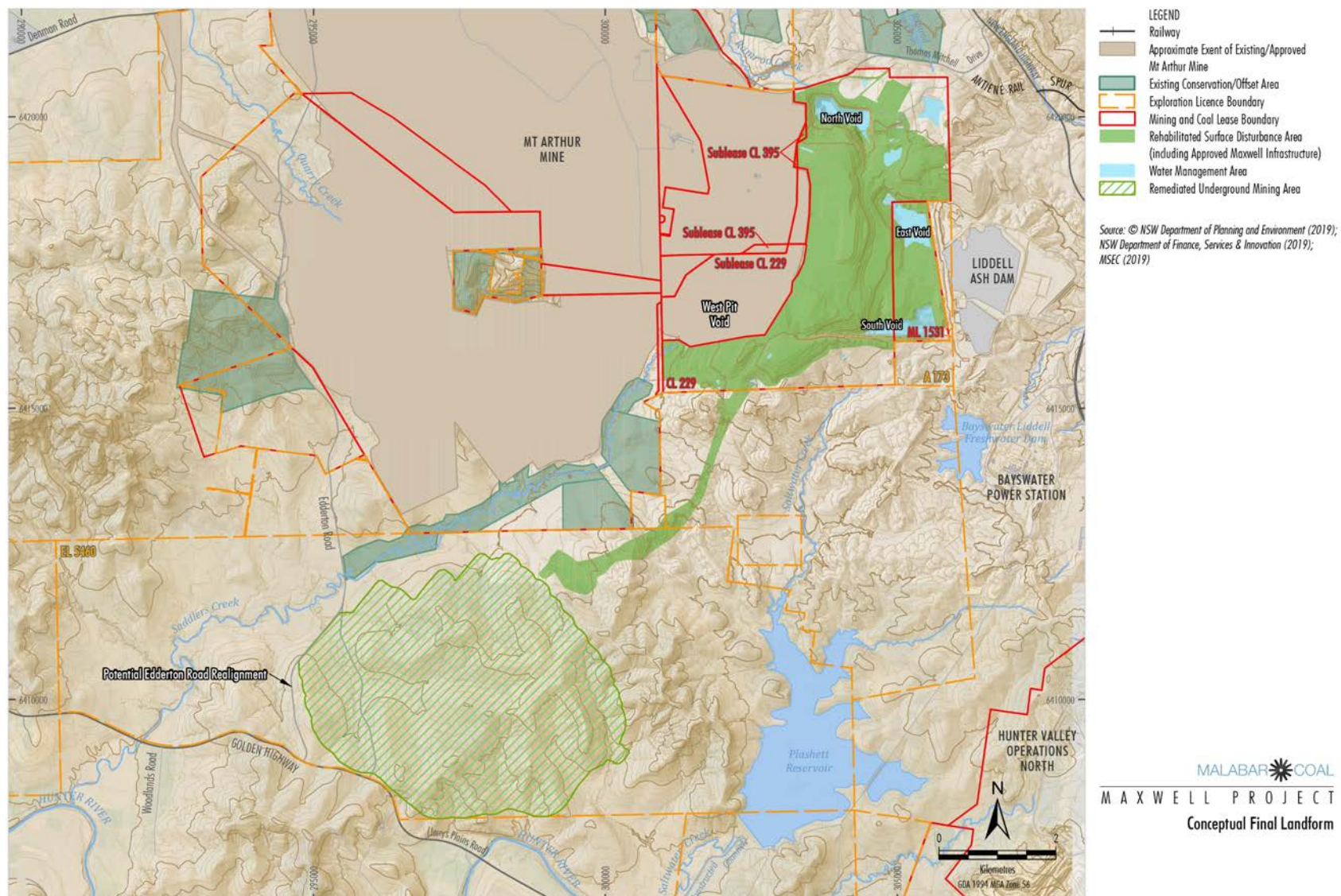


Figure 41 | Proposed conceptual final landform

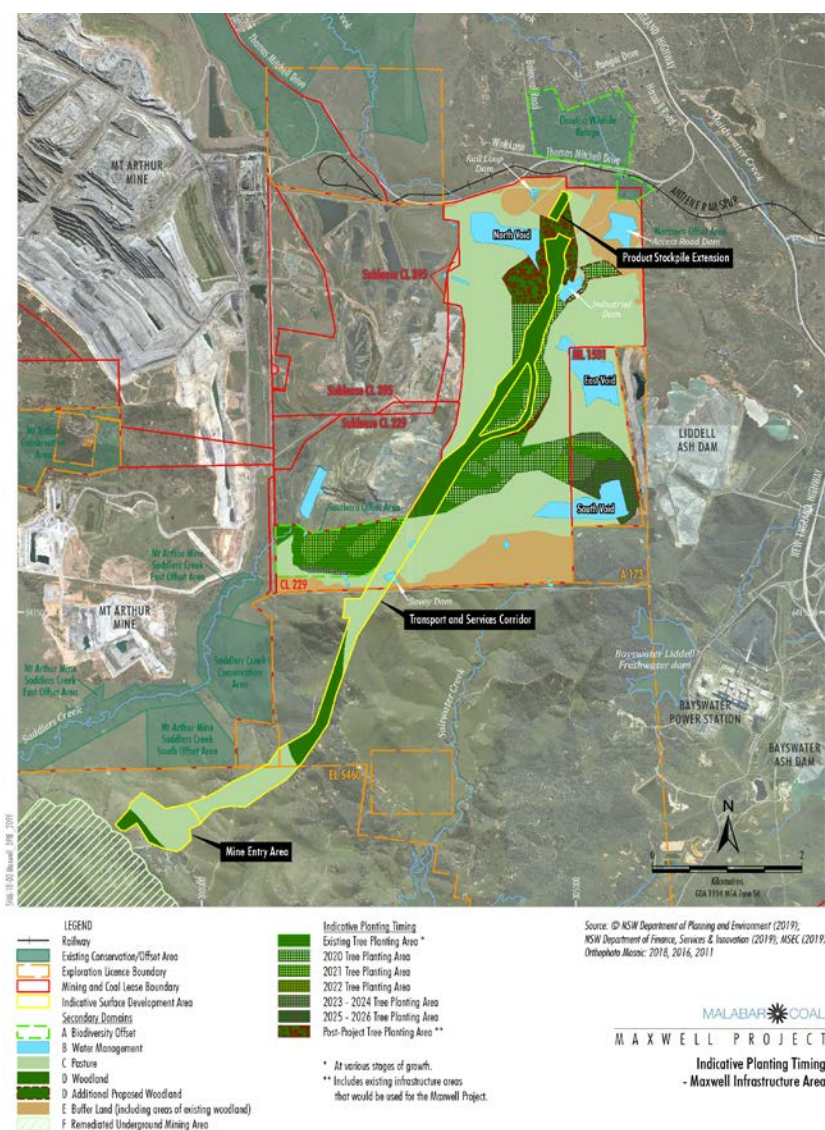


Figure 42 | Proposed Maxwell Infrastructure rehabilitation domains and simulation (also showing the separate Maxwell Solar Project)

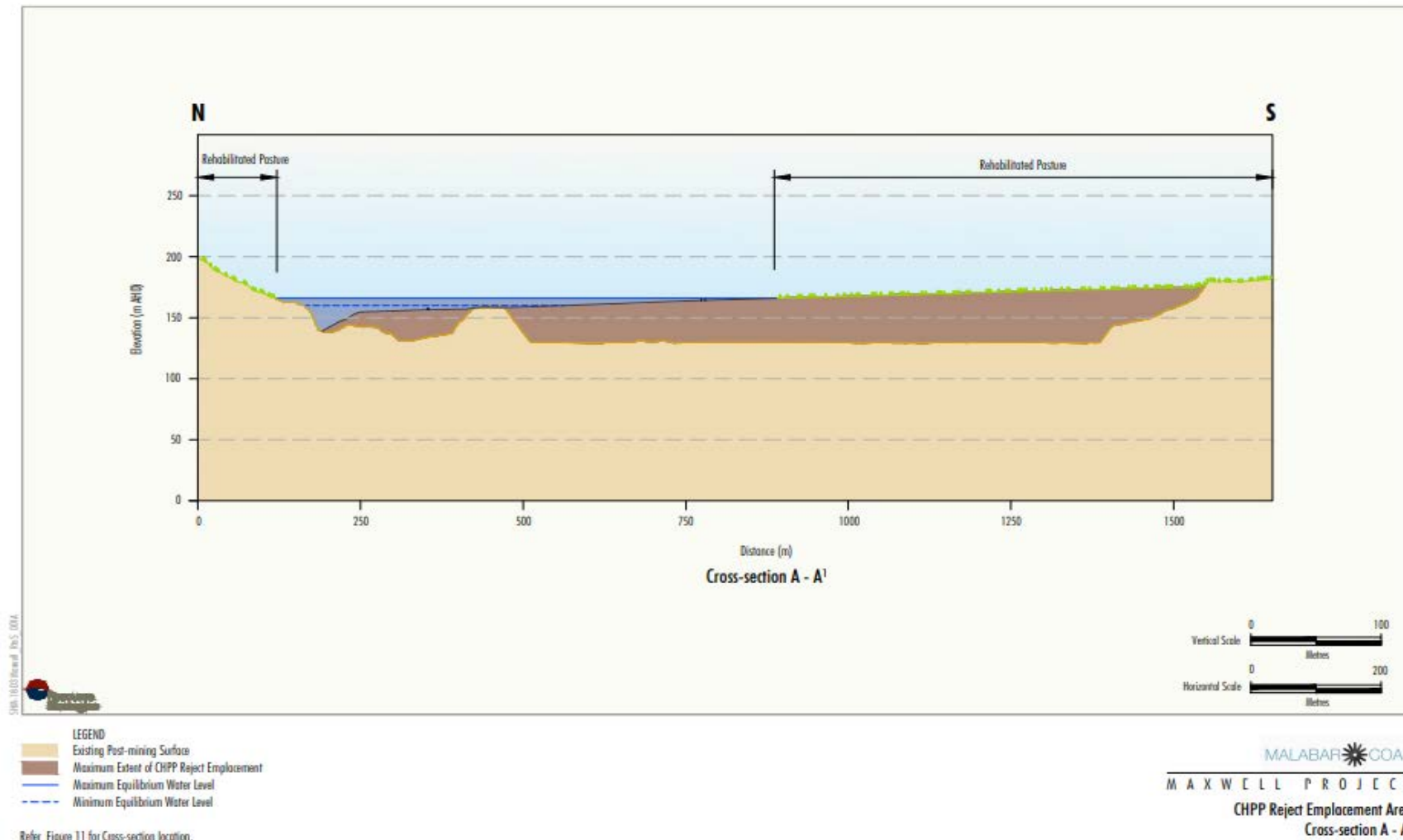


Figure 43 | Cross-section of partially backfilled East Void

6.12.8 Following the completion of mining, the underground mining portals and ventilation shafts would be sealed and surface infrastructure at the MEA and within the transport and services corridor would be decommissioned and removed.

Maxwell Infrastructure

6.12.9 The proposed final landform for the Maxwell Infrastructure site is generally consistent with the final landform contemplated in the Environmental Assessment for MP 06_0202, in the event that the North and East Voids remained. A comparison of approved and proposed landforms is provided in **Table 6-20**.

6.12.10 Malabar proposes to continue the progressive rehabilitation of historical mining areas outside the proposed disturbance footprint over the life of the Project. Unless a beneficial re-use is identified prior to the conclusion of mining, all surface infrastructure, including roads and rail facilities would be decommissioned and removed.

6.12.11 Malabar also proposes to reshape emplacement areas, where possible, to integrate with the undulating landscape in the surrounding locality and to create the appearance of natural drainage lines.

