MALABAR COAL

MAXWELL PROJECT

SECTION 9

Evaluation and Conclusion

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9 EVALUATION AND CONCLUSION

This section provides a summary evaluation and conclusion for the Project EIS. Consistent with the requirement of the SEARs, this section provides justification for why the Project should be approved.

As part of this justification, consideration has been given to:

- the suitability of the site (Section 9.1);
- Project design decisions, including feasible alternatives (Section 9.2);
- relevant planning and policy objectives, including the principles of ESD (ecologically sustainable development) (Section 9.3);
- key potential biophysical, economic and social impacts and benefits (Section 9.4); and
- the consequences of not carrying out the Project (Section 9.4.3).

9.1 SUITABILITY OF THE SITE

This sub-section describes the Project site with respect to five key relevant aspects of suitability. The remainder of Section 9 also presents additional information that pertains to the suitability of the site and the more general suitability of the Project within the NSW environmental assessment and approval regime.

The Project has attributes which are akin to a 'brownfield' project, in particular:

- the beneficial use of the substantial existing Maxwell Infrastructure for coal handling and processing, water storage and CHPP reject emplacement;
- access to existing rail and port infrastructure;
- an established site access point; and
- extensive geological and geotechnical data providing a high level of confidence in the coal resource.

9.1.1 Existing Tenements

The NSW *Mining Act, 1992* facilitates the development of mineral resources in NSW (including coal), having regard to the need to encourage ESD. This includes processes for the allocation of exploration tenements for coal, and the need for regular review and renewal of these tenements.

The Project would involve the extraction of underground coal resources within EL 5460. EL 5460 was first granted under the NSW *Mining Act, 1992* in 1998, and was most recently renewed in December 2017. Other tenements have previously existed in the area, as described in Section 2.1.1.

Extensive geological and geotechnical data is available within the target area in EL 5460 from multiple exploration campaigns (Section 2.1). This data was a significant factor in Malabar electing to proceed with the Project, as proposed, with confidence in the coal resource and hence return on investment.

Condition 13 of EL 5460 specifically prevents prospecting for the purposes of any open cut development within the licence area:

> *This exploration licence only authorises prospecting for the purposes of the assessment and potential future extraction of underground resources (i.e. resources between 15 metres to 900 metres below the surface of the land). For the avoidance of doubt, the holder of this exploration licence is not prevented from:*
>
> *a) carrying out prospecting operations on and from the surface of the land; and*
>
> *b) investigating options for the construction of surface infrastructure and works, including access to the underground coal seams, that may be required for the extraction of these underground resources.*

The Project involves underground mining and is consistent with the above condition of EL 5460.

The substantial existing Maxwell Infrastructure is located within existing mining tenements under the NSW *Mining Act, 1992* (CL 229, ML 1531 and CL 395) and would be used for the handling, processing and transportation of coal for the life of the Project.

9.1.2 Existing Surface Infrastructure

Key existing assets at the Maxwell Infrastructure include:

- site access road from Thomas Mitchell Drive;
- CHPP, which includes:
  - ROM coal stockpile and ROM hopper;
  - coal processing plant; and
  - product coal stockpiles;
- train load-out facility and rail loop (connecting to the Antiene Rail Spur);

- administration, employee amenities, training centre, emergency services, workshops, washdown bays, store, parking facilities and explosives storage facilities;
- electrical distribution infrastructure;
- CHPP reject emplacement facilities; and
- site water management infrastructure (including water storages, pumps and pipelines and a wastewater treatment facility).

The use of the Maxwell Infrastructure for the Project results in significantly less disturbance and a lower initial capital cost, than would otherwise be required for a 'greenfield' project to access the coal resource within EL 5460.

In the absence of approval for the Project, this existing infrastructure would be decommissioned and the potential benefits of its use would be lost.

In addition to the above, the Project would support continued rehabilitation activities at the Maxwell Infrastructure (within CL 229, ML 1531 and CL 395), including reduction in the volume of final voids through emplacement of reject material generated by coal processing activities.

9.1.3 Access to Rail and Port Infrastructure and Markets

The Project has direct rail access via the existing Antiene Rail Spur and the Main Northern Railway (part of the Hunter Valley coal rail network) to transport product coal to the Port of Newcastle for export or to local markets.

The Antiene Rail Spur is owned by a Joint Venture between BHP and Malabar. The Project would operate within current rail limits on the Antiene Rail Spur for the Maxwell Infrastructure with continued use of the existing infrastructure.

Anticipated coal production from the Project has been included in forecast volumes for the Hunter Valley coal rail network and rail network capacity is expected to be available for the Project (Section 5.3.5).

Similarly, sufficient port capacity at the Kooragang and Carrington Coal Terminals (both of which load ships for export of coal through the Port of Newcastle) is expected to be available for the Project (Section 5.3.5).

The use of the Hunter Valley coal rail network and coal export terminals at the Port of Newcastle would have positive economic flow-on effects for these operations.

In the near term, the largest customer for the Project's coking coal product is expected to be Japan, followed by South Korea, delivered using existing rail and port infrastructure. Collectively, these two countries are anticipated to account for more than half of Malabar's coking coal sales in the Project's early years. Japan and Korea have a long history of purchasing semi-soft coking coals and the trade is considered relatively stable and consistent (Wood Mackenzie, 2019).

In the longer-term, Malabar anticipates that India would also be a significant customer for the Project's coking coal product. Wood Mackenzie (2019) predicts that the urbanisation and industrialisation of India will increase demand for seaborne coking coal, more than offsetting any falling steel demand of mature economies, such as Japan. Wood Mackenzie (2019) forecasts an increase in annual global seaborne trade of coking coals of 110 million tonnes between 2018 and 2040, of which approximately 75 million tonnes will come from Australian exports. Australia is well-placed to provide coking coal to support the increased demand for steel in India due to competitive delivered costs (i.e. through the Port of Newcastle) (Wood Mackenzie, 2019).

The Project's thermal coal production is expected to be relatively small compared to global market supply. The Project's main thermal coal markets are expected to be Japan, South Korea and Taiwan. Some small quantities of thermal coal may also be sold on the domestic market (e.g. to AGL's Liddell or Bayswater Power Stations) in instances where Project coal would substitute supply from existing sources.

9.1.4 Permissibility

It is noted that there is no general presumption of allowing development that is permissible. Notwithstanding, the permissibility of a development may be a relevant consideration for the consent authority.

Pursuant to clause 7 of the Mining SEPP, the Project is permissible with development consent under Part 4 of the EP&A Act (Section 4.3.1).

The permissibility of mining within the Project area was specifically considered by the NSW Government in December 2017. The Minister publicly exhibited a proposed change to the Mining SEPP to prohibit a development application for open cut mining in EL 5460. The Mining SEPP was formally amended on 22 December 2017 to include the prohibition.

In a report on the submissions to the *Explanation of Intended Effects* for the amendment, the NSW Government (2017) noted that the prohibition applies only to open cut mining. This was because the key reasons for the refusal of previous applications for open cut mining included noise and dust impacts, both of which would be significantly less for underground mining.

This EIS presents an assessment of the potential biophysical, economic and social impacts and benefits of the proposed underground mining operations in EL 5460 under the Project.

9.1.5 Compatibility with Land Uses in the Vicinity of the Project

Existing and approved land uses in the vicinity of the Project include:

- mining (Mt Arthur Mine) and power generation (Liddell and Bayswater Power Stations);
- equine enterprises (with the Coolmore and Godolphin Woodlands Studs the closest equine enterprises);
- a viticulture enterprise (Hollydene Estate Wines);
- rural residential properties to the north of Thomas Mitchell Drive;
- agricultural land owned by Malabar, currently used for cattle grazing and opportunistic fodder cropping; and
- industrial uses in the Muswellbrook Industrial Area.

The compatibility of the Project with each of these land uses, along with likely preferred uses of land, is considered below.