Table 6-20 | Comparison of Approved and Proposed Final Landforms

Component	Drayton Mine Extension Project	Proposed Project
Proposed Final Land Use	<ul style="list-style-type: none"> Predominantly woodland and pasture 	<ul style="list-style-type: none"> Predominantly woodland and pasture
Composition of Woodland/Pasture	<ul style="list-style-type: none"> 444 ha of woodland 664 ha pasture 	<ul style="list-style-type: none"> 500 ha of woodland 760 ha of pasture
Final Voids	<p>Either:</p> <ul style="list-style-type: none"> One Void (South Void) – subject to commercial agreements and approvals; or Three Voids (North, South and East Voids) 	<ul style="list-style-type: none"> Three Voids (North, South and East Voids) East Void partially backfilled with reject material Flexibility for future emplacement in all three voids, subject to commercial agreements and approvals

6.12.12 The proposed final landform retains the woodland biodiversity corridor from the northeast to the southwest of the site. However, the woodland corridor would shift eastward along the sides of the overburden emplacement that would have previously been rehabilitated back to pasture in order to accommodate the approved Maxwell Solar Project (see **Figure 42**).

6.12.13 In response to concerns raised by MSC regarding the adequacy of the corridor and the timing of its establishment, Malabar has:

- extended the proposed woodland corridor in the northeast of the site and agreed to plant 10 ha of woodland to the south of the Access Dam by the end of 2020; and
- committed to progressively carry out additional planting within the proposed biodiversity corridor (excluding infrastructure areas required for the current Project) as shown in **Figure 42**.

- 6.12.14 Overall, the Department considers that the proposed change would achieve the same long term biodiversity outcomes at the Maxwell Infrastructure site. Additionally, by reorienting the woodland corridor to run along the steeper slopes of the existing overburden emplacement, the modified biodiversity corridor would improve offsite visual impacts and facilitate the release and beneficial reuse of a large area of flat rehabilitated mining land situated on top of the overburden emplacement for renewable energy production.
- 6.12.15 Consequently, the Department supports the proposed alteration of the woodland corridor and considers that it would deliver significant social benefits with no long term ecological cost relative to the existing approved operations.
- 6.12.16 The Department's recommended conditions still require Malabar to rehabilitate all areas of the former Drayton including the area that is subject to the separate Maxwell Solar Project. Under the recommended conditions, this area would need to be restored to grassland suitable for pastoral grazing. In this manner, irrespective of whether the separate Maxwell Solar Project proceeds in the future, the entirety of the Maxwell Infrastructure site will be appropriate rehabilitated under the development consent for the Project.

Final Voids

- 6.12.17 The proposed final landform retains the existing North, South and East Voids at the Maxwell Infrastructure site. Malabar submits that the backfilling of the legacy voids is not feasible, on the basis that:
- there is insufficient overburden available at the Maxwell Infrastructure site to backfill the voids and create a free-draining landform;
 - assuming that Malabar could obtain sufficient overburden from off-site sources and by re-handling material within existing overburden emplacements, the cost of backfilling the voids to natural ground level would be in the order of \$760 million;⁵⁰
 - even partial backfilling of all three voids would involve the disturbance of approximately 800 ha of previously rehabilitation land, with associated noise and dust impacts; and
 - re-handling emplaced overburden would exacerbate spontaneous combustion risks and require the disturbance of inert material elsewhere on the site for capping purposes.
- 6.12.18 Notwithstanding these limitations, Malabar notes that the East Void would be partially backfilled through the emplacement of approximately 22 million bank cubic metres (Mbcm) of CHPP reject material generated by the Project. This emplacement area would then be subsequently capped and rehabilitated as discussed in **Section 6.2**.
- 6.12.19 Consistent with Anglo American's previous commitments under MP 06_0202, Malabar would investigate opportunities to further reduce the size of the voids, including:
- the emplacement of fly ash from the adjacent power stations within the East Void;
 - the emplacement of reject material from any future mining operations at Spur Hill, most likely in the East Void; and

⁵⁰ The estimated cost of backfilling does not include the cost of the 100 million bank cubic metres of material that would need to be sourced off-site

- the emplacement of overburden and rejects from nearby mining operations in the South and North Voids, respectively.
- 6.12.20 The Department notes that the land containing the East Void and part of the South Void is owned by AGL. Should AGL wish to emplace additional fly ash material in these voids it retains the commercial option to be transferred the relevant mining lease (ML 1531) and assume responsibility for ongoing management of the voids, following the conclusion of the Project.⁵¹ However, this appears unlikely, given that both power stations are expected to close by 2035.
- 6.12.21 With respect to the receipt of reject material, the Department notes that Malabar's proposed Spur Hill Underground Project would be the subject of a separate future determination process. Additionally, the Department is unaware of any commercial agreement having been reached with HVEC for the receipt of material at the Maxwell Infrastructure site and notes that more cost-effective emplacement options already exist within the Mt Arthur Coal Complex.
- 6.12.22 In this regard, while the Department considers that Malabar should exhaust all opportunities to reduce the size of final voids, it also acknowledges the legacy constraints of the site and recognises that the backfilling options identified in the EIS may not eventuate. Consequently, the Department has conservatively based its assessment on a worst-case scenario in which these voids are retained as water storages in the final landform.
- 6.12.23 Malabar has indicated that if the potential third-party agreements are not in place by the end of 2025, Malabar would begin the rehabilitation of the South Void highwall and North Void low wall. The rehabilitation of the North Void highwall would be delayed until the end of the Project when the nearby CHPP and rail facilities are no longer in use.
- 6.12.24 Consistent with the approved Mining Operations Plan for the site, the highwalls within the existing voids would be blasted to reduce their slope and improve overall stability. Blasting operations would be consistent with the approved Blast Management Plan for the site, which would be updated under the Department's recommended conditions (see **Section 6.13**).
- 6.12.25 Irrespective of the outcome of future negotiations with third parties, the Department considers that a stable, non-polluting and appropriately integrated final landform is achievable at the Maxwell Infrastructure site. Nonetheless, the Department considers that there are opportunities to further refine and improve the rehabilitation outcomes of the Project and has reflected this in its recommended conditions, as discussed below.

Rehabilitation Management

- 6.12.26 The Department's recommended conditions incorporate detailed rehabilitation objectives for the Project. These conditions require Malabar to prepare a comprehensive Rehabilitation Strategy (incorporating a post-mining land use strategy) and Rehabilitation Management Plan for the Project, in consultation with MSC, the Resources Regulator and other key agencies.

Maxwell Underground

- 6.12.27 The recommended rehabilitation objectives for the Project would require Malabar to ensure that the underground mining area does not experience a decline in land and soil capabilities

⁵¹ AGL has until 1 January 2023 to decide whether to exercise this option.

relative to pre-mining conditions and that areas proposed for agricultural or pastoral use are rehabilitated to capabilities that are suitable for their intended future land use.

Maxwell Infrastructure

- 6.12.28 The Department's recommended conditions require Malabar to establish final landforms which are visually compatible with the surrounding landscape and incorporate relief patterns and drainage structures which mimic natural topography and mitigate erosion.
- 6.12.29 The recommended conditions would ensure that the planting and establishment of woodland areas that form part of the realigned biodiversity corridor commences early in the life of the Project. These conditions would also require Malabar to prioritise the re-establishment of the two CEECs impacted by the Project.

Final Voids

- 6.12.30 The Department's recommended conditions regarding water management in the final voids are discussed in **Section 6.2**. In addition, the recommended conditions would require Malabar to actively investigate opportunities to reduce the size of voids and/or to beneficially re-use the voids following the conclusion of mining. Malabar would be required to report on the outcomes of its investigations at least every three years and update its Rehabilitation Strategy accordingly.

Post Mining Land Use

- 6.12.31 MSC has recommended the establishment of a working group by 2035 to identify opportunities for post-mining land uses that can provide social and economic benefit to the local community. MSC also recommended that this working party include representatives from local and State government, RAPs and the Muswellbrook Chamber of Commerce.
- 6.12.32 The Department supports MSC's recommendation and considers that this working group would help to inform the post-mining land use strategy required as part of the overarching Rehabilitation Strategy. This requirement has been reflected in the Department's recommended conditions.

Conclusion

- 6.12.33 The Department has carefully considered Malabar's conceptual rehabilitation strategy for the Project, in consultation with key agencies, including the Resources Regulator. As discussed in **Section 5.3**, following its review of the Submissions Report and additional supporting information provided by Malabar, the Resources Regulator has not raised any further concerns regarding the Project. The Department considers that rehabilitation risks can be suitably managed under recommended conditions of consent and under the conditions of Malabar's mining leases.
- 6.12.34 The Department also considers that safe, sustainable and visually sympathetic rehabilitation outcomes are achievable for the Project. The Department considers that these outcomes can be appropriately managed under recommended conditions, a detailed Rehabilitation Strategy and Rehabilitation Management Plan.

6.13 Other issues

6.13.1 Other issues associated with the Project include impacts on Aboriginal cultural and historic heritage, blasting and vibration, agricultural impacts and other hazards. The Department's assessment of these issues is summarised in **Table 6-21**.

Table 6-21 | Other issues considered in the Department's assessment

Issue	Findings	Recommended Conditions
Aboriginal Cultural Heritage	<ul style="list-style-type: none"> The EIS included an ACHAR prepared by AECOM Australia Pty Ltd in consultation with 27 RAPs. The ACHAR draws on historical archaeological assessments undertaken between 1980 and 2012, supplemented by contemporary surveys undertaken in August and October 2018. The Project Area forms part of a wider cultural landscape with strong cultural values and connections for the Aboriginal people, predominantly associated with Mt Arthur, the Hunter River and Saddlers Creek. While these key landscape features would not be directly impacted by the Project, views from Mt Arthur and Saddlers Creek would be impacted by the proposed MEA and transport services corridor. The ACHAR identified a total of 275 Aboriginal sites within the Project Area. Combined, these sites comprise over 4,000 stone artefacts. The Project would result in direct disturbance of 39 open artefact sites. Two of these sites (AHIMS #37-2-0004 and #37-2-0505) are considered to have moderate scientific significance, while the remaining sites are considered to have low scientific significance. Subsidence cracking and associated remediation may have additional indirect impacts to a number of the remaining 236 sites located above the underground mining area. These remaining sites include two stone quarries that were assessed as having high scientific significance (AHIMS #37-2-1954 and #37-2-1955), both of which are outside the predicted extent of conventional subsidence. Although identified in 2000 and recorded in the AHIMS database, one of these quarry sites (#37-2-1955) was not located during two recent survey attempts in 2012 and 2018. Of the remaining indirectly impacted sites, 18 were considered to have moderate scientific significance and the remaining sites were considered to have low scientific significance. Malabar has proposed the following measures to manage impacts on identified Aboriginal sites: <ul style="list-style-type: none"> Surface collection and salvage excavation of moderately significant AHIMS sites (#37-2-0004 and #37-2-0505) which would be directly impacted by the Project; 	<ul style="list-style-type: none"> To minimise potential Aboriginal cultural heritage impacts, the Department has recommended conditions requiring Malabar to prepare a detailed ACHMP in consultation with RAPs and relevant agencies prior to the commencement of any construction work. The recommended conditions would also require Malabar to monitor the previously recorded location of quarry site #37-2-1955. The Department considers that the Aboriginal cultural heritage impacts of the Project are likely to be minimal and could be suitably managed under recommended conditions of consent.

**Aboriginal
Cultural
Heritage
(continued)**

- Surface collection of the other 37 sites to be directly impacted by the Project;
- Monitoring of all sites with high and moderate significance within the underground mining area (including #37-2-1954);
- Surface artefacts with high and moderate significance would be collected and potential archaeological deposits would be excavated and salvaged in the event of subsidence impacts, such as cracking; and
- Surface collection of low significance artefacts in the underground mining area would only occur where subsidence remediation is required.
- The ACHAR indicates that the Project would reduce the region's potential open artefact resource by approximately 0.18%.
- As all proposed surface infrastructure would be removed post-mining, the Department considers that the Project is unlikely to have a significant long-term impact on the cultural landscape.
- BCD advised that it is satisfied with the ACHAR and recommended that an Aboriginal Cultural Heritage Management Plan (ACHMP) be prepared for the Project, in consultation with RAPs, prior to any ground disturbance occurring.

**Historic
Heritage**

- The EIS included a Historic Heritage Assessment (HHA) and Statement of Heritage Impact prepared by Extent Heritage.
- The Maxwell Infrastructure site contains three historic heritage sites of local significance, including stockyards and a burial site. None of these sites would be impacted by the Project.
- There are no listed heritage items within the footprint of the proposed underground mining area.
- The Plashett Homestead is located to the southeast of the Maxwell Underground site and is owned by Malabar. The HHA identifies that Plashett Homestead is listed on the local heritage register and may also have potential State heritage significance.
- Bowfield Homestead is located to the west of the Maxwell Underground site and is also owned by Malabar. The homestead is not listed on the local or State heritage register, however the HHA concludes that it is of potential local heritage significance.
- Edderton Homestead is located to the northwest of the Maxwell Underground site and is owned by HVEC.
- A number of historic homesteads are also located to the south and southwest and are associated with the Coolmore and Woodlands Studs and Hollydene Estate.
- The Department has recommended conditions to:
 - minimise visual impacts on the Edderton Homestead; and
 - maintain historic records (including photographic records) of the existing Drayton Mine for public viewing on request;
- The Department considers that the impacts of the Project on historic heritage are likely to be negligible and could be suitably managed under recommended conditions of consent.

**Historic
Heritage
(continued)**

- The Project is not predicted to result in any detectable subsidence or blasting impacts at any of the historic homesteads in the locality.
- Edderton Homestead is predicted to experience minor visual impacts associated with the MEA and transport corridor. The HHA indicates that these impacts could be mitigated by screen planting at selected locations along the southern and eastern fence-line of the homestead.
- MSC requested that Malabar establish a memorial for the former Drayton Mine at the site entrance and prepare an assessment and photographic record of on-site infrastructure.
- While the site may be of some local historical significance, the Department considers that the establishment of a public memorial at the entrance of working mine could be problematic and introduce additional public safety risks.
- Malabar has committed to maintain a record of historical information regarding the former Drayton Mine for viewing on-site by request. Malabar has also committed to make these records available to MSC should it wish to establish a permanent memorial to the former mine. The Department considers that Malabar's commitments are appropriate and these measures are reflected in the Department's recommended conditions.

**Blasting &
Vibration**

- The Project would involve limited small-scale blasting during the construction of the MEA and transport corridor (Years 1 to 3). This blasting would be used as a last resort option, where the use of dozers and excavators would not be effective.
 - Construction blasts would be limited to a maximum instantaneous charge of approximately 500 kilograms, which is significantly smaller than typical blasts associated with open cut mining.
 - Any construction-related blasts would occur at least 4.5 km from the boundary of the Coolmore and Woodlands Studs, at least 4.7 km from the nearest private residence and at least 3 km from Edderton Road.
 - Blasting may also occur at the Maxwell Infrastructure site to improve the slope and stability of highwalls within the existing voids (see **Section 6.12**), consistent with the existing requirements of MP 06_0202.
 - The EIS does not include an assessment of blast fume impacts. However, given the small scale of proposed construction blasts, impacts on private receivers are likely to be negligible.
- The Department has recommended conditions requiring Malabar to take all reasonable steps to minimise blasting impacts on nearby residences and livestock, establish blast notification and complaints systems and implement complaints-based blast monitoring at receivers, where directed by the Planning Secretary.
 - The Department considers that the blasting and vibration impacts of the Project are likely to be negligible and could be suitably managed under recommended conditions of consent.

Agricultural Impacts

- The EIS included an AIS prepared by 2rog Consulting. This was supported by a Refined BSAL Verification Assessment prepared by SLR Consulting Australia in response to the recommendations of the Gateway Panel (see **Section 4.2**).
- The majority of the proposed underground mining area comprises moderate to low land and soil capability (classes 4 to 6) with moderate to high soil fertility.
- There is 72 ha of verified BSAL on the western side of the underground mining area. This area of BSAL is split by the current alignment of Edderton Road. This area would be re-unified by the proposed realignment and eventual rehabilitation of the existing road pavement (see **Section 6.12**).
- Predicted subsidence impacts and proposed remediation strategies are discussed in **Section 6.3**. The Department considers that these strategies would appropriately manage potential impacts on BSAL.
- Potential land use compatibility issues with respect to nearby Equine and Viticulture CIC operations are discussed in **Section 6.11**.
- The Department's recommended rehabilitation objectives for the Project would require Malabar to ensure there is no decline in land and soil capability within the underground mining area (including areas of verified BSAL) following the conclusion of mining.
- Measures to monitor, maintain, and where necessary, re-establish the integrity of agricultural land would be outlined in future Extraction Plans and in the Rehabilitation Strategy and Rehabilitation Management Plan for the Project.

Hazards

- TfNSW's advice on the Project recommended that the Road Transport Assessment be updated to identify the transport route for dangerous goods (including fuel and explosives) associated with the Project.
 - Malabar responded in its Submissions Report by confirming that it would transport, handle and store all dangerous goods in accordance with the *NSW Work Health and Safety Regulation 2017*.
 - All transport would be via Thomas Mitchell Drive & Denman Road or the New England Highway, which are established routes for the transport of dangerous goods to other mines in the locality.
 - The Department notes that the Maxwell Infrastructure site already contains an explosive storage facility and hydrocarbon storage areas and is satisfied that these existing facilities could counting to be safely operated and effectively regulated by the Resources Regulator for the Project.
 - The Department's recommended conditions would require Malabar to storage, handling and transport all dangerous goods in accordance with relevant Australian Standards and the Dangerous Goods Code.
 - Explosives store on site would also be regulated and managed in accordance with the requirements of the Resources Regulator.
-

7 Evaluation

- 7.1.1 The Department has assessed the Project in accordance with the relevant requirements of the EP&A Act. The Department has carefully considered the potential impacts of the Project on the natural and cultural environments, nearby residents and key industries in the locality.
- 7.1.2 The Department's assessment has concluded that the impacts of the Project would comply with relevant assessment criteria, policies and guidelines. The Department also considers that the residual environment and social impacts of the Project can be managed under recommended conditions and a comprehensive set of management plans.
- 7.1.3 The Department's recommended conditions are included in **Appendix H**. The Department has consulted with relevant agencies regarding the recommended conditions and has amended the conditions in response to advice received from these agencies. Additionally, Malabar has reviewed these conditions and has not objected to their imposition.
- 7.1.4 Importantly, the proposed Project is located at the interface between the coal mining, equine and viticulture industries in the Upper Hunter Valley. As the Department noted in **Section 3**, while previous mining proposals have brought these key industries into potential conflict, the current underground proposal is considered to be a well designed option that would make it possible for these key industries to successfully co-exist.
- 7.1.5 The Project represents a logical 'brownfield' extension of an existing mine, which would utilise existing infrastructure. It would also require a substantially smaller disturbance footprint than previously proposed open cut mining operations in the locality.
- 7.1.6 The Project would facilitate the recovery of 148 million tonnes of ROM coal over the lifespan of the mine, with at least 75 percent of product coal being semi-coking coal suitable for use by the steel-making industry. The Project would provide wide-ranging economic benefits for the region and the State. The Project would generate approximately 250 jobs during construction and up to 350 jobs during operations. The Project is expected to generate net benefits to NSW of over \$1 billion (net present value) and is predicted to have local non-labour expenditure effects in the order of \$43 million per year during mining operations.
- 7.1.7 The Department considers that the Project has been designed to minimise environmental and amenity impacts to the greatest extent practicable. In addition to this, the Department has recommended strict conditions to manage residual impacts on groundwater and surface water resources, noise, dust and visual amenity.
- 7.1.8 While there remains some potential for negative perceptions regarding the Project's impacts and associated reputational damage to the Equine CIC, the Department does not consider that these perceptions are supported by the weight of evidence provided in the EIS. Furthermore, the Department considers that these perceptions may be further mitigated through ongoing community engagement as part of the Community Consultative Committee and development of detailed extraction plans and management plans for the Project.
- 7.1.9 Overall, the Department considers that the benefits of the Project outweigh its potential negative impacts. The Department is also of the view that the Project represents the best option for the successful co-existence of the coal mining, equine and viticulture industries in this location.

Consequently, the Department considers that the Project is in the public interest, and is approvable, subject to stringent conditions.

7.1.10 This assessment report is hereby presented to the Independent Planning Commission for determination of the development application.



29/09/2020

Matthew Sprott
Director
Resource Assessments



29/09/20

Mike Young
Executive Director
Energy, Resources and Compliance

Appendices

Appendix A – Environmental Impact Statement

<https://www.planningportal.nsw.gov.au/major-projects/project/10151>

Appendix B – Submissions

<https://www.planningportal.nsw.gov.au/major-projects/project/10151>

Appendix C – Submissions Report

[Malabar Submissions Report \(undated\) received 18 November 2019](#)

Appendix D – Additional Information

- [Malabar's response dated 10 December 2019, relating to advice provided by the IESC](#)
- [Malabar's response dated 11 December 2019, relating to matter raised by EPA](#)
- [Malabar response dated 20 January 2020, relating to matters raised by the Resources Regulator and the Department \(relating primarily to the Economic Assessment\)](#)
- [Malabar's response dated 30 January 2020, relating to matters raised by MSC](#)
- [Malabar's response dated 28 February 2020, relating to matters raised by DPIE Water and NRAR](#)
- [Malabar's response dated 30 April 2020, relating to matters raised by DPIE, DPIE-Water, MSC and TfNSW](#)
- [Malabar's response dated 1 June 2020, relating to rehabilitation and blasting issues raised by DPIE](#)
- [WRM Memoranda dated 15 June 2020, relating to the updated water balance model calibration and correction to Table 5.13 of the SWA](#)
- [Malabar's response dated 9 June 2020, relating to water licensing issues raised by DPIE Water and NRAR](#)
- [Malabar's response dated 15 June 2020, relating to flora survey issues raised by BCD](#)
- [Malabar's response dated 4 August 2020, relating to MNES issues raised by DPIE](#)
- [Malabar's response \(undated\) received 30 July 2020, relating to water issues raised by DPIE](#)

Appendix E – Agency Advice on Assessment

- [BCD EPBC Bilateral Assessment dated May 2020](#)
- [BCD Advice on Submission by Scott Franks and Anor on behalf of the Wonnarua People dated 20 May 2020](#)
- [BCD Advice on Flora Surveys dated 22 May 2020, 14 July 2020 and 21 August 2020](#)
- [EPA Advice on Assessment dated 8 January 2020](#)
- [IESC Advice dated 19 November 2019](#)

Appendix F – Consideration of Statutory Requirements, Policies and Strategies

F1 Objects of the EP&A Act

The objects of the EP&A Act are the underpinning principles for all decision making under the Act. They must be considered by the consent authority when determining a development application under the Act. **Table F1** summarises how the relevant objects of the EP&A Act have been considered in the Department's assessment of the Project.

Table F1 | Consideration of objects of the EP&A Act

Objects of the EP&A Act (section 1.3)	Consideration
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;	<ul style="list-style-type: none"> The Project would provide significant economic benefits to the local community and to the State of NSW. These benefits are discussed further in Section 6.10. While the Project has the potential to result in both positive and negative social impacts, overall, the Department considers that any negative social impacts can be appropriately managed under recommended conditions. Social impacts are discussed further in Section 6.9.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;	<ul style="list-style-type: none"> The Department's assessment has sought to integrate all significant environmental, social and economic considerations. The Department considers that the Project can be carried out in a manner that is consistent with the principles of ESD.
(c) to promote the orderly and economic use and development of land;	<ul style="list-style-type: none"> The Project involves a brownfield expansion of an existing coal mine, which can be largely carried out using existing site and transport infrastructure. The Department considers that this represents an orderly and economic use of land.
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;	<ul style="list-style-type: none"> The Department has assessed the biodiversity impacts of the Project in accordance with relevant State and Commonwealth legislation, policies and guidelines. The Department considers that the Project avoids and minimises, to the greatest extent practicable, impacts on threatened species and communities and key habitats. The Department has recommended conditions to ensure that the residual biodiversity impacts of the Project would be appropriately managed and offset (see Section 6.4).
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage);	<ul style="list-style-type: none"> The Department has assessed the likely impacts of the Project on Aboriginal cultural heritage and historic heritage. These matters are discussed further in Section 6.13.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State;	<ul style="list-style-type: none"> The Department engaged with Council and other NSW government authorities on the Project. This engagement process is discussed further in Section 5.
(j) to provide increased opportunity for community participation in environmental planning and assessment.	<ul style="list-style-type: none"> The Department has carefully considered issues raised by the community during the public exhibition period in its assessment of the Project. These issues are discussed further in Section 5.