Compatibility with Nearby Mining and Power Generation

Malabar will continue to consult and work closely with BHP, the owner of the Mt Arthur Mine, regarding the interactions between this operation and the Project to maximise cooperation and efficiencies. Potential interactions between the two operations include:

- integration and interactions between the Maxwell Infrastructure and Mt Arthur Mine final landforms (Section 7);
- sharing mine water between the operations (Sections 3.10.3 and 6.5);
- continued shared use of the Antiene Rail Spur, which is jointly managed by BHP and Malabar (Section 2.3.4);
- the assessment and management of cumulative impacts (Sections 2.3.9 and 6); and
- potential amenity impacts on BHP-owned rural residences (noting there would be no exceedance of relevant criteria) (Section 6 and Appendices I and J).

Similarly, Malabar will continue to consult and work closely with AGL, the operator of Liddell and Bayswater Power Stations, to manage interactions between these operations and the Project. Potential interactions between the operations include:

- the existing AGL-owned conveyor across Malabar's land, which transports coal from Mt Arthur Mine to Bayswater Power Station;
- the construction of the transport and services corridor for the Project across AGL-owned land and over the existing AGL-owned conveyor (Section 5.3.4);
- continued use of, and access to, the East Void by Malabar for the emplacement of CHPP rejects (Section 2.3.5);
- AGL's management of the Liddell Ash Dam located proximal to the Maxwell Infrastructure (Sections 6.20.2 and 7); and
- the assessment and management of cumulative impacts (Sections 2.3.9 and 6).

Subsidence from Project underground mining activities would not affect any infrastructure owned by BHP or AGL.

Based on the above and the engagement outcomes to date (Section 5.3.4):

- there is not anticipated to be any material incompatibility between the Project and existing and approved mining and power generation land uses; and
- there may be some potential benefits and efficiencies for Mt Arthur Mine and AGL associated with the Project proceeding (e.g. sharing of water between the operations and maximising use of voids).

Compatibility with Nearby Equine Enterprises

Previous open cut mining proposals in EL 5460 have been considered to be incompatible with nearby equine land uses, notably the Coolmore and Godolphin Woodlands Studs.

This Project is for an underground mining operation that is unlike previous proposals in EL 5460. Stakeholder concerns and perceptions of previous proposals have been considered and incorporated into the Project design and Malabar's operating philosophy.

Malabar has approached the design of this Project and its relationship with nearby equine enterprises with the following aims:

- being aware of the points of view and perceptions of nearby equine enterprises;
- making key senior Malabar personnel approachable and available for consultation to allow for direct consideration of stakeholder feedback;
- incorporating significant design measures into the Project to avoid and mitigate potential direct impacts on nearby equine enterprises (Section 5.2); and
- developing an operating philosophy that also addresses the perceptions of stakeholders associated with nearby equine enterprises (including customers).

Table 9-1 presents a summary of the key assessment outcomes related to the Coolmore and Godolphin Woodlands Studs.

With the proposed Project design, there is not anticipated to be any material biophysical incompatibility between the Project and the Coolmore and Godolphin Woodlands Studs.

In addition to the Project design measures already incorporated (Section 5.2) and the engagement conducted to date (Section 5.3.4), Malabar would implement the following measures to address perceptions and queries of stakeholders associated with nearby equine enterprises (including customers):

- Malabar has offered (and will re-iterate the offer) to meet with representatives of the Coolmore and Godolphin Woodlands Studs to discuss the findings of this EIS, once it is on public exhibition.
- Malabar would offer to meet regularly with representatives of the Coolmore Stud and Godolphin Woodlands Stud over the life of the Project.
- Malabar would maintain fence lines, entrances and roadside plantings within Malabar-owned properties to present a visually pleasing appearance that is congruent and sympathetic with the appearance of surrounding rural properties.
- Malabar would discourage workers from wearing high-visibility clothing when travelling to public places in Jerrys Plains.
- When and where appropriate, Malabar would:
  - Use appropriate media platforms to disseminate current Project information that outlines the relative benefits of underground mining and the beneficial outcomes of the Project.
  - Offer to release joint media with horse studs or other sensitive receptors regarding the potential for co-existence between underground mining and other local industries (including equine, viticulture and agriculture).

Compatibility with Nearby Viticulture Enterprise

Potential impacts on Hollydene Estate Wines have been avoided or mitigated through the significant design measures incorporated into the Project (Section 5.2).

Table 9-1 presents a summary of the key assessment outcomes related to Hollydene Estate Wines.

With the proposed Project design, there is not anticipated to be any material incompatibility between the Project and Hollydene Estate Wines.

In June 2019, Hollydene Estate Wines entered into a long-term lease with Malabar allowing Hollydene Estate Wines to occupy Malabar's Llanillo homestead proximal to its existing business. This demonstrates Malabar's willingness to co-exist and provide benefit to its neighbours, where practical.

Table 9-1
Summary of Key Assessment Outcomes for Nearby Equine and Viticulture Enterprises

Potential Impact	Summary of Assessment Outcomes
Potential impacts to infrastructure used by nearby equine and viticulture enterprises	
Subsidence impacts on infrastructure owned by equine and viticulture enterprises.	There would be no subsidence impacts on infrastructure owned by Coolmore, Godolphin or Hollydene Estate Wines (Appendix A).
Subsidence impacts on public road infrastructure.	The Golden Highway, a State highway that provides access to the Coolmore and Godolphin Woodlands Studs and Hollydene Estate Wines, is not predicted to experience any measurable tilts, curvatures or strains and would remain in a safe and serviceable condition during and after the Project underground mining (Section 6.3.4 and Appendix A). Edderton Road, a local road used by Coolmore and Godolphin Woodlands Studs as an alternative to the main roads to access Muswellbrook and Scone, crosses the western part of the Maxwell Underground area. Malabar has mitigated concerns about potential impacts on Edderton Road by presenting two alternatives that would maintain both the safety and operability of Edderton Road (Sections 3.15.1 and 6.14.3). The two proposed options are: (i) subsidence management and normal road maintenance techniques along the existing alignment; or (ii) the realignment of the road around the Maxwell Underground area (Section 6.14.3).
Increased traffic levels on surrounding road network.	The Project would use the existing site access to the Maxwell Infrastructure from Thomas Mitchell Drive. This would limit Project traffic movements on the Golden Highway and Edderton Road, which are used by Coolmore and Godolphin Woodlands Studs and Hollydene Estate Wines. Any employee travel on the Golden Highway past these operations would be primarily limited to employees residing locally (e.g. in Jerrys Plains). Deliveries to the Project would not travel on this section of road unless necessary due to RMS requirements. The Road Transport Assessment (Appendix K) concludes that the existing road network can satisfactorily accommodate the forecast traffic demands resulting from the Project without any specific additional road upgrade requirements.
Changes in travel times on surrounding road network.	Potential changes in travel time on the surrounding road network would be limited to changes associated with Edderton Road. The potential realignment of Edderton Road would have a minor impact on travel time, resulting in a minor decrease in travel time for drivers travelling to and from Golden Highway west of Edderton Road and an increase in travel time for drivers travelling east by approximately 1 minute (Section 6.14.3 and Appendix K). The layout of the new intersection with the Golden Highway would be safer than that of the existing intersection of Edderton Road and the Golden Highway, as it allows turning vehicles to slow clear of the through traffic on the Golden Highway (Appendix K). In the event that subsidence on Edderton Road is managed along the existing alignment, reductions in speed limits from 100 km/h to 40 km/h would increase travel time in both directions by up to approximately 2.5 minutes during periods of active subsidence management (Appendix K). Malabar would provide Jerrys Plains residents, Coolmore and Godolphin Woodlands Studs and Hollydene Estate Wines with notice of upcoming relevant Project works on Edderton Road throughout the life of the Project (Section 8).
Access to equine and viticulture support services and infrastructure.	The Project would not have any material impact on support services or infrastructure, as there would be no property acquisitions or other impacts likely to isolate any equine or viticulture enterprise from, or lead to the closure of, a support service, such as an equine veterinarian (Appendix Q). Malabar contributes to the overall viticulture cluster in the Upper Hunter through its ownership of Merton Vineyard (home of the 'Small Forest Wines' brand), which would not be affected by the Project.
Potential impacts to agricultural resources used by nearby equine and viticulture enterprises	
Availability and/or quality of water available to equine and viticulture enterprises.	The Project would not have any material impacts on water resources used by nearby equine and viticulture enterprises (surface water extraction from the regulated Hunter River and rainfall runoff) (Section 6 and Appendix B).
Increased biosecurity risks (weeds, plants and animals).	Malabar would implement weed and pest animal management programs to reduce biosecurity risks to off-site areas. Where vehicles and mechanical equipment have operated off-road, these would be washed down to minimise seed transport off-site (Section 6.7.4).