F2 Environmental Planning Instruments

F2.1 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industry) 2007

Table F2 | Mandatory matters for consideration under Part 3 of the Mining SEPP

Clause	Matters for Consideration	Consideration
12AB	Non-discretionary development standards for mining	<ul style="list-style-type: none"> The Project is predicted to comply with non-discretionary standards with respect to noise, air quality, airblast and overpressure impacts. The Project is predicted to comply with the Level 2 minimal impact considerations for water table decline and depressurisation in the 'less productive' fractured rock water sources. The Project is predicted to comply with the Level 1 minimal impact considerations for all alluvial water sources.
12	Compatibility of proposed mine, petroleum production or extractive industry with other land uses	<ul style="list-style-type: none"> The Department has carefully considered the merits of the Project, having regard to existing and approved land uses in the vicinity of the site. The Department has also considered what it understands to be the preferred uses of land in the area, having regard to relevant strategic plans (see Section 3). The strategic planning framework does not favour either the equine industry or coal mining as the 'preferred' land use for the area, but rather seeks to strike a sustainable balance between the two industries. Notwithstanding, the Department recognises that two large scale open cut mining proposals on the site have been previously refused due to potential compatibility issues with the nearby equine industry. The Department is of the view that the current underground proposal addresses the material causes of this conflict, such that the Project could proceed and yield significant public benefit without adversely affecting the reputation or viability of the equine industry. The public benefits generated by the Project and the equine industry are discussed in Sections 3 and 6.10. The Department considers that the measures proposed by Malabar to mitigate and manage any potential impacts on the equine industry are reasonable and appropriate. The Department has sought to strengthen and enhance those commitments in its recommended conditions.
12A	Consideration of voluntary land acquisition and mitigation policy (VLAMP)	<ul style="list-style-type: none"> Voluntary noise mitigation rights have been afforded to four privately-owned receivers (see Section 6.5). No voluntary acquisition rights are applicable.
13	Compatibility of proposed development with mining, petroleum production or extractive industry	<ul style="list-style-type: none"> The Department considers that the Project represents a logical use of existing mine infrastructure, including shared infrastructure with the neighbouring Mt Arthur Coal Complex. Malabar has also identified opportunities for additional resource sharing (including water sharing) with the Mt Arthur Coal Complex over the life of the Project. The Department is of the view that the Project would likely complement, rather than conflict with, existing mining operations in the locality.
14	Natural resource management and environmental management	<ul style="list-style-type: none"> The Department has recommended a robust suite of conditions to ensure that the Project is undertaken in an environmentally responsible manner. These include conditions to avoid, or minimise, to the greatest extent practicable: <ul style="list-style-type: none"> impacts on significant water resources (see Section 6.2)

		<ul style="list-style-type: none"> – impacts on biodiversity, including threatened species (see Section 6.4); – GHGEs (see Section 6.6) • The Department has considered the assessment of GHGEs provided in the EIS (including downstream emissions), having regard to applicable State and national policies, programs and guidelines (see Section 6.6).
15	Resource recovery	<ul style="list-style-type: none"> • The Department has considered the efficiency of the Project with respect to resource recovery, in consultation with MEG and the Resources Regulator. The Department is of the view that the Project represents an efficient recovery of resources and has not recommended any specific conditions in this regard.
16	Transport	<ul style="list-style-type: none"> • The Project would not involve any coal transport by public road. • The Department consulted with MSC and TfNSW during its assessment of the Project. • The Department has recommended conditions requiring the preparation of a Traffic Management Plan for the Project, in consultation with relevant agencies.
17	Rehabilitation	<ul style="list-style-type: none"> • The Department has recommended strict conditions to ensure that both the Maxwell Infrastructure and Maxwell Underground sites are rehabilitated in a timely and integrated manner and that the final landform is made safe, stable and non-polluting. • Rehabilitation outcomes are discussed further in Section 6.12.

F2.2 State Environmental Planning Policy (Infrastructure) 2007

The Project involves the construction of a new 66 kV power line and switch station, as well as the undermining of existing electricity infrastructure. The Project would also require a powerline extension running from the Mt Arthur Coal Complex to the new Maxwell Infrastructure switch station, however this separate extension would be undertaken by Ausgrid and subject to separate assessment under Part 5 of the EP&A Act.

The Department consulted with Ausgrid regarding the Project's impacts on electricity infrastructure during the public exhibition period. No comments were received. The Department has recommended conditions to manage subsidence impacts on existing infrastructure.

The Department also consulted with ARTC during the exhibition period. ARTC did not raise any concerns regarding the proposal. Consistent with the ARTC's advice, the Department has considered the *Development Near Rail Corridors and Busy Roads – Interim Guideline* in its assessment. Importantly, the Department notes that the Project does not seek to alter approved transport limits under DA 106-04-00 and would not involve any construction on or near the Main Northern Railway Line.

The Department has also consulted with TfNSW and MSC regarding the Project's impacts on the State and local road networks (see **Section 5.3**).

F2.3 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)

The EIS includes a Preliminary Hazard Analysis (PHA) in accordance with clause 12 of SEPP 33. The current The Department has also consulted with relevant public authorities during its assessment of the Project, including the EPA, TfNSW and NSW Health.

The Department has taken all relevant matters under SEPP 33 into consideration in its assessment of the Project, including all feasible alternatives to the carrying out of the Project and likely future uses of land surrounding the development.

The EIS has considered the potential hazards and risks associated with the Project, including the storage of hazardous goods, potential for fire and/or explosion and contamination of land, water and air. These hazards and risks would be managed under a comprehensive suite of management plans for the Project.

F2.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)

State Environmental Planning Policy (Koala Habitat Protection) 2019 (Koala SEPP 2019) commenced on 1 March 2020. However, clause 15 of the Koala SEPP 2019 provides that any development made, but not yet determined, prior to the commencement of the Policy must be assessed in accordance with SEPP 44.

The Project Area does not contain 'core Koala habitat'. However, the Project Area contains preferred Koala feed trees and meets the definition of 'potential Koala habitat'.

The nearest recorded Koala sightings in the vicinity of the Project Area were at the Mt Arthur Coal Complex to the northeast of the site and on the western side of Saltwater Creek, north of Plashett Reservoir. No Koala sightings have been recorded in the Project Area during either the contemporary or historical fauna surveys.

The BDAR also notes that there are only 24 recorded Koala sightings within the Muswellbrook Shire local government area. Consequently, if the species does occur, it would be in small numbers, on a sporadic basis. As such, no specific offsets are required for the Koala under the BAM.

Malabar has committed to engage a suitably qualified wildlife handler to undertake pre-clearance surveys and to capture and relocate threatened fauna prior to disturbance. Malabar has also committed to minimise the indirect and 'edge' effects of the Project on adjacent woodland. These commitments are reflected in the Department's recommended conditions.

The Department considers that the Project is consistent with the aims, objectives and requirements of SEPP 44.

F2.5 State Environmental Planning Policy No. 55– Remediation of Land

The EIS includes a Land Contamination Assessment (LCA) incorporating a Stage 1 - Preliminary Investigation as required under clause 7 of SEPP 55 and having regard to *Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land* (1998). The Department considered all relevant matters under SEPP 55, including the potential contamination hazards and risks associated with the proposed surface activities being undertaken within areas historically used for residential, agricultural, farming and mining purposes.

The EIS indicated that the following Project Areas may contain potential contaminated material:

- Maxwell Underground:
 - the sheep dip, Nissen hut and surface soils;
 - the residence, shed structures and surface soils; and
 - fill material in a creek bed at the southern boundary of the underground mining area; and

- Maxwell Infrastructure:
 - areas located within or near the existing surface infrastructure including the bulk diesel storage, refuelling bays, lube bay, workshop, washdown pad, hydrocarbon storage areas, explosive storage facility, bioremediation cells, CHPP and train load out facility.

The LCA indicates that there is limited potential for migration of contaminants from the underground mining area over the life of the Project as the areas of potential contamination identified above are not proposed to be directly impacted by the Project. Where disturbance is required, for example, to remediate subsidence impacts, Malabar has committed to first undertake a hazardous materials survey and develop appropriate management and removal procedures.

The LCA also indicates that there is limited potential for off-site migration of potential contaminants from the Maxwell Underground site and Malabar would continue to manage contamination risks in accordance with detailed management plans.

There is an existing bioremediation area south of the workshop within the Maxwell Infrastructure site. This area was constructed prior to 2013 and was subsequently upgraded in 2014, to manage soils and organic materials contaminated by hydrocarbons from various areas of the former Drayton Mine. Malabar has advised that this area would be utilised as part of the operational activities associated with the Project.

The bioremediation area is managed under the former Drayton Mine Bioremediation Management Plan (Bioremediation MP) and the Mining Operations Plan. Should development consent be granted for the Project, Malabar would need to review and update the Bioremediation MP as a component of future Mining Operations Plans.

The Department considers the land within the Project Area to be suitable for the Project's intended use. The land has a low contamination risk with no remediation required prior to the commencement of the Project. Based on the information available at the time of this assessment, the Department is of the view that the Project is generally consistent with the aims, objectives and provisions of SEPP 55.

F2.6 Muswellbrook Local Environment Plan 2009 (MLEP)

The Department has considered the aims of the MLEP, as well as the objectives of the RU1 Primary Production and SP2 Infrastructure zones and other relevant provisions of the Plan in its assessment of the Project.

Relevant aims of the MLEP include the protection, enhancement and conservation of productive agricultural land, areas of high scenic value and places of archaeological and heritage significance. The MLEP also seeks to promote ecologically sustainable rural development and protect and conserve soil stability, remnant native vegetation and water resources.

Relevant objectives of the RU1 Primary Production zone include the maintenance of rural landscape character in the long term and ensuring that mining development will not:

- destroy or impair the agricultural production potential of the land or, in the case of underground mining, unreasonably restrict or otherwise affect any other development on the surface, or*
- detrimentally affect in any way the quantity, flow and quality of water in either subterranean or surface water systems, or*
- visually intrude into its surroundings, except by way of suitable screening.*

The objectives of SP2 Infrastructure include the prevention of development *‘that is not compatible with or that may detract from the provision of infrastructure’*.

The Department considers that the Project can be carried out in a manner that is consistent with these aims and objectives and has sought to integrate these considerations into its recommended conditions of consent (see **Appendix H**).

The Project Area includes land identified on the *Terrestrial Biodiversity Map* under clause 7.1 of the MLEP. Under clause 7.1(3), development consent cannot be granted for the Project unless the consent authority is satisfied that:

- (a) *the development is designed and will be located and managed to avoid any potential adverse environmental impact, or*
- (b) *if a potential adverse environmental impact cannot be avoided, the development—*
 - (i) *is designed and located so as to have minimum adverse impact, and*
 - (ii) *incorporates effective measures to remedy or mitigate any adverse impact caused.*

The Department considers that the Project has been designed so as to avoid biodiversity impacts to the greatest extent practicable. The Department has also recommended conditions to ensure that the residual biodiversity impacts are appropriately managed, mitigated and offset in accordance with the NSW Biodiversity Offsets Scheme.

The Department notes that local Aboriginal communities were notified of the proposal, in accordance with clause 5.10(8) of the MLEP and has considered all submissions in its assessment of the Project (see **Section 5**).

F3 Other Relevant Considerations

Relevant Plans, Strategies and Assessments

Other regional plans and strategies relevant to the Project include:

- *Muswellbrook Shire Council Community Strategic Plan 2017-2027;*

MSC’s Community Strategic Plan establishes a number of goals for the Muswellbrook Shire LGA, including economic prosperity through job growth and economic diversification, improving affordability, liveability and amenity, building social inclusion and delivery of social services. The plan also seeks to enhance vegetation connectivity and achieve higher quality ‘natural’ final landforms for mining projects, with shallower final voids and greater emphasis on progressive rehabilitation and utilisation of the local workforce.

The Department considers that the Project can be carried out in a manner that is consistent with these goals and has sought to integrate these objectives into its recommended conditions, particularly with respect to social impacts, biodiversity and rehabilitation.

- *Land Use Development Strategy (2015)*

Council’s Land Use Development Strategy outlines a series of general principles for coal mining in the Muswellbrook Shire LGA. These principles relate to the management of land use conflicts, impacts on biodiversity and water resources and mine rehabilitation, and are intended to inform MSC’s policy position on mining proposals. As this Strategy is not a statutory instrument, the Department has given more weight to the content of MSC’s submissions, which relate specifically to the current Project.

- *Hunter Subregion Bioregional Assessment*

The Hunter Subregion Bioregional Assessment is of limited relevance to the Project, as it considered open cut operations at the former Drayton Mine and the previously proposed Drayton South Coal Project. It is also based on regional-scale modelling, using data collected up to 2015.

Muswellbrook-Jerrys Plains Landscape Conservation Area

The Muswellbrook-Jerrys Plains Landscape Conservation Area (MJPLCA) was listed by the National Trust of Australia in 1985, in recognition of its aesthetic significance. **Figure 31** of the Department's assessment shows the relationship between the Project Area and the MJPLCA.

There are no specific statutory or policy considerations for development in the vicinity of the MJPLCA. However, the aesthetic values which are central to the MJPLCA are also central to the Equine and Viticulture CIC. The Project's impacts on these values are considered in **Sections 6.8** and **6.11** of the Department's assessment.

The Department's recommended conditions in **Appendix H** include requirements for a Visual Impact Management Plan to be developed to minimise the visual impacts of the development on the surrounding landscape and minimise views of the development from key vantage points in the public and/or private domain. The Department considers that the preparation and implementation of this plan would also be sufficient to protect the visual character of the MJPLCA.

Appendix G – Matters of National Environmental Significance

The Maxwell Underground Coal Mine Project (the Project) was declared to be a ‘controlled action’ under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to its potential impacts on listed threatened species and communities and water resources. In making this determination, the delegate for the Commonwealth Minister for the Environment accredited the State’s environmental assessment processes under the *Environmental Planning and Assessment Act 1979* (EP&A) Act. Consequently, the potential impacts on controlling provisions under the EPBC Act have been assessed under Part 4 of the EP&A Act.

The Department provides the following additional information for the Commonwealth Minister to take into account when deciding whether or not to approve the Project under the EPBC Act.

The Department’s assessment has been prepared based on the information contained in:

- the Environmental Impact Statement (EIS) for the Project, particularly Appendices B to F;
- the Applicant’s Submissions Report;
- advice provided by the Commonwealth’s Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC);
- the Applicant’s Response to the IESC;
- supplementary information provided by the Applicant during the assessment process (see **Appendix D**); and
- advice provided by the Water Group and the Biodiversity Conservation Division (BCD) within the Department (see **Appendix E**); and
- advice provided by the Commonwealth Department of Agriculture, Water and the Environment (DAWE).

This Appendix is supplementary to, and should be read in conjunction with, the main volume of the Department’s Assessment Report which includes the Department’s consideration of impacts to water resources and listed threatened species and communities in **Section 6.2** and **Section 6.4**, respectively.

BCD has also provided a review of impacts on threatened species and communities, which is provided in **Appendix E** of the Department’s Assessment Report.

G.1 Impacts to Listed Threatened Species and Communities

The Project’s direct impacts on EPBC-listed threatened species and communities are summarised in **Table G1** below. The Department notes that the Commonwealth’s controlled action declaration in respect of the proposal relates only to areas of proposed surface disturbance areas and not to the predicted subsidence area. However, predicted areas of subsidence-related ponding, as described in **Section 6.4** and shown in **Figure 25**, have also been considered as surface disturbance for the purposes of this assessment.

In addition to proposed clearing and associated loss and/or fragmentation of habitat, the Project has the potential to result in indirect impacts on the threatened species and communities outlined in **Table G1**. Potential indirect impacts include dust and noise generation, erosion and sedimentation, lighting impacts and increased risk of bushfire and pest and weed infestation.

Malabar has proposed a range of management strategies to minimise the severity of these impacts. These strategies are discussed in **Section G3**.

Table G1 | Summary of likely impacts on threatened species listed under the EPBC Act

Species	EPBC Listing Status	Direct Disturbance of Potential Habitat (Ha)	Significant Impact Predicted	Comments
Central Hunter Valley Eucalypt Forest and Woodland	Critically Endangered	135.2	Yes	Relevant Ecosystem credits – PCTs 1604, 1655 and 1691 (woodland form)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	12.1	Yes	Relevant Ecosystem credits - PCT 1606 (both forms)
Hunter Valley Weeping Myall (<i>Acacia pendula</i>) Woodland	Critically Endangered	Nil	No	No clearing proposed – potential subsidence impacts only ^a
Tarengo Leek Orchid (<i>Prasophyllum petilum</i>)	Endangered	139.8	No	Estimates of potential habitat are conservative and may be refined following further surveys (see Section 6.4)
Tesselate Everlasting (<i>Ozothamnus tessellatus</i>)	Vulnerable	12.3	No	
Austral Toadflax (<i>Thesium australe</i>)	Vulnerable	45.5	No	
Pink-tailed Legless Lizard (<i>Aprasia parapulchella</i>)	Vulnerable	38.7	Yes	Species credit species
Striped Legless Lizard (<i>Delma impar</i>)	Vulnerable	152.8	Yes	Species credit species
Swift Parrot (<i>Lathamus discolor</i>)	Critically Endangered	25 ^b	Yes	Relevant Ecosystem credits – PCTs 201, 1606, 1655, 1691 and 1692 (woodland form)
Regent Honeyeater (<i>Anthochaera phrygia</i>)	Critically Endangered	22.2 ^b	Yes	Relevant Ecosystem credits – PCTs 201, 1606, 1655 and 1691 (woodland form)
Painted Honeyeater (<i>Grantiella picta</i>)	Vulnerable	25.2 ^b	No	Relevant Ecosystem credits – PCTs 201, 1606, 1655 and 1691 (woodland form)
Spotted-tailed Quoll (<i>Dasyurus maculatus maculatus</i>)	Vulnerable	161.1	No	Relevant Ecosystem credits – PCTs 201, 1604, 1607, 1606, 1655, 1691, 1692 and 1731
Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>)	Vulnerable	20.9	No	Relevant Ecosystem credits – PCTs 201, 1606, 1655 and 1691 (woodland form)
Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	Vulnerable	24.5	No	Relevant Ecosystem credits – PCTs 201, 1604, 1606, 1655 and 1691 (woodland form)
Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>)	Vulnerable	25 ^b	No	Relevant Ecosystem credits – PCTs 201, 1604, 1606, 1655 and 1691 (woodland form)

^a Subsidence impacts (other than ponding) do not form part of Controlled Action 2018/8287, however, impacts on Hunter Valley Weeping Myall (*Acacia pendula*) Woodland are included here for completeness

^b Foraging habitat only

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland CEEC)

The Project involves the clearance of 135.2 ha of Box Gum Woodland CEEC, comprising 9.6 ha of woodland and 125.6 ha of derived native grassland (DNG). Less than 0.1 ha of this CEEC within the underground mining area may also be subject to localised ponding.

While the BDAR indicates that the Project is likely to have a significant impact on Box Gum Woodland CEEC, the BDAR also concludes that the Project is unlikely to lead to a substantial reduction in the quality or integrity of remaining Box Gum Woodland CEEC in the locality or modify natural processes or systems necessary for the survival of the community.

Malabar has committed to a range of measures to manage indirect 'edge effects' of Box Gum Woodland CEEC, including the development of a Vegetation Clearance Protocol and Bushfire Management Plan and the ongoing management of dust, weeds and erosion and sedimentation (see **Section G3**).

Malabar has also committed to offset the residual impacts of the Project on Box Gum Woodland CEEC on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

Malabar has committed to establish a 500 ha woodland corridor within the Maxwell Infrastructure site as part of the post-mining final landform. The Department's recommended conditions require Malabar to focus on the regeneration, enhancement and re-establishment of the CEECs impacted by the Project, including Box Gum Woodland CEEC, within the woodland corridor and any biodiversity offset areas.

Central Hunter Valley Eucalypt Forest and Woodland (Central Hunter Woodland CEEC)

The Project involves the clearance of up to 12.1 ha of Central Hunter Woodland CEEC. Less than 0.3 ha of this CEEC within the underground mining area may also be subject to localised ponding.

While the BDAR indicates that the Project is likely to have a significant impact on Central Hunter Woodland CEEC, the BDAR also indicates that the Project is unlikely to result in fragmentation of the Central Hunter Woodland CEEC, reduce the quality or integrity of remaining Central Hunter Woodland CEEC in the surrounding area or modify natural processes or systems necessary for the survival of the community.

Malabar has committed to a range of measures to manage indirect impacts on Central Hunter Woodland CEEC, including dust, weed infestation, erosion and sedimentation and bushfire risk as discussed in **Section G3**.

Malabar has also committed to offset the residual impacts of the Project on Central Hunter Woodland CEEC on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

Malabar has committed to establish a 500 ha woodland corridor within the Maxwell Infrastructure site as part of the post-mining final landform. The Department's recommended conditions require Malabar to focus on the regeneration, enhancement and re-establishment of the CEECs impacted by the Project, including Central Hunter Woodland CEEC, within the woodland corridor and any biodiversity offset areas.

Hunter Valley Weeping Myall (*Acacia pendula*) Woodland

The predicted subsidence area contains approximately 0.4 ha of *Acacia pendula*. Subsidence impacts (excluding predicted ponding) do not form part of Controlled Action 2018/8287. However, the

Department notes that, subject to the implementation of suitable monitoring and remediation of subsidence impacts, the small areas of *Acacia pendula* within the underground mining area are unlikely to be adversely affected by the proposal.

Malabar has committed to establish a fenced 'Environmental Protection Area' around *Acacia pendula* within the subsidence area.

The Department's recommended conditions would require Malabar to monitor, mitigate and remediate potential impacts on *Acacia pendula*. In the event of unexpected impacts which cannot be reasonably or feasibly remediated, Malabar would be required to provide an equivalent offset on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

Slaty Red Gum (*Eucalyptus glaucina*)

Slaty Red Gum has not been recorded in the Project Area. However, in response to BCD concerns regarding the original survey effort, Hunter Eco undertook supplementary surveys in July 2020. These supplementary surveys included parallel field traverses of the Project Area at a distance of up to 40 m. No Slaty Red Gum trees were identified during the supplementary surveys.

In August 2020, BCD advised that the supplementary surveys were sufficient to discount the presence of Slaty Red Gum within the proposed disturbance area. The BDAR and supplementary information provided by Hunter Eco also indicate that the species is unlikely to be present within the subsidence area.

On this basis, the Department considers that the Project is unlikely to have any direct impacts on this species.

Tarengo Leek Orchid (*Prasophyllum petilum*)

Tarengo Leek Orchid has not been recorded in the Project Area. However, this species is associated with the woodland forms of PCTs 1604, 1606 and 1655, which occur within the Project Area.

The Department has conservatively assumed that the Project would disturb up to 139.8 ha of potential Tarengo Leek Orchid habitat, consistent with the advice of BCD. However, Hunter Eco has noted that the Project Area is not in the Wybong locality, where the species is likely to occur, and the site has been subject to intensive grazing activity. Consequently, the Project is unlikely to have a significant impact on this species.

However, the Department's recommended conditions would require Malabar to undertake pre-clearance surveys and to salvage and translocate any identified plants within the surface disturbance area.

In the event that Tarengo Leek Orchids are identified within the underground mining area, Malabar has proposed to establish an "Environmental Protection Area" around identified plants, comprising a 20 m buffer and livestock exclusionary fencing.

The Department's recommended conditions would require Malabar to offset the residual impacts of the Project on the Tarengo Leek Orchid on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

The Department notes that the Tarengo Leek Orchid is a potential SAI entity. However, subject to the implementation of the recommended conditions, the Department considers that the Project is unlikely to have a serious or irreversible impact on the species.

Tesselate Everlasting (*Ozothamnus tessellatus*)

Tesselate Everlasting has not been recorded in the Project Area. The nearest record of this species is approximately 15 km northwest of the Project Area. In response to concerns raised by BCD, Hunter Eco undertook supplementary surveys of the Project Area in July 2020. While the species was not identified anywhere in the Project Area during the supplementary surveys, the Department notes that the recommended survey period for Tesselate Everlasting is between September and October.

While the Department has conservatively assumed that the Project would disturb up to 12.3 ha of potential Tesselate Everlasting habitat, the Department notes that BCD has advised that the Project is unlikely to have a significant impact on this species.