Table 9-1 (Continued)
Summary of Key Assessment Outcomes for Nearby Equine and Viticulture Enterprises

Potential Impact	Summary of Assessment Outcomes
Potential impacts affecting amenity and/or customer perception of nearby equine enterprises	
Construction and operational noise and vibration.	Noise contributions from the Project at the Coolmore and Godolphin Woodlands Studs and Hollydene Estate Wines would be indistinguishable from background noise (Section 6.9.4 and Appendix I). There would be no noticeable vibration as a result of the Project at the Coolmore and Godolphin Woodlands Studs and Hollydene Estate Wines (Section 6.9.4 and Appendix I).
Dust emissions.	Changes in particulate matter concentrations in the air at Coolmore and Godolphin Woodlands Studs and Hollydene Estate Wines would be negligible (i.e. less than 0.1 µg/m^3 of $PM_{2.5}$ averaged over any 24-hour period) (Section 6.10.4 and Appendix J). Changes in dust deposition on pastures at Coolmore and Godolphin Woodlands Studs and vines at Hollydene Estate Wines would also be negligible (i.e. less than 0.05 g/m^2/month) (Section 6.10.4 and Appendix J).
Odour.	Events that could potentially cause releases of odour (i.e. spontaneous combustion) would be managed and monitored during operations. It is not expected that spontaneous combustion would occur at the Maxwell Underground due to the low sulphur content of the targeted coal seams.
Visual and landscape changes.	In both the sub-regional and regional contexts, the Project's surface components are considered to be insignificant in terms of extent of visibility and the visual context, which includes extensive existing mining landscapes (Section 6.11.3 and Appendix N). There would be no views of the Project from Hollydene Estate Wines (Section 6.11.3 and Appendix N). Views of the Project's surface components would be largely screened at nearby equine enterprises by the topography to the north of the Golden Highway. There would be no views of the Project from the majority of viewpoints on the Coolmore and Godolphin Woodlands Studs. At the highest vantage points on these properties, a section of the transport and services corridor and covered overland conveyor would be potentially visible as it crosses ridgelines north-east of the MEA. These components of the Project would be between 7.5 km and 7.7 km from the viewer and would take up a very small portion of the primary view (<1%), which significantly reduces discernible components. The assessed visual impact at these vantage points is low and would be in the context of existing views of the Mt Arthur Mine from this location (Section 6.11.3 and Appendix N). The visual impacts of diffuse lighting associated with the mine entry area and transport and services corridor would be minimal compared to existing diffuse lighting as a result of the existing surrounding mining operations and power stations (Section 6.11.3 and Appendix N).
Perception of impacts as a result of preferences, associations and memories.	Personal perceptions would be affected by preferences, associations and memories derived from reading, hearing and/or seeing information on previous, existing and proposed activities and stakeholder interactions. Perceptions vary between individuals and can, therefore, be difficult to assess (Appendix N). DP&E (2017) relevantly states: *When considering perceptions of adverse impacts on amenity, an evaluation must be made of the reasonableness of those perceptions. This evaluation involves 'the identification of evidence that can be objectively assessed to ascertain whether it supports a factual finding of an adverse effect on amenity…': Telstra Corporation Ltd v Hornsby Shire Council [2006] NSWLEC 133.* Assessment of potential impacts on nearby equine and viticulture enterprises is provided above and in Section 6 based on the evidence available. Malabar would continue to mitigate potential impacts on the perceptions of stakeholders associated with nearby equine enterprises (including customers) through the implementation of a number of measures described below and in Section 8. Malabar would continue to engage with both the owners and the operators of Hollydene Estate Wines to identify and manage any concerns.

Compatibility with Nearby Rural Residential Properties North of Thomas Mitchell Drive

The Maxwell Infrastructure is located in the vicinity of residences in the Antiene and East Antiene residential areas located north of Thomas Mitchell Drive and near the New England Highway.

As well as being located proximal to the Maxwell Infrastructure, these residences are located within the vicinity of a major State road and other industrial developments (including Liddell Power Station and Mt Arthur Mine).

Of relevance to these residences, the Project would involve:

- the continuation of rehabilitation activities at the Maxwell Infrastructure;
- the recommencement of coal handling and processing activities at the Maxwell Infrastructure; and
- the recommencement of train movements from the Maxwell Infrastructure along the Antiene Rail Spur.

Any potential incompatibility that may arise as a result of the Project would be related to potential impacts on the amenity of these residences. Table 9-2 presents a summary of the key assessment outcomes.

There would not be any material incompatibility between the Project and this rural residential land use, given that the assessment outcomes and mitigation measures comply with relevant Government policy and this land use was previously compatible with the former Drayton Mine.

Compatibility with Nearby Agricultural Land Owned by Malabar

Malabar would maintain and enhance agricultural activity on land that Malabar owns that is not required for mining activities, the Maxwell Solar Project or biodiversity conservation (Plate 9-1).

The Agricultural Impact Statement (Appendix Q) concludes there would be no significant impact on the agricultural resources, practices or infrastructure used by these agricultural operations.

Compatibility with Industrial Enterprises in the Muswellbrook Industrial Area

The Muswellbrook Industrial Area is located off Thomas Mitchell Drive to the north-west of the Maxwell Infrastructure.

The Project would be compatible with these industrial enterprises as Malabar would continue to support contractors and suppliers based at the Muswellbrook Industrial Area. There would also be no potential direct impacts on the Muswellbrook Industrial Area and the Project would only contribute a small proportion of total traffic in the vicinity of the Muswellbrook Industrial Area (Section 6.14.3).

Compatibility with Likely Preferred Land Uses in the Vicinity of the Project

In considering likely preferred land uses and land use trends, it is noted that the Maxwell Underground area is identified in the *Hunter Regional Plan 2036* (NSW Government, 2016) as a company-held coal exploration tenement, and in the *Upper Hunter Strategic Regional Land Use Plan* (NSW Government, 2012b) as an existing exploration tenement with the "potential for new open cut and/or underground mine". Therefore, within the Maxwell Underground area, underground mining is considered a likely preferred land use.

Having regard to historic, current and approved uses of the land, land zoning, land use zone objectives, land use trends, strategic planning documents and economic circumstances (discussed further in Sections 2 and 4.1 and Attachment 7), other likely preferred land uses in the vicinity of the Project include:

- the existing and approved land uses:
  - mining and power generation;
  - agriculture, agribusiness and agritourism (including uses associated with equine and viticulture enterprises); and
  - rural dwellings;
- the Maxwell Solar Project;
- the ongoing and future use of the existing Maxwell Infrastructure;
- industrial and/or employment land development at the site of the Liddell Power Station; and
- other agricultural, agribusiness and agritourism opportunities.

Table 9-2
Summary of Key Assessment Outcomes for Rural Residential Properties North of Thomas Mitchell Drive

Potential Impact	Summary of Assessment Outcomes
Potential amenity impacts associated with activities at the Maxwell Infrastructure and Antiene Rail Spur	
Construction and operational noise.	Noise generated by the Maxwell Infrastructure during the Project life would generally be less than previously approved levels for open cut operations at the former Drayton Mine, which operated for over 30 years. With the implementation of appropriate Project mitigation measures, negligible or no exceedance of the Project noise trigger levels is predicted at all but four privately-owned receivers to the north of the Maxwell Infrastructure (Section 6.9.4 and Appendix I). These four properties (one on Thomas Mitchell Drive, and three on Pamger Drive) would experience marginal exceedances of the Project-specific noise trigger levels (i.e. up to 5 dBA). These landholders would have the right to mitigation measures at their property on request, such as mechanical ventilation/comfort condition systems to enable windows to be closed.
Rail noise.	The Project would operate within current Antiene Rail Spur rail limits over an extended period. The Project would comply with relevant rail noise criteria (in the RING) on the Antiene Rail Spur (Section 6.15.3 and Appendix I).
Road transport noise.	The Project would comply with relevant road noise criteria (Section 6.15.3 and Appendix I).
Dust emissions.	Dust emissions for the Maxwell Infrastructure during the Project life would be less than previously approved levels for open cut operations at the former Drayton Mine, which operated for over 30 years. The Project would comply with relevant air quality criteria at these receivers (Section 6.10.2 and Appendix J).
Odour.	Mined, open cut areas at the Maxwell Infrastructure have experienced spontaneous combustion in the past. Malabar would continue to manage the potential for spontaneous combustion in accordance with the MOP as rehabilitation at the Maxwell Infrastructure progresses.
Visual and landscape changes.	The Project would result in limited contrast or change to the existing visual setting in the vicinity of the Maxwell Infrastructure (Appendix N). Ongoing rehabilitation activities at the Maxwell Infrastructure would progressively decrease the visual contrast with the surrounding setting, enhancing the visual integration with the local landscape over time (Appendix N).

Plate 9-1 – Cattle Grazing on Malabar Land

The compatibility of the Project with existing and approved land uses is considered in the sub-sections above. Consideration of other likely preferred land uses are provided in the sub-sections below.

Maxwell Solar Project

Malabar is also seeking consent for a solar farm, known as the "Maxwell Solar Project" (SSD 18_9820) (Section 2.3.2). The solar panels would be located on areas of previous open cut mining disturbance within CL 229.

The Project is compatible with this likely preferred land use and would not negatively impact the development of the proposed Maxwell Solar Project.

Future Use of the Maxwell Infrastructure

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

The Project would not negatively impact on the potential for future resource extraction and the continued use of the Maxwell Infrastructure.

The substantial resource inventory within the tenements held by Malabar in the Project area and surrounds (JORC estimate of approximately 1,400 Mt) provides Malabar with the opportunity to potentially recover additional coal beyond the life of the Project and continue to emplace CHPP reject material in the legacy voids at the Maxwell Infrastructure.

The extraction of additional coal beyond the life of this Project would be subject to the rigorous assessment and consultation processes outlined in relevant State and Commonwealth legislation at that time.

It is Malabar's intention to be a long-term employer in the region with underground operations delivering predominantly coking coal (also known as metallurgical coal) to the global metals market.

Future Development of the Liddell Power Station Site

A long-term priority of the *Upper Hunter Economic Diversification Action Plan: Implementation Priorities* (NSW Government, 2018a) is to support new investment, employment and skills development at the Liddell Power Station site following its planned closure in 2022.

In mid-2018, AGL launched the 'Liddell Innovation Project' and sought requests for ideas for future developments at the site (AGL, 2019a). The information released by AGL (2019a) as part of the 'Liddell Innovation Project' recognises the existing mining land use at the Maxwell Infrastructure.

Proposals will be assessed by AGL against a multifaceted set of regionally focussed criteria considering: social impact; organisational, commercial and economic factors; energy security and innovation; and health, safety and environment (AGL, 2019b).

It is understood that AGL is currently assessing ideas and proposals for the site, and details of identified preferred uses are yet to be publicised (AGL, 2019a).

It is anticipated preferred uses will include power generation, industrial land and/or agribusinesses. It is not expected the Project would be incompatible with these uses.

Future Agricultural, Agribusiness and Agritourism Opportunities

Agricultural, agribusiness and agritourism land uses in the vicinity of the Project are expected to be likely preferred land uses. For similar reasons to those given above with respect to existing approved uses of this nature, the Project is expected to be compatible with these likely preferred land uses.

The adoption of underground mining methods for the Project means that portions of land within the Maxwell Underground area and rehabilitated land at the Maxwell Infrastructure would be available for agricultural activities during the life of the Project, including potential intensive agribusiness activities.

Following the completion of mining, the Project area would be rehabilitated to a combination of pasture and woodland areas.

It is anticipated that agricultural activities would occur on rehabilitated pasture land, subject to the agreed final land use and any land use constraints developed in consultation with relevant stakeholders prior to mine closure.

Malabar will continue to encourage and be supportive of other community and government proposals or initiatives for the use of Malabar land or infrastructure that can co-exist with the Project. Any proposals or initiatives would need to be permissible land uses and would require relevant assessment and approvals.

9.2 CONSIDERATION OF PROJECT DESIGN ALTERNATIVES AND JUSTIFICATION OF PROJECT DESIGN

This EIS presents and assesses Malabar's preferred design and staging for the Project.

Malabar's approach to the design of this Project is described in Section 2.1.5.

As part of the development of the Project design, Malabar carefully considered feedback provided by the local community, government agencies and other stakeholders. Significant design measures have been incorporated into the Project to address stakeholder feedback, which are outlined in Section 5.2.

An analysis of feasible alternatives to the Project considered by Malabar is provided below, in accordance with clause 7 of Schedule 2 of the EP&A Regulation (Table 1-4) and requirements pertaining to assessment under the Commonwealth EPBC Act (Attachment 2).

Consideration of feasible alternatives and the justification of the Project design is discussed in relation to: (i) impacts related to underground mining subsidence and associated impacts on the overlying physical environment; and (ii) impacts related to surface infrastructure and activities.

9.2.1 Mine Subsidence-related Impacts

Mining Method

Malabar is committed to developing the Project solely as an underground mining operation. Open cut mining is not a permissible land use within EL 5460 (Section 9.1.4).

The Project would involve a combination of both bord and pillar mining methods and longwall mining methods.

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

- to minimise the time to first coal; and
- due to the thinner working section, limited extent and lower depth of cover compared to the other target seams (i.e. this resource is not as amenable to extraction by longwall mining methods).

Longwall mining methods are proposed in the Woodlands Hill, Arrowfield and Bowfield seams:

- to maximise coal recovery and efficiency; and
- due to the greater coal thickness, the continuity of the seams in the area and the depths of cover, which makes the longwall mining method for these seams safer, more efficient and lower cost.

Underground Mine Extent

Malabar would seek to maximise resource recovery within geological, environmental and tenement constraints.

Section 3.1.3 describes the geological and technical constraints that have been considered in the development of the underground mine layout, including:

- the presence of dolerite sills that intrude into the Whynot, Arrowfield and Bowfield Seams;
- the presence of geological structures that result in a discontinuity within the coal seam;
- technical constraints associated with low depths of cover in the Whynot Seam; and
- technical constraints associated with interburden thickness between the Arrowfield and Bowfield Seams.

As described in Section 5.2, the underground mine layout has also been constrained:

- to avoid direct subsidence impacts on the Hunter River, the Hunter River alluvium and Saddlers Creek (noting these features were identified as important by the Aboriginal community, nearby landholders and other stakeholders); and
- to be wholly beneath the extent of freehold land owned by Malabar (i.e. there would be no direct subsidence impacts to land owned by neighbouring equine enterprises).

Consideration of the avoidance of potential subsidence impacts on other natural and built features is discussed further below.

Underground Mine Geometry

The longwalls would have overall void widths of approximately 305 m (including first workings), and lengths of between approximately 1,300 m and 4,100 m.

The longwalls would be staggered between seams so that the chain pillars would not align. This would reduce total subsidence at the surface, and also has some technical operational benefits.