The Department's recommended conditions would require Malabar to undertake pre-clearance surveys and to salvage and translocate any identified plants within the surface disturbance area. Recommended conditions would also require Malabar to adaptively manage impacts on threatened flora within the underground mining area.

The Department's recommended conditions would require Malabar to offset the residual impacts of the Project on Tesselate Everlasting on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

Austral Toadflax (*Thesium australe*)

Austral Toadflax has not been recorded in the Project Area. Nor are there any records of Kangaroo Grass (*Themeda triandra*), which is typically associated with Austral Toadflax, within the Project Area. In response to concerns raised by BCD, Hunter Eco undertook supplementary surveys of the Project Area in July 2020. While the species was not identified anywhere in the Project Area during the supplementary surveys, the Department notes that the recommended survey period for Austral Toadflax is between November and February.

While the Department has conservatively assumed that the Project would disturb up to 45.5 ha of potential Austral Toadflax habitat, the Department notes that BCD has advised that the Project is unlikely to have a significant impact on this species.

The Department's recommended conditions would require Malabar to undertake pre-clearance surveys and to salvage and translocate any identified plants within the surface disturbance area. Recommended conditions would also require Malabar to adaptively manage impacts on threatened flora within the underground mining area.

The Department's recommended conditions would require Malabar to offset the residual impacts of the Project on Austral Toadflax on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

Pink-tailed Legless Lizard (*Aprasia parapulchella*)

While the Pink-tailed Legless Lizard has not previously been recorded within the Project Area during historical surveys, a single individual was identified to the south east of the proposed mine entry area

during 2019 fauna surveys. Rocky areas of Box Gum Woodland CEEC within the Project Area are considered to provide suitable breeding and foraging habitat for this species.

The Project involves the clearance of up to 38.7 ha of suitable habitat for the Pink-tailed Legless Lizard. This includes a 50-metre buffer zone around rocky areas within PCT 1606.

The BDAR indicates that the Project is likely to have a significant impact on the species, by reducing suitable habitat for what may be an 'important population' of the species, which has not previously been recorded within the Muswellbrook local government area.

However, the BDAR also notes that there is breeding and foraging habitat surrounding the proposed disturbance area, including an area to the northeast of the underground mining area identified as a potential Biodiversity Stewardship Site. On this basis, the BDAR indicates that the Project is unlikely to significantly fragment available habitat or lead to a long-term decrease in the local population.

The BDAR notes that there is potential for individuals to fall into surface cracks within the predicted subsidence area. However, the BDAR also notes that larger cracks (more than 50 mm wide) would be actively remediated and smaller cracks would naturally fill with sediment over time.

The BDAR also considers potential vehicle strikes along the internal site access road. However, the BDAR indicates that the risk of vehicle strikes of legless lizards along the access road is low and would be unlikely to materially affect the local population of the species.

Malabar has also committed to offset the residual impacts of the Project on the Pink Legless Lizard on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

The Department's recommended conditions would also require Malabar to focus on the establishment of suitable habitat and foraging resources for the Pink Legless Lizard in its Rehabilitation Strategy and Biodiversity Management Plans for the Project.

Striped Legless Lizard (*Delma impar*)

The Striped Legless Lizard was recorded at several locations with the proposed surface disturbance area and the surrounding area, with a total of 16 individuals identified during 2019 surveys. The Project involves the clearance of up to 152.8 ha of suitable habitat for this species. The predicted subsidence area also contains potential habitat and approximately 0.5 ha of this area may be subject to ponding.

The Striped Legless Lizard has not previously been recorded in the locality. The nearest recorded population is located approximately 15 km northeast of the Project Area. The BDAR indicates that habitat within the Project Area may be critical to the survival of the Striped Legless Lizard, on the basis that it 'provides foraging and breeding habitat and represents a newly discovered range extension' for the species.

The BDAR indicates that the construction of the proposed transport and services corridor is unlikely to significantly fragment available habitat or isolate the local population of the species. Individual lizards were predominantly located on the southeastern side of the proposed transport and services corridor. The species is also typically slow moving, travelling up to 50 m over several weeks.

The BDAR also indicates that legless lizard species are unlikely to cross the site access road as they generally have low mobility and seek protected habitat. Consequently, the risk of vehicle strikes is considered low.

Malabar has committed to a range of best practice measures to minimise impacts on the species, including the salvage of rocks from disturbance areas for re-use in rehabilitation and offset areas, the management of feral animals and remediation of surface cracking within the subsidence area (see **Section G3**).

Malabar has also committed to offset the residual impacts of the Project on the Striped Legless Lizard on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*. On this basis, the BDAR concludes that the local Striped Legless Lizard population is likely to persist, irrespective of the Project.

The Department's recommended conditions would also require Malabar to focus on the establishment of suitable habitat and foraging resources for the Striped Legless Lizard in its Rehabilitation Strategy and Biodiversity Management Plans for the Project.

Swift Parrot (*Lathamus discolor*)

The Project involves the clearance of up to 25 ha of potential foraging habitat for the Swift Parrot. Approximately 0.8 ha of foraging habitat may also be subject to ponding.

The BDAR conservatively assumed that the Project would have a significant impact on the Swift Parrot, however the species has only been recorded in one location outside of the proposed surface disturbance area in 2012. Additionally, as Swift Parrots only breed in Tasmania, there would be no breeding habitat within the proposed surface disturbance area. Given the Swift Parrot's mobility and the availability of similar foraging habitat in the surrounding locality, the BDAR indicates that clearing associated with the Project is likely to have minimal impacts on the species.

Malabar has also proposed a range of measures to minimise potential indirect impacts on the Swift Parrot, including the preparation and implementation of a vegetation clearance protocol (see **Section G3**).

The residual impacts of the Project on the Swift Parrot would be offset under the relevant ecosystem credits as shown in **Table G1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

The Department's recommended conditions also require Malabar to prioritise the establishment of Box Gum Woodland CEEC and Central Hunter Woodland CEEC in the Rehabilitation Strategy and Biodiversity Management Plans for the Project, which should assist in the long-term establishment of foraging habitat for the Swift Parrot.

Regent Honeyeater (*Anthochaera phrygia*)

The Project involves the clearance of up to 22.2 ha of potential foraging habitat for the Regent Honeyeater. Approximately 0.8 ha of foraging habitat may also be subject to ponding.

The BDAR conservatively assumed that the Project would have a significant impact on the Regent Honeyeater, however, the information presented in the BDAR indicates that a significant impact on the species is unlikely. There is no breeding habitat within the proposed surface disturbance area, and the Regent Honeyeater has not been recorded within the Project Area in contemporary or historical surveys.

Malabar has also proposed a range of measures to minimise potential indirect impacts on the Regent Honeyeater, including the preparation and implementation of a vegetation clearance protocol (see **Section G3**).

The residual impacts of the Project on the Regent Honeyeater would be offset under the relevant ecosystem credits as shown in **Table G1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

The Department's recommended conditions also require Malabar to focus on the regeneration, enhancement and re-establishment of habitat and foraging resources for EPBC-listed threatened fauna, including the Regent Honeyeater, in the Rehabilitation Strategy and Biodiversity Management Plans for the Project, which should assist in the long-term establishment of foraging habitat for the species.

Painted Honeyeater (*Grantiella picta*)

The Project involves the clearance of approximately 25.2 ha of potential foraging habitat for the Painted Honeyeater. A single individual Painted Honeyeater was recorded in the Project Area during 2019 surveys. This species was not previously identified during historical surveys.

Due to the availability of equivalent foraging habitat in the area, the BDAR indicates that habitat within the proposed disturbance area is unlikely to be critical to the survival of the species.

Malabar has also proposed a range of measures to minimise potential indirect impacts on the Painted Honeyeater, including the preparation and implementation of a vegetation clearance protocol (see **Section G3**).

The residual impacts of the Project on the Painted Honeyeater would be offset under the relevant ecosystem credits as shown in **Table G1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)

The Project involves the clearance of up to 161.1 ha of potential habitat for the Spotted-tailed Quoll. Approximately 2 ha of foraging habitat may also be subject to ponding.

The Spotted-tailed Quoll was not recorded in the Project Area during 2019 surveys, however it has been recorded within the Southern Offset Area at the Maxwell Infrastructure site and to the northwest and southwest of the underground mining area during historical surveys.

Malabar has also proposed a range of measures to minimise potential indirect impacts on the Painted Honeyeater, including the preparation and implementation of a vegetation clearance protocol and the establishment of speed limits on internal roads (see **Section G3**).

The residual impacts of the Project on the Spotted-tailed Quoll would be offset under the relevant ecosystem credits as shown in **Table G1**, in accordance with the *NSW Biodiversity Offsets Scheme*. On this basis, the BDAR indicates that the Project is unlikely to have a significant impact on the Spotted-tailed Quoll.

The Department's recommended conditions also require Malabar to focus on the establishment of Box Gum Woodland CEEC and Central Hunter Woodland CEEC in the Rehabilitation Strategy and Biodiversity Management Plans for the Project, which should assist in the long-term establishment of foraging habitat for the Spotted-tailed Quoll.

Corben's Long-eared Bat (*Nyctophilus corbeni*)

The Project involves the clearance of up to 20.9 ha of potential habitat for Corben's Long-eared Bat. Approximately 0.8 ha of potential habitat may also be subject to ponding.

While the BDAR notes there is anecdotal evidence of sightings in past decades, this species was not recorded in the Project Area during contemporary or historical surveys. Given the lack of sightings, and the availability of similar habitat in the locality, the Project is unlikely to have a significant impact on Corben's Long-eared Bat.

Nonetheless, Malabar has proposed a range of measures to minimise potential impacts on threatened bats, as outlined in **Section G3**. The residual impacts of the Project on Corben's Long-eared Bat would be offset under the relevant ecosystem credits as shown in **Table G1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

Grey-headed Flying Fox (*Pteropus poliocephalus*)

The Project involves the clearance of up to 24.5 ha of potential foraging habitat for the Grey-headed Flying Fox. Less than 0.3 ha of potential habitat may also be subject to ponding.

The Grey-headed Flying Fox was recorded in two locations to the southeast of the proposed mine entry area during 2019 fauna surveys. However, no breeding camps were identified and the BDAR indicates that the proposed surface disturbance area does not contain any suitable breeding habitat.

Given the availability of equivalent foraging habitat in the area, the BDAR indicates that habitat within the proposed disturbance area is unlikely to be critical to the survival of the species.

Nonetheless, Malabar has proposed a range of measures to minimise potential impacts on threatened bats, as outlined in **Section G3**. The residual impacts of the Project on the Grey-headed Flying Fox would be offset under the relevant ecosystem credits as shown in **Table G1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

Large-eared Pied Bat (*Chalinolobus dwyeri*)

The Project involves the clearance of up to 25 ha of potential foraging habitat for the Large-eared Pied Bat. An additional 0.8 ha of potential habitat may be subject to ponding.

The Large-eared Pied Bat has been recorded at several locations within the Project Area during contemporary and historical surveys. However, the Project Area does not contain any suitable roosting or breeding habitat.

Malabar has proposed a range of measures to minimise potential impacts on threatened bats, including the development and implementation of a vegetation clearance protocol (see **Section G3**).

Given the availability of equivalent foraging habitat in the area, the BDAR indicates that habitat within the proposed disturbance area is unlikely to be critical to the survival of the species.

Consideration of Additional EPBC-listed Species

Other EPBC-listed species were considered in the BDAR, including: Green and Golden Bell Frog (*Litoria aurea*), Koala (*Phascolarctos cinereus*), New Holland Mouse (*Pseudomys novaehollandiae*), White-flowered Wax Plant (*Cynanchum elegans*), Leek Orchid (*Prasophyllum* sp. Wybong) and Illawarra Greenhood (*Pterostylis gibbosa*). The assessment concluded that these species were not likely to be present in the Project Area or surrounding locality, and as such, the Project would pose a nil to negligible risk of impact.

G.2 Impacts to Water Resources

A detailed assessment of the Project's potential impacts on water resources is provided in **Section 6.2** of the Department's Assessment Report.

This assessment considered predicted impacts on groundwater and surface water resources, including impacts on GDEs, water users and downstream environments, having regard to expert advice provided by the IESC, DPIE Water, NRAR and the EPA.