The development of longwalls with optimised dimensions has advantages for a number of aspects of the mining operation, including:

- higher rates of coal extraction are achievable by adopting longer and wider longwalls within a mining domain, hence a greater recovery of the State's coal resource can be achieved;
- depending on layout, the number of longwall moves (i.e. to relocate the longwall machine at the end of each longwall) can be reduced, hence costs, safety hazards and downtime associated with these moves can be minimised;
- the lead-time and capital and operational costs associated with roadway development are balanced with the coal recovered and efficiency of extracting the longwall panels; and
- improved efficiencies (e.g. reduced numbers of longwall moves) allow Malabar to increase annual ROM coal production rates per longwall machine, hence improving mining efficiency and associated economic benefits.

Varying the dimensions of the mine layout (such as longwall width, longwall length and pillar width) can affect the development and expression of subsidence effects at the surface. However, it is important to consider whether any such changes would also be accompanied by any material change in the environmental consequences that arise from mine subsidence.

Consideration of the minimisation of potential subsidence impacts on natural and built features is discussed further below.

Consideration of Avoidance or Minimisation of Subsidence Impacts on Particular Features

Natural and built features located above the underground mine layout include (Section 6.3.5):

- unnamed drainage lines;
- steep slopes;
- native vegetation;
- an area of verified BSAL used for cattle grazing;
- Aboriginal heritage sites (in particular open artefact sites);
- Edderton Road;
- an 11 kV power line owned by Ausgrid;
- State survey control marks; and
- Malabar-owned infrastructure and improvements, including unsealed tracks, fences, farm dams, groundwater bores, land contours and cattle yards.

The Subsidence Assessment (Appendix A) indicates that the levels of impact on these natural and built features can be managed through the preparation and implementation of appropriate management strategies.

The topic of potential subsidence impacts on the safety and operability of Edderton Road was raised during engagement activities (Section 5).

The avoidance of subsidence impacts on Edderton Road is not considered to be reasonable or feasible. This would result in the sterilisation of at least 10.4 Mt of ROM coal and 12 additional longwall moves, along with associated economic costs and loss of access to the State's coal resources. Subsidence impacts on Edderton Road can be managed in a similar way to the management of subsidence impacts on local roads in other parts of NSW (including the Singleton LGA).

The environmental impact assessment and engagement processes did not identify any other potential subsidence impacts on built or natural features that would warrant consideration of avoidance or further minimisation of subsidence impacts.

Management of Potential Subsidence Impacts on Edderton Road

Malabar has mitigated concerns about potential impacts on Edderton Road by presenting two alternatives that would maintain both the safety and operability of Edderton Road (Sections 3.15.1 and 6.14.3). The two proposed options are: (i) subsidence management and normal road maintenance techniques along the existing alignment; or (ii) the realignment of the road around the Maxwell Underground area (Section 6.14.3).

Malabar is seeking consent for both of these options as part of the Project.

The potential road transport and socio-economic implications of both options have been assessed as part of the Project. Construction noise impacts and potential impacts on visual amenity, biodiversity, heritage and agriculture associated with the potential realignment of Edderton Road have also been assessed. The Economic Assessment (Appendix M) also considers both options.

The assessments did not identify any potential environmental or social impacts that would preclude proceeding with either of the proposed options. This would be further informed during the EIS engagement process.

9.2.2 Impacts Associated with Surface Infrastructure and Activities

The requirement to develop new infrastructure for the Project has been limited through the use of the substantial existing Maxwell Infrastructure. Should the Project not proceed, the Maxwell Infrastructure would be decommissioned and the potential benefits of using this existing infrastructure would be lost.

Production Scale and Rate

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

The Project would involve handling and processing of up to 8 Mtpa of ROM coal, which is consistent with the previous operational limits at the Maxwell Infrastructure. The Project would also operate within current rail limits on the Antiene Rail Spur.

This maximum production rate has been selected to:

- maximise the economic benefits of using the substantial existing Maxwell Infrastructure; and
- minimise amenity impacts associated with the recommencement of coal handling and processing activities at the Maxwell Infrastructure.

Minor upgrades to the ROM and product coal handling facilities at the Maxwell Infrastructure would be required to achieve the required product specification for coking coal and cater for underground mining operations. With the exception of the product stockpile extension, these upgrades would occur within the current footprint of the Maxwell Infrastructure area.

It is noted that noise generated by the Maxwell Infrastructure during the Project life would generally be less than previously approved levels for open cut operations at the former Drayton Mine (Appendix I).

Location and Design of Mine Entry Area

The proposed location of MEA was selected in consideration of the following design principles:

- identifying a location away from sensitive receptors and in a natural valley that mitigates and minimises alteration of the visual landscape (particularly from the Golden Highway and neighbouring equine enterprises);
- minimising the length of underground roadways required to access the coal seams (reducing initial capital costs and the time to first coal);
- identifying a location predominantly within an area of derived native grassland, rather than woodland; and
- considering and avoiding the location of records of threatened flora species (i.e. the Pine Donkey Orchid [*Diuris tricolor*]).

Malabar did not identify any other feasible locations for the MEA that satisfied the above design principles.

The extent of the MEA has been minimised through several design iterations, reducing the total disturbance footprint. In the most recent design iterations, the disturbance footprint of the MEA was reduced from approximately 75 ha in the Gateway Application and EPBC Act Referral to approximately 48 ha proposed in this EIS.

Malabar implemented the following design measures to minimise the extent of the MEA:

- re-using and re-purposing existing services and facilities at the Maxwell Infrastructure;
- locating personnel at the Maxwell Infrastructure who would have roles and tasks that do not require a physical presence underground or at the mine entry, reducing the requirement for administration and parking facilities at the MEA;
- minimising the size of the coal surge stockpiles at the MEA; and
- other design measures to maximise the efficient use of space.

Malabar also designed the MEA such that infrastructure at the MEA would not be visible from the Golden Highway, Coolmore Stud or Godolphin Woodlands Stud. To achieve this design outcome, Malabar re-designed the surge stockpile and conveyor infrastructure by incorporating:

- a smaller capacity stockpile at the MEA with a bunker style base to maintain “live” capacity;
- replacing a skyline with an inclined stacker to provide a lower profile transfer system; and
- an increase in the capacity of the covered, overland conveyor to supplement the reduced stockpile capacity.

Modelling and simulations completed for the Landscape and Visual Impact Assessment (Appendix N) confirmed that the MEA meets the above design outcome.

The costs associated with this design have been factored into the capital and operating costs of the Project considered in the Economic Assessment (Appendix M). The additional capital costs associated with these design refinements are approximately $9 million.

Malabar did not identify any feasible alternatives to completely avoid views of the MEA from Edderton Road; however, visual outcomes have been improved as a result of the design changes described above. The Project would incorporate visual screening to mitigate potential visual impacts (Section 6 and Appendix N).

Location and Design of Transport and Services Corridor

Where possible, Malabar has located multiple infrastructure elements within the same transport and services corridor between the Maxwell Underground and Maxwell Infrastructure (i.e. the site access road, covered overland conveyor, power supply and other ancillary infrastructure and services). This reduces the total surface disturbance required for these infrastructure elements.

The transport and services corridor is located primarily on Malabar-owned land; however, it crosses a small area of AGL-owned land. Crossing this portion of AGL-owned land reduces the number of transfer points required on the conveyor by maintaining a curved geometry. An agreement has been executed with AGL for access to, and grant of an easement in favour of, Malabar for this land.

At the highest vantage points on the Coolmore and Godolphin Woodlands Studs, a section of the transport and services corridor and covered overland conveyor would be potentially visible as it crosses ridgelines north-east of the MEA. These components of the Project would be between 7.5 km and 7.7 km from the viewer and would take up a very small portion of the primary view (<1%), which significantly reduces discernible components (Appendix N).

Malabar has not identified any reasonable or feasible alternative locations for the transport and services corridor as:

- local topography dictates that the corridor must pass over the ridgelines that are visible from the highest vantage points to connect the MEA to the Maxwell Infrastructure;
- the assessed visual impact at these vantage points is low; and
- the Mt Arthur Mine is also visible from these locations.

Location and Design of Infrastructure Supporting Underground Mining Operations

At some underground mining operations, it is typical for the inbye ends of the longwall panels (the ends furthest away from the mine entry) to contain surface-to-seam boreholes for dewatering, ventilation and gas management. These boreholes are often serviced by pumps, pipelines and power infrastructure.

However, it is feasible for these services to be provided via the underground roadway network from the mine entry for the Project. This approach has been demonstrated at other underground mines that are located in areas with sensitive overlying land uses.

To address stakeholder concerns about visual impacts, the Project has been designed to limit surface disturbance for ventilation, gas management and mine dewatering to within the extent of the MEA.

The costs associated with the above commitment have been factored into the capital and operating costs of the Project considered in the Economic Assessment (Appendix M).

Site Access Road

Initial analysis in support of the Project design identified two potential primary access points to the Maxwell Underground site:

- an extension of the existing site access to the Maxwell Infrastructure from Thomas Mitchell Drive; or
- construction of a new access road from the south via Edderton Road.

Construction of a new access road from Edderton Road would have allowed for construction of the Project to commence sooner. This is because the proposed access route from the Maxwell Infrastructure is longer and requires construction of an overpass across the existing AGL-owned conveyor (Section 2.3.5).

Notwithstanding, Malabar elected to proceed with the proposed access route from the Maxwell Infrastructure at additional cost, to address stakeholder concerns regarding Project traffic movements on the Golden Highway and Edderton Road and the compatibility with existing equine and viticulture land uses.

The timeframe for construction of the extended site access road to the MEA would be reduced through the use of a prefabricated crossing for the AGL-owned conveyor.

In recognition of stakeholder concerns, Malabar has also committed to sealing the extended site access road to the MEA during the first year of mining operations at additional cost.

The cost associated with sealing the site access road has been factored into the capital costs of the Project considered in the Economic Assessment (Appendix M).

ROM Coal Transport

The two main options for transportation of ROM coal from the MEA to the Maxwell Infrastructure are: (i) truck haulage; and (ii) overland conveying.

Trucking provides a lower development capital approach and is also more suitable for the transportation of lower material tonnages.

The Project would use a covered overland conveyor, which would be operational prior to the commencement of transport of coal extracted by longwall mining machinery. This transport approach was adopted to reduce potential dust and noise impacts, which were raised as areas of concern during early engagement (Section 5).

Early ROM coal would be transported by truck (at significantly lower tonnages), while the covered overland conveyor is constructed and commissioned. This approach would allow the employment and other social benefits of the Project to commence earlier. Transfer of the small and intermittent volumes of coal at these early development and commissioning phases is also not efficient via overland conveyor.

Trucks used for coal haulage would be purpose-built for the transport of bulk materials and road-registerable (Section 3.6.1). The large off-road coal haul trucks in general use at open cut mines would not be used.

Gas Management and Abatement

Gas would be drained from areas where elevated quantities of gas naturally occur in the seam to maintain gas content at levels suitable for underground mining operations (i.e. for the safety of operation personnel) (Section 3.5.6).

As described above, the Project has been designed to centralise surface gas management infrastructure at the MEA through the use of underground collection systems to address stakeholder feedback.

The gas collected from the underground mining areas would be managed through the following hierarchy:

- where practical, gas would be stored underground in the goaf;
- where there is sufficient methane content in the deeper coal seams, a small gas-powered plant (less than 5 MW) may be installed at the MEA to generate power from gas drained in the underground workings;
- if a gas-powered plant is not installed, drained gas would be flared at the MEA (to reduce methane levels); or
- drained gas would be vented to the atmosphere at the MEA, if the gas is too low in methane content for flaring (or other operational reasons, such as the gas content being too variable).

Malabar is seeking consent for all of the above options as part of the Project. The assessments in this EIS have assessed the "worst case" option where relevant, in particular:

- the greenhouse gas emission estimates conservatively assume no greenhouse gas abatement (i.e. venting as opposed to flaring or power generation) (Appendix J);
- the assessment of potential emissions of oxides of nitrogen considers the use of methane in flaring or power generation (Appendix J); and
- the estimation of noise from the MEA includes the potential for noise from power generation activities (which would be louder than flaring or venting) (Appendix I).

The above assessments did not identify any potential environmental impacts that would preclude proceeding with any of the proposed options.

Water Management

The Project would use water treatment systems, such as Reverse Osmosis, to maximise the re-use of water on-site.

These water treatment systems would treat the water to a suitable standard to be used in the underground mining operations, and have been factored into the capital and operating costs of the Project considered in the Economic Assessment (Appendix M).

The Project also includes provision of the transfer of water between the Project and Mt Arthur Mine, providing appropriate commercial terms are in place. This also allows for the beneficial re-use of water collected by the Project, and is part of a hierarchy of measures to manage any excess water that may accumulate at the Project (Section 3.10.3).

The site water balance modelling demonstrates that the proposed water management system has sufficient capacity and flexibility to accommodate a wide range of groundwater inflows and climate scenarios while (Appendix C):

- providing security of supply for mine operations, with no requirement to source water externally for mining operations (e.g. from the Hunter River); and
- avoiding the need for controlled release of mine-affected water to the Hunter River.

Product Coal Stockpile Management

Longwall mining operations provide a high output during extraction of longwall panels; however, output is significantly reduced during longwall moves. This requires more flexible product stockpile management, compared to an open cut mining operation, to maintain supply to customers.

The Project incorporates an extension of the existing product coal stockpile area at the Maxwell Infrastructure to provide sufficient capacity during longwall moves and to allow for better management of different product coal blends (Section 3.4.5).

To mitigate potential noise impacts associated with this proposed change at the Maxwell Infrastructure, the Project incorporates:

- the use of "low noise" attenuated mobile plant on the product stockpile extension area; and
- pro-active noise management during noise-enhancing meteorological conditions to maintain compliance with predicted noise levels (Section 6.9.6 and Appendix I).

No further reasonable or feasible noise mitigation measures for the product coal stockpile were identified.

CHPP Reject Management

The Project would emplace CHPP reject material from coal processing within existing mine voids left behind by previous mining activities at Maxwell Infrastructure. This is the preferred approach based on the:

- proximity of these legacy voids to the CHPP at the Maxwell Infrastructure (reducing costs and environmental impacts associated with transporting the material elsewhere);
- visual and rehabilitated landform benefits associated with reducing the volume of these legacy voids; and
- avoidance of additional surface disturbance that would be involved if the material was emplaced at an alternative location.

The CHPP reject material would preferentially be emplaced within the existing East Void in ML 1531 at the Maxwell Infrastructure. This void was used for CHPP reject material emplacement between 2012 and 2016.

Final Land Use

Post-mining land use objectives for the Maxwell Infrastructure are described in the approved MOP. Rehabilitation domains were developed following an assessment of potential post-mining land uses (e.g. nature conservation, agriculture), taking into account relevant strategic land use objectives in the region, consultation outcomes and the potential benefits of the post-mining land use to the environment, future landholders and the community (Appendix U).

The proposed final land uses for the Project aim to establish sustainable grazing lands and enhance local and regional habitat corridors.

Malabar recognises that government and community stakeholders may identify final land uses that provide greater net benefits to the locality. Malabar would encourage and be supportive of other community and government proposals or initiatives for the use of Malabar land or infrastructure that can co-exist with the Project both during and post-mining. These alternative final land uses would be subject to separate assessments and approval, and do not form part of the Project.