The Department considers that the proposed action is unlikely to have significant impacts on regional groundwater and surface water resources. The Department is also of the view that the water-related impacts of the Project can be appropriately monitored, mitigated and managed under recommended conditions of consent. The Department's recommended conditions would require:

- the preparation and implementation of a comprehensive, site-wide Water Management Plan, including a program to monitor groundwater levels and surface and groundwater quality;
- preparation of detailed Water Management Plans as part of future Extraction Plans;
- the provision of compensatory water supplies for any affected groundwater user;
- compliance with water management performance measures; and
- the implementation of suitable mitigation, management, monitoring and response measures to manage impacts on water resources.

G.3 Demonstration of 'Avoid, Mitigate, Offset' for Matters of National Environmental Significance (MNES)

Avoidance of Biodiversity Impacts

Following the Commonwealth's Controlled Action Decision dated 12 November 2018, Malabar reduced the size of the proposed mine entry area by approximately 36 percent. This led to a variation of the Controlled Action Decision on 10 July 2019. While the Project, as proposed, would result in the total clearance of 147.3 ha of CEEC, the Department notes that:

- as a 'brownfield' development, the Project would utilise existing cleared areas at the Maxwell Infrastructure site, thereby reducing the total impact area required for the development;
- the Project would result in considerably less surface disturbance than previous open cut mining proposals for the site; and
- the majority of CEEC proposed to be cleared is derived native grassland, which has a lower vegetation integrity score than the woodland form of the CEEC.

Mitigation and Management of Indirect Biodiversity Impacts

Malabar has committed to:

- adaptively manage and remediate subsidence impacts (as discussed in **Section 6.3** of the Department's Assessment Report);
- establish an "Environmental Protection Area" around known and previously recorded locations containing *Acacia pendula*, comprising a 20 m buffer zone and stock-exclusionary fencing;
- develop and implement a vegetation clearance protocol;
- delineation of approved disturbance areas to prevent accidental damage of adjacent vegetation and habitat;

- engage a suitably qualified person to undertake pre-clearance fauna surveys and remain on-site during clearing of native vegetation and rocky areas to capture and relocate native fauna;
- trim, rather than clear native trees along electricity transmission corridors, where possible;
- salvage and re-use potential habitat features, such as tree hollows and bush rock;
- prepare and implement an Erosion and Sedimentation Control Plan;
- implement a weed management program;
- use of on-site wheel washes to minimise the transport of weeds off-site;
- erect fencing along the length of the site access road; and
- develop and implement a bushfire management procedure.

As an underground mining operation, dust impacts on biodiversity are expected to be relatively minor. The Department's recommended conditions would require Malabar to implement best practice air quality management in accordance with a detailed Air Quality and Greenhouse Gas Management Plan. Recommended conditions would also require Malabar to seal the site access road within the first 12 months of mining operations, to minimise wheel generated dust emissions along the transport and services corridor prior to the commissioning of the overland conveyor.

Blasting impacts are also likely to be minor, as only small construction-related blasting and final blasting of highwalls in the Maxwell Infrastructure voids is proposed.

The Department considers that noise and lighting impacts can be suitably managed under a Noise and Blasting Management Plan and Visual Impact Management Plan. The Department's recommended conditions also require Malabar to develop and implement pest and weed management protocols as part of a comprehensive Biodiversity Management Plan (BMP) for the Project, having regard to relevant Threat Abatement Plans (see **Section F.4.2**).

Biodiversity Offset Strategy

The Department's recommended conditions require Malabar to develop a biodiversity offset strategy which accounts for the residual impacts of the Project which cannot be addressed through the proposed avoidance and mitigation measures, as outlined in **Table G2**.

Table G2 | Summary of biodiversity credit requirements for MNES

Credit Type	Credits Required	
	Stage 1	Stage 2
Ecosystem Credits		
PCT201 Fuzzy Box Woodland on Alluvial Brown Loam Soils mainly in the NSW South Western Slopes Bioregion (Woodland) ^c	15	-
PCT1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum Shrub – Grass Woodland of the Central and Upper Hunter ^c	44	-
PCT1606 White Box- Narrow-leaved Ironbark – Blakely's Red Gum Shrubby Open Forest of the Central and Upper Hunter (Woodland) ^{a,c}	216	2
PCT1606 White Box- Narrow-leaved Ironbark – Blakely's Red Gum Shrubby Open Forest of the Central and Upper Hunter (Derived Native Grassland) ^{a,c}	971	45
PCT1655 Grey Box – Slaty Box Shrub – Grass Woodland on Sandstone Slopes of the Upper Hunter Valley and Sydney Basin (Woodland) ^{b,c}	21	2
PCT1691 Narrow-leaved Ironbark – Grey Box Grassy Woodland of the Central and Upper Hunter (Woodland) ^{b,c}	184	-

Credit Type	Credits Required	
	Stage 1	Stage 2
PCT1692 Bull Oak Grassy Woodland of the Central Hunter Valley (Woodland) ^c	45	-
Species Credits		
Tarengo Leek Orchid (<i>Prasophyllum petilum</i>) ^c	1,114	98
Tesselate Everlasting (<i>Ozothamnus tessellatus</i>) ^c	217	5
Austral Toadflax (<i>Thesium australe</i>) ^c	34	0
Pink-tailed Legless Lizard ^c	382	41
Striped Legless Lizard ^c	1,126	99

^a Commensurate with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the EPBC Act

^b Commensurate with Central Hunter Valley Eucalypt Forest and Woodland under the EPBC Act

^c Species and related ecosystem credits for EPBC-listed species and communities must be retired on a like-for-like basis

Malabar proposes to retire the required credits in accordance with the *Biodiversity Assessment Method*, using one or a combination of offsetting mechanisms available under the *Biodiversity Offset Scheme*, including the establishment of a Biodiversity Stewardship Site, payment into the Biodiversity Conservation Fund and/or mine site ecological rehabilitation. Credits relating to MNES would be retired on a like-for-like basis, across two discrete stages that match the timing of predicted impacts.

Stage One comprises all surface disturbance associated with the Maxwell Infrastructure area, transport and services corridor and mine entry area. Stage Two relates solely to the realignment of Edderton Road, which would occur midway through the life of the Project.

As discussed in **Section 6.4** of the Department's Assessment Report, the recommended conditions provide flexibility for Malabar to commission further BAM-compliant flora surveys (during the appropriate survey periods) or commission an expert report, to more accurately determine the extent of impacts on threatened flora that have been assumed to be present within the proposed disturbance area, in consultation with BCD. These conditions would enable Malabar to seek a reduction of the credit requirements outlined in **Table G2**, where flora species credits are found to have been overestimated.

Malabar has identified a potential biodiversity offset area to the east of the Project Area (see **Section 6.4** of the Department's Assessment Report). Initial surveys undertaken by Malabar indicate that this area is likely to satisfy the Stage One credit requirements for the majority of MNES impacted by the Project.

Following the State's determination of the application, Malabar would need to undertake further surveys in accordance with the BAM to ascertain whether the potential offset area fully satisfies the requirements outlined in **Table G2**. However, the Department notes that any potential shortfall could be addressed using the full range of available offsetting mechanisms discussed above.

Avoidance, Mitigation and Offsetting of Impacts on Water Resources

The Department's recommended conditions impose strict performance measures for the Project. These performance measures would require Malabar to ensure that its operations have:

- negligible impacts on alluvial aquifers (including changes to water quality, water levels or impacts on groundwater users) beyond those predicted in the EIS;
- negligible impacts on base channel stability for the Hunter River or its tributaries;
- negligible impacts on aquatic and riparian ecosystems within the Hunter River and its tributaries beyond those predicted in the EIS.

The recommended conditions would require the development of detailed Water Management Plans, including surface and groundwater monitoring programs and Trigger Action Responses Plans to manage risks during mining operations.

The recommended conditions also provide a mechanism for remediation of unexpected impacts on water resources. In the event that these impacts cannot be suitably remediated, the recommended conditions would require Malabar to provide a proportionate offset, in consultation with relevant Government agencies.

G.4 Requirements for Decisions About Threatened Species and Endangered Ecological Communities

In accordance with section 139 of the EPBC Act, in deciding whether or not to approve, for the purposes of a subsection of either section 18 or section 18A of the EPBC Act, the taking of an action and what conditions to attach to such an approval, the Commonwealth Minister must not act inconsistently with certain international environmental obligations, Recovery Plans or Threat Abatement Plans. The Commonwealth Minister must also have regard to relevant approved Conservation Advice.

G.4.1 Australia's International Obligations

Australia's obligations under the *Convention on Biological Diversity* (Biodiversity Convention) include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

The recommendations of this report are not inconsistent with the Biodiversity Convention, which promotes environmental impact assessment (as has been undertaken for this proposal) to avoid and minimise adverse impacts on biological diversity. The Department's recommended conditions require avoidance, mitigation and management measures for listed threatened species and communities and all information related to the proposed action is required to be publicly available to ensure equitable sharing of information and improved knowledge relating to biodiversity.

Australia's obligations under the *Convention on Conservation of Nature in the South Pacific* (Apia Convention) include encouraging the creation of protected areas which together with existing protected areas will safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations and regions. Additional obligations include using best endeavours to protect fauna and flora (special attention being given to migratory species) so as to safeguard them from unwise exploitation and other threats that may lead to their extinction. The Apia Convention was suspended on 13 September 2006. Nonetheless, Australia's obligations under the Convention have been taken into consideration. The recommended approvals are not inconsistent with the Convention which generally aims to promote the conservation of biodiversity.

The *Convention on International Trade in Endangered Species of Wild Flora and Fauna* (CITES) is an international agreement between governments which seeks to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The recommended approvals are not inconsistent with CITES as the proposed action does not involve international trade in specimens of wild animals and plants.

G.4.2 Recovery Plans and Approved Conservation Advices

The Department has undertaken a detailed and comprehensive assessment of the potential impacts of the Project on listed threatened species and communities under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. The Department has taken into consideration approved Conservation Advice and Recovery Plans for the species and communities which may be impacted by the Project.

Conservation Advice

The following Conservation Advice is relevant to the proposed action:

- *Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community* (May 2015);
- *Approved Conservation Advice (including listing advice) for Hunter Valley Weeping Myall (Acacia pendula) Woodland* (August 2005);
- *Approved Conservation Advice for Eucalyptus glaucina (Slaty Red Gum)* (July 2008);
- *Approved Conservation Advice for Ozothamnus tessellatus* (October 2008);
- *Approved Conservation Advice for Thesium australe (austral toadflax)* (December 2013);
- *Conservation Advice Aprasia parapulchella Pink-tailed worm-lizard* (October 2015);
- *Conservation Advice Delma impar striped legless lizard* (December 2016);
- *Conservation Advice Lathamus discolor Swift Parrot* (May 2016);
- *Conservation Advice Anthochaera phrygia Regent Honeyeater* (July 2015);
- *Conservation Advice Grantiella picta Painted Honeyeater* (July 2015); and
- *Conservation Advice Nyctophilus corbeni South-eastern Long-eared bat* (October 2015).

There is no approved Conservation Advice in respect of *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Prasophyllum petilum*; Spotted-tailed Quoll, Grey-headed Flying-fox or Large-eared Pied Bat.

The Department has considered relevant Conservation Advice in its assessment of the Project, particularly in respect to Central Hunter Woodland CEEC, the Pink-tailed Legless Lizard, the Striped Legless Lizard, the Swift Parrot and the Regent Honeyeater, which have the potential to be significantly impacted by the Project.

The key threats to these MNES include mining-related vegetation clearing and landscape fragmentation, introduction of weeds (including African olive), predation (particularly by feral cats and foxes), removal of fallen timber and bush rock, habitat degradation by livestock and altered fire regimes.

The Department's recommended conditions would require Malabar to:

- engage a suitably qualified person to undertake pre-clearance surveys and relocate threatened fauna encountered during surface disturbance;
- minimise indirect 'edge effects' on vegetation adjacent to disturbance areas;
- manage weeds and feral pests in accordance with a detailed BMP;

- maximise the salvage of fallen timber and tree hollows from disturbance areas to improve habitat integrity in existing and proposed biodiversity offset areas;
- manage impacts associated with ongoing grazing activities;
- manage spontaneous combustion risks and develop and implement a Bushfire Management Plan;
- progressively establish a woodland corridor, consisting primarily of Central Hunter Woodland and Box Gum Woodland CEEC, within the Maxwell Infrastructure site; and
- offset the residual impacts of the Project in accordance with the BAM and *Biodiversity Offsets Scheme*.