9.3 CONSIDERATION OF RELEVANT PLANNING AND POLICY OBJECTIVES

9.3.1 Consideration of the Project Against the Objects of the Environmental Planning and Assessment Act, 1979

Section 1.3 of the EP&A Act describes the objects of the EP&A Act as follows:

> *(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,*
>
> *(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
>
> *(c) to promote the orderly and economic use and development of land,*
>
> *(d) to promote the delivery and maintenance of affordable housing,*
>
> *(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*
>
> *(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
>
> *(g) to promote good design and amenity of the built environment,*
>
> *(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*
>
> *(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
>
> *(j) to provide increased opportunity for community participation in environmental planning and assessment.*

The Project is considered to be generally consistent with the objects of the EP&A Act, as:

- The Project would facilitate local and regional employment and economic development opportunities (Appendices L and M).
- The Project would develop the State's coal resources within EL 5460, with the value of coal production to the NSW economy recognised in the *Strategic Statement on NSW Coal* (NSW Government, 2014).
- The Project would incorporate relevant ESD considerations (Section 9.3.5).
- The Project has been designed to allow for underground mining in EL 5460 to co-exist and be compatible with its near neighbours, including neighbouring equine and viticulture businesses (Sections 6 and 9.1.5).
- The Project would incorporate a range of measures for the protection of the environment, including the protection of native plants and animals, threatened species, and their habitats (Section 8).
- Aboriginal and historic heritage assessments have been undertaken and the Project would incorporate suitable mitigation measures for potential direct and indirect impacts of the Project on heritage (Section 8 and Appendices G and H).
- The Project would utilise the substantial existing Maxwell Infrastructure, which has limited the requirement to develop new infrastructure. The Project design mitigates the potential visual impacts of new Project infrastructure (Sections 5.2 and 9.2).
- A PHA has been conducted to assess the potential hazards associated with the Project (Section 6.20.1 and Appendix T), and the Project would operate within Malabar's safety management systems and NSW legislation to manage risks to workers and other persons.
- The Project would be determined by the IPC or the Minister; however, a wide range of stakeholders have been consulted throughout the assessment process.
- The Project would be developed in a manner that incorporates community engagement through the Project EIS consultation program (Section 5) as well as the public exhibition of the EIS document and the major project assessment process.

9.3.2 Consideration of the Project Against the Objects of the Environment Protection and Biodiversity Conservation Act, 1999

Section 3 of the EPBC Act describes the objects of the EPBC Act as follows:

> *(1) The objects of this Act are:*
>
> *(a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and*
>
> *(b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and*
>
> *(c) to promote the conservation of biodiversity; and*
>
> *(ca) to provide for the protection and conservation of heritage; and*
>
> *(d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and*
>
> *(e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and*
>
> *(f) to recognise the role of indigenous peoples in the conservation and ecologically sustainable use of Australia's biodiversity; and*
>
> *(g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.*

The Project is considered to be generally consistent with the objects of the EPBC Act, as:

- The Project incorporates measures to protect the environment (including aspects of the environment that are of national significance), through the Project design (Section 5.2) and the application of mitigation, offsets and other measures (Section 6).
- The Project would develop the State's mineral resources (i.e. coal resources) while incorporating relevant ESD considerations (Section 9.3.5).
- An assessment of potential biodiversity impacts has been undertaken, and the Project includes a proposal for offsetting unavoidable impacts on ecology and other compensatory measures (Sections 6.7.6 and 8 and Appendix E).

- The proposed action under the EPBC Act would not have a significant impact on water resources in consideration of the guidance in the Significant Impact Guidelines for Water Resources (DotE, 2013) (Sections 6.4.3 and 6.5.3 and Appendices B and C).
- Aboriginal and historic heritage assessments have been undertaken, which identify relevant cultural values (including the significance of biodiversity in Aboriginal cultural values) and suitable mitigation measures for potential direct and indirect impacts have been incorporated into the Project (Section 8 and Appendices G and H).
- The Project would be developed in a manner that incorporates engagement from the community, landholders and Indigenous peoples through the Project EIS consultation program (Section 5), the public exhibition of the EIS document and the NSW major Project assessment process.
- The EIS includes consideration of the Project's contribution to maintaining Australia's international environmental responsibilities and the potential impacts on these (e.g. consideration of greenhouse gas emissions). The Project would not have a significant impact on migratory species protected under international agreements.

9.3.3 Evaluation under Section 4.15(1) of the Environmental Planning and Assessment Act, 1979

In evaluating the Development Application for the Project under section 4.15(1) of the EP&A Act, the consent authority is required to take into consideration a range of matters as they are of relevance to the subject of the application, including:

(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),

…

that apply to the land to which the development application relates,

(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

(c) the suitability of the site for the development,

…

(e) the public interest.

This EIS has been prepared to address the requirements of section 4.15(1) to assist the Minister or the IPC in evaluating the Project, as follows:

- Consideration of the requirements of relevant environmental planning instruments, development control plans and the EP&A Regulation is provided in Sections 1 and 4 and Attachments 7 and 8 of the EIS.
- While no planning agreement or draft planning agreement has been agreed for the Project to date, Malabar has made a written offer (Section 4.3.8) and intends to negotiate with Muswellbrook Shire Council in good faith to reach agreement on the terms of a planning agreement.
- The predicted impacts of the Project, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality are provided in Appendices A to V and Section 6 of the EIS.
- The suitability of the proposed site for the Project is considered in Sections 4 and 9.1.
- Consideration of whether, on evaluation, the Project is considered to be in the public interest is provided in Section 9.5.

9.3.4 Potential Implications of Climate Change

Consideration of the potential implications of climate change involves complex interactions between climatic, biophysical, social, economic, institutional and technological processes.

Although scientific understanding of climate change has improved, projections are still subject to a wide range of uncertainties such as (Commonwealth Scientific and Industrial Research Organisation [CSIRO] and BoM, 2015):

> *…scenario uncertainty, due to the uncertain future emissions and concentrations of greenhouse gases and aerosols; response uncertainty, resulting from limitations in our understanding of the climate system and its representation in climate models; and natural variability, the uncertainty stemming from unperturbed variability in the climate system.*

The sources for climate change projections considered for the Project include:

- Climate Change in Australia, produced by CSIRO and BoM (Dowdy *et al*., 2015).
- The NSW and Australian Capital Territory (ACT) Regional Climate Modelling (NARCLiM) Project, a research partnership between the NSW and ACT Governments and the Climate Change Research Centre at the University of NSW (NARCLiM, 2015).

The Climate Change in Australia report presents climate change projections for Australia. The NARCLiM Project presents climate change projections for NSW and ACT only.

Climate Change Projections for Australia

In Australia, the climate is generally projected to become warmer and drier. Climate change may result in changes to rainfall patterns, runoff patterns and river flow.

Two greenhouse gas global emission scenario projections for annual average rainfall in the East Coast South sub-cluster of "Eastern Australia" for 2030 and 2090 (relative to 1995) are presented in Table 9-3.

It is noted that the RCP8.5 scenario illustrated in Table 9-3 is a scenario where minimal greenhouse gas emissions controls are introduced, and hence does not reflect the measures currently being pursued by signatories of the *Paris Agreement*.

Table 9-3
Climate Change Projections for the East Coast South Sub-cluster, Eastern Australia – Percentage Change in Rainfall[1]

Period	2030	2090	
	RCP4.5	RCP4.5	RCP8.5
Summer	+1	0	+11
Autumn	-3	-1	-2
Winter	-5	-8	-17
Spring	-1	-6	-8
Annual	-3	-2	-3

Source: After Dowdy *et al.* (2015).

[1] Relative to 1995.

RCP4.5: Emissions scenario assuming a slow reduction in emissions that stabilises CO_2 concentration at about 540 parts per million (ppm) by 2100.

RCP8.5 Emissions scenario assuming an increase in emissions leading to a CO_2 concentration of about 940 ppm by 2100.

Climate Change Projections in NSW

The Project is located within the Hunter Region of the NARCliM Project domain. NARCliM projections are generated with the Weather Research and Forecasting Model, which has been demonstrated to be effective in simulating temperature and rainfall in NSW and provides a good representation of local topography and coastal processes (Evans and McCabe, 2010).

Mean temperatures in the Hunter Region are projected to rise by 0.7°C by 2039 and 2°C by 2079. Summer and spring will experience the greatest changes in temperatures, with maximum temperatures increasing by 2.3°C by 2079. These increases are projected to occur across the region, with a slightly greater increase in the Upper Hunter (NARCliM, 2015).