The Department considers that the Project can be carried out in a manner that is consistent with relevant Conservation Advice for impacted MNES.

Recovery Plans

The following Recovery Plans are relevant to the proposed action:

- *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*;
- *National Recovery Plan Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley*;
- *National Recovery Plan for the Tarengo Leek Orchid (Prasophyllum petilum)*;
- *National Recovery Plan for the Swift Parrot (Lathamus discolor)*;
- *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia)*;
- *National Recovery Plan for the Spotted-tailed Quoll (Dasyurus maculatus)*; and
- *National Recovery Plan for the Large-eared Pied Bat (Chalinolobus dwyeri)*.

There are no approved recovery plans in respect of *Central Hunter Valley Eucalypt Forest and Woodland* EEC, *Eucalyptus glaucina*, *Ozothamnus tessellatus*, *Thesium australe*, Pink-tailed Legless Lizard, Striped Legless Lizard, Painted Honeyeater, Corben's Long-eared Bat or the Grey-headed Flying-fox.

The key objectives of the relevant Recovery Plans include:

- achieving no net loss in extent and condition of Box Gum Woodland CEEC;
- increasing protection of sites containing Box Gum Woodland CEEC with high recovery potential;
- increasing landscape functionality of Box Gum Woodland CEEC through management and restoration of degraded sites;
- increasing transitional zones and linkages between areas of remnant Box Gum Woodland CEEC;
- ensuring that all natural populations of Tarengo Leek Orchid are stable or increasing in size;
- preventing a further decline in the Swift Parrot population and achieving a demonstrable sustained improvement in the quality and quantity of habitat;
- reverse the long-term population trend of decline and increase the number of Regent Honeyeaters to a level where there is a viable, wild breeding population even in poor breeding years;
- enhance the condition of Regent Honeyeater habitat to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation;
- reduce the rate of habitat loss and fragmentation for the Spotted-tailed Quoll;
- manage threats to the Spotted-tailed Quoll by introduced predators (foxes, cats and wild dogs);
- manage the impacts of fire regimes on the Spotted-tailed Quoll; and
- reduce the frequency of Spotted-tailed Quoll road mortality.

Malabar has committed to offset the impacts of the Project on MNES on a like-for-like basis in accordance with the BAM and the Biodiversity Offsets Scheme. This will likely include the establishment

of a land-based offset site to the north-east of the underground mining area. This site would be secured and managed in perpetuity under a Biodiversity Stewardship Agreement.

The Department's recommended conditions would also require Malabar to manage indirect impacts on MNES, including predation by feral pests and altered fire regimes, under a detailed BMP.

While the Project has the potential to result in road mortality for the Spotted-tailed Quoll, this is unlikely to result in a significant decline in the local population.

On this basis, the Department considers that the Project can be carried out in a manner that is consistent with the key objectives of the relevant National Recovery Plans.

G.4.2 Threat Abatement Plans (TAPs)

The Department has considered the Threat Abatement Plans (TAPs) relevant to the Project under the EPBC Act. These TAPs are available at <http://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/approved>.

The TAPs which are relevant to the Project are as follows:

- *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs*
This TAPs are relevant to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC.
- *Threat Abatement Plan for competition and land degradation by rabbits*
This TAP is relevant to *Prasophyllum petilum*, Pink-tailed Legless Lizard, Striped Legless Lizard, and the Regent Honeyeater.
- *Threat abatement plan for predation by feral cats*
This TAP is relevant to the Striped Legless Lizard, Swift Parrot and the Spotted-tailed Quoll.
- *Threat abatement plan for predation by the European red fox*
This TAP is relevant to the Striped Legless Lizard and the Spotted-tailed Quoll.

The Project has the potential to:

- facilitate the spread, or lead to a higher abundance of foxes and feral pigs and cats (and other unmanaged or feral fauna) through the clearance and modification of habitat; and
- increase the amount of disturbed and modified habitats, which rabbits tend to colonise, and lead to an increase in rabbit populations.

The Department has included measures for the control of feral animals under the recommended Biodiversity Management Plan for the Project, including specific requirements for the Applicant to consider the actions identified in relevant TAPs. With these measures in place, the Department considers that the action can be carried out in a manner which is compatible with the relevant TAPs.

The following TAPs apply to species and communities affected by the action, but are not considered relevant to the Project:

- *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*
This TAP is relevant to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC, however, it not considered a relevant threat for the Muswellbrook region.
- *Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi**

This TAP is relevant to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC and *Hunter Valley Weeping Myall (Acacia pendula) Woodland* CEEC. However, the BDAR indicates that *Phytophthora cinnamomi* is unlikely to region, due to its relatively dry climate. As such, no specific management measures are considered necessary.

There are no TAPs relevant to *Central Hunter Valley Eucalypt Forest and Woodland* EEC, *Eucalyptus glaucina*, *Ozothamnus tessellatus*, Painted Honeyeater, Corben's Long-eared Bat or the Grey-headed Flying-fox.

G.5 Additional EPBC Act Considerations

Table G3 contains a range of further mandatory considerations, factors to be taken into account and factors to have regard to under the provisions of the EPBC Act.

Table G3 | Additional Considerations for the Commonwealth Minister under the EPBC Act

EPBC Act Section	Consideration	Conclusion
Mandatory considerations		
136(1)(b)	Social and economic matters are discussed in the EIS and Sections 6.9 and 6.10 of this Report.	The Department considers that the proposed development would result in a range of benefits for the local and regional economies and would allow for the continued and valuable production of coal from the region.
Factors to be taken into account		
136(2)(a)	<p>Principles of ecologically sustainable development (ESD), including the precautionary principle, have been taken into account, in particular in:</p> <ul style="list-style-type: none"> • long and short-term economic, environmental, social and equity considerations relevant to this decision; • conditions that restrict environmental impacts, impose monitoring and adaptive management requirements and reduce uncertainty concerning the potential impacts of the Project; • conditions requiring the Project to be operated in a sustainable way that protects the environment for future generations and conserves MNES; • advice provided within this report which reflects the importance of conserving biological diversity and ecological integrity in relation to the controlling provisions for this Project; and • mitigation measures to be implemented which reflect improved valuation, pricing and incentive mechanisms that promote a financial cost to the applicant to mitigate the environmental impacts of the Project. 	The Department considers that, subject to the recommended conditions of consent, the Project could be undertaken in a manner that is consistent with the principles of ESD.

136(2)(e)	Other information on the relevant impacts of the action.	The Department considers that all information relevant to the impacts of the Project has been taken into account.
136(2)(fa)	Advice was sought from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC)	The Department has reviewed the advice and recommendations of the IESC, and considered Malabar's response (see Appendix D) to these matters in Section 6.2

Factors to have regard to

176(5)	Bioregional plans	<p>The Commonwealth Government released its bioregional assessment package for the Northern Sydney Basin - Hunter Subregion in May 2018. The Department notes that the bioregional assessment was based on the former Drayton South Coal Project and not the current underground mining proposal.</p> <p>A more contemporary and detailed assessment of the Project's potential impacts on water resources and biodiversity has been provided in the EIS. The Department considers that these assessments are more likely to provide an accurate prediction of cumulative environmental impacts of the Project than any regional-scale assessment tool.</p>
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Considerations on deciding conditions

134(4)	<p>Must consider:</p> <ul style="list-style-type: none"> information provided by the person proposing to undertake the action or by the designated applicant of the action; and desirability of ensuring as far as practicable that the condition is a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition. 	<ul style="list-style-type: none"> Documents provided by the Applicant are provided at Appendices A, C and D of this report. The Department considers that the recommended conditions of consent in Appendix H are a practicable and cost-effective means to achieve their purposes. These conditions have been prepared following careful considerations of material provided by the Applicant and following consultation with NES Government Agencies and DAWE.
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G.6 Conclusions on Controlling Provisions

G.6.1 Threatened Species and Communities (sections 18 and 18A of the EPBC Act)

The information provided to date identifies that the Project could have the potential to result in significant impacts on the following threatened species and communities listed under the EPBC Act:

- Box Gum Woodland CEEC;

- Central Hunter Woodland CEEC;
- Pink-tailed Legless Lizard; and
- Striped Legless Lizard.

The Project also has potential to significantly impact the Swift Parrot and Regent Honeyeater, however the BDAR indicates that significant impacts are unlikely.

The Department considers that the impacts of the proposed action on threatened species and communities would be acceptable, subject to the avoidance, mitigation, offsetting and management measures described in the Applicant's environmental assessment documents, and the requirements of the Department's recommended conditions of consent (see **Appendix H**).

The Applicant has committed to offset the impacts of the Project on threatened species and communities in two stages, as outlined in **Table G2**, in accordance with the requirements of the NSW *Biodiversity Offsets Scheme* (see conditions B50 and B56).

The recommended conditions provide flexibility for the Applicant to use one or more of the mechanisms available under the Biodiversity Offsets Scheme, provided that all credits relating to MNES are retired on a like-for-like basis.

The Applicant would be required to retire all of the credits required for Stage One prior to commencing construction of the Project or other timeframe agreed by the Planning Secretary. This timing reflects the need to retire relevant biodiversity offset credits prior to disturbance, but also allows for flexibility in the commencement of limited construction activities where the Planning Secretary is satisfied that sufficient credits have been retired for these works (eg through payment into the BCF), while a Biodiversity Stewardship Agreement is being entered into for the remaining Stage 1 biodiversity offset credits. The Applicant would be required to retire all Stage Two credits prior to commencing any works associated with the realignment of Edderton Road.

The recommended conditions provide a mechanism to adjust the credit requirements for *Prasophyllum petilum*, *Ozothamnus tessellatus* and *Thesium australe* outlined in **Table G2** following further surveys undertaken in accordance with the BAM (see condition B54).

The Department has also recommended a condition requiring the Applicant to prepare a detailed Biodiversity Management Plan (see condition B57). This plan would describe the measures to be implemented to:

- avoid and minimise impacts to threatened species and communities;
- regenerate, enhance and re-establish Box Gum Woodland and Central Hunter Woodland CEECs;
- re-establish habit and foraging resources for the Pink-tailed Legless Lizard, Striped Legless Lizard, Swift Parrot and Regent Honeyeater; and
- control feral pests in accordance with the relevant TAPs.

The Department recommends that the Commonwealth Minister require the Applicant to implement the State's conditions, where they relate to the management of impacts on threatened species and communities listed under the EPBC Act.

G.6.2 Water Resources (sections 24D and 24E of the EPBC Act)

The Project was jointly referred by the Department and DAWE to the IESC, requesting advice on potential surface water and groundwater impacts, including potential impacts on GDEs, downstream water users and receiving environments. The IESC's advice is included in **Appendix E**.

The Department has considered the IESC's advice and Malabar's response in its assessment of the Project and in its recommended conditions (see **Appendix H**).

G.7 Other Protected Matters

DAWE has determined that other matters under the EPBC Act are not controlling provisions with respect to the proposed action. These include listed World Heritage places, National Heritage places, migratory species, Ramsar wetlands, the Commonwealth marine environment, Commonwealth land, Commonwealth actions, nuclear actions, the Great Barrier Reef Marine Park and Commonwealth Heritage places located overseas.

G.8 Conclusions

Threatened species and communities (Sections 18 and 18A of the EPBC Act)

For the reasons set out in **Section 6.4** and this Appendix, the Department recommends that the impacts of the action would be acceptable, subject to the avoidance and mitigation measures described in Malabar's EIS (see **Appendix A**) and Submissions Report (see **Appendix C**), and the Department's recommended conditions of consent (see **Appendix H**).

A water resource, in relation to coal seam gas development and large coal mining development (Sections 24D and 24E of the EPBC Act)

For the reasons set out in **Section 6.2** and this Appendix, the Department recommends that the impacts of the action on a water resource, in relation large coal mining development would be acceptable, subject to the avoidance and mitigation measures described in Malabar's EIS (see **Appendix A**), Submissions Report (see **Appendix C**) and additional supporting information (see **Appendix D**), and the Department's recommended conditions of consent (see **Appendix H**).

Appendix H – Recommended Instrument of Consent

<https://www.planningportal.nsw.gov.au/major-projects/project/10151>