Changes to annual rainfall are predicted to vary across the Hunter Region, with rainfall projected to decrease in spring and winter and increase in autumn (NARCliM, 2015) (Table 9-4).

Table 9-4
Climate Change Projections for the Hunter Region, NSW – Percentage Change in Rainfall

Period	2020-2039	2060-2079
Summer	-2.9	+9.6
Autumn	+12.7	+13.1
Winter	-1.3	-2.8
Spring	-0.1	+2.4
Annual	+1.8	+7.2

Source: After NARCliM (2015).

Note Projections based on Intergovernmental Panel on Climate Change high emissions A2 scenario and relative to 1990-2009 baseline period.

The NARCliM (2015) and Dowdy *et al.* (2015) rainfall projections are quite variable, particularly for the 2079/2090 forecast. As shown in Table 9-3, Dowdy *et al.* (2015) project a generally drier climate, whereas Table 9-4 indicates that NARCliM (2015) projects a wetter climate.

NARCliM projections are based on the Intergovernmental Panel on Climate Change high emissions A2 scenario, which projects an increase in global warming by approximately 3.4°C by 2100. The A2 scenario is similar to the RCP8.5 scenario modelled by Dowdy *et al.* (2015), in terms of changes in global mean temperature, and hence does not reflect the measures currently being pursued by signatories of the *Paris Agreement*.

The potential implications of climate change on local groundwater and surface water resources are considered in Appendices B and C, respectively.

Over the life of the Project, it is anticipated that such climatic modelling for Australia, NSW and various regions will be updated many times as international greenhouse gas emission mitigation measures are adjusted based on the uptake of less carbon-intensive technology and as climate science continues to evolve. Notwithstanding, these recent projections indicate some of the potential outcomes that could occur if greenhouse gas reduction measures were not employed, or were not effective.

The potential contributions of Project greenhouse gas emissions to national and international emissions are considered in the following sub-sections.

9.3.5 Ecologically Sustainable Development Considerations

Background

The concept of sustainable development came to prominence at the World Commission on Environment and Development (1987), in the report titled *Our Common Future*, which defined sustainable development as:

> *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

In recognition of the importance of sustainable development, the Commonwealth Government developed a National Strategy for Ecologically Sustainable Development (NSESD) (Commonwealth of Australia, 1992) that defines ESD as:

> *…using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.*

The NSESD was developed with the following core objectives:

- to enhance individual and community wellbeing and welfare by following a path of economic development that safeguards the welfare of future generations;
- to provide for equity within and between generations; and
- to protect biological diversity and maintain essential processes and life support systems.

In addition, the NSESD contains the following goal:

> *Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.*

In accordance with the core objectives and a view to achieving this goal, the NSESD presents private enterprise in Australia with the following role:

> *Private enterprise in Australia has a critical role to play in supporting the concept of ESD while taking decisions and actions which are aimed at helping to achieve the goal of this Strategy.*

The Project will require approval under both the EP&A Act and the EPBC Act (Sections 4.3 and 4.4).

In deciding whether or not to approve the Project, the Commonwealth Minister must take into account the principles of ESD pursuant to section 136(2) of the EPBC Act. The relevant definition of the principles of ESD is provided in section 3A of the EPBC Act.

Clause 7(4) of Schedule 2 of the EP&A Regulation sets out the principles of ESD. The term ESD is defined under the EP&A Act to have the same meaning as it has in section 6(2) of the NSW *Protection of the Environment Administration Act, 1991*. The principles of ESD as outlined in section 3A of the EPBC Act and section 6(2) of the NSW *Protection of the Environment Administration Act, 1991* are presented and compared in Table 9-5.

Consideration of Ecologically Sustainable Development for the Project

The design, planning and assessment of the Project has been carried out applying the principles of ESD, through:

- incorporation of risk assessment and analysis at various stages in the Project design, environmental assessment and decision-making;
- adoption of high standards for environmental and occupational health and safety performance;
- consultation with regulatory and community stakeholders;
- optimisation of the economic benefits to the community arising from the development of the Project; and
- taking into account biophysical considerations in the Project design.

Assessment of potential medium and long-term impacts of the Project was carried out during the preparation of this EIS on aspects of surface water and groundwater, visual character, agriculture, transport movements, air quality emissions (including greenhouse gas emissions), noise emissions, aquatic and terrestrial ecology, heritage and socio-economics.

In addition, it can be demonstrated that the Project can be operated in accordance with ESD principles through the application of mitigation measures, compensatory measures and offset measures that have been developed based on conservative impact assumptions for the Project.

The following sub-sections describe the consideration and application of the principles of ESD to the Project.

Precautionary Principle

Environmental assessment involves predicting the likely environmental outcomes of a development. The precautionary principle reinforces the need to take risk and uncertainty into account, especially in relation to threats of irreversible environmental damage.

A PHA (Appendix T) and an ERA (Appendix S) were conducted to identify Project-related risks and develop appropriate mitigation measures and strategies.

The PHA (Appendix T) considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external events) from fixed installations.

The ERA (Appendix S) considers potential environmental impacts associated with the Project, including long-term risks. In addition, long-term effects are considered by the specialist studies conducted in support of this EIS (Section 1.3).

In the Groundwater, Surface Water and Economic Assessments (Appendices B, C and L), risk and uncertainty have also been taken into account through sensitivity and/or uncertainty analysis. Other specialist studies have accounted for uncertainty by adopting conservative Project assumptions and/or prediction methodologies, such as the Subsidence Assessment, Air Quality and Greenhouse Gas Assessment and Noise Impact Assessment (Appendices A, I and J).

Findings of these specialist assessments are presented in Section 6 and relevant appendices. Measures designed to avoid, mitigate and offset potential environmental impacts arising from the Project are also described in Section 6, and summarised in Section 8.

Table 9-5
Principles of Ecologically Sustainable Development – EPBC Act and Protection of the Environment Administration Act, 1991

Section 3A of the EPBC Act	Section 6(2) of the NSW *Protection of the Environment Administration Act, 1991*
(a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;	-
(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;	*(a) the **precautionary principle** – namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In the application of the precautionary principle, public and private decisions should be guided by:* *(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and* *(ii) an assessment of the risk-weighted consequences of various options,*
(c) the principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;	*(b) **inter-generational equity** – namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;	*(c) **conservation of biological diversity and ecological integrity** – namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
(e) improved valuation, pricing and incentive mechanisms should be promoted.	*(d) **improved valuation, pricing and incentive mechanisms** – namely, that environmental factors should be included in the valuation of assets and services, such as:* *(i) polluter pays – that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,* *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,* *(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanism, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The specialist assessments, PHA and ERA have evaluated the potential for harm to the environment associated with the development of the Project. A range of mitigation measures have been adopted as components of the Project design to minimise the potential for serious and/or irreversible damage to the environment, including the development of environmental management and monitoring programs, compensatory measures and ecological offsets based on conservative assumptions (Section 8). Where residual risks are identified, contingency controls have been considered (Section 8).

In addition, for key Project environmental assessment studies (i.e. Subsidence Assessment [Appendix A] and Groundwater Assessment [Appendix B]), peer review by recognised experts was undertaken (Attachment 6).

A range of measures have been adopted as components of the Project design to minimise the potential for serious and/or irreversible damage to the environment. These include operational controls, physical controls (e.g. minimising the scale of the MEA), the development of environmental management and monitoring programmes and biodiversity offsets (Sections 6 and 8). Where residual risks are identified contingency controls have also been considered (Section 6).

Social Equity

Social equity is defined by inter-generational and intra-generational equity. Inter-generational equity is the concept that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations, while intra-generational equity is applied within the same generation.

The principles of social equity are addressed through:

- assessment of the social and economic impacts of the Project (Sections 6.16 and 6.17 and Appendices L and M), including the distribution of impacts between stakeholders and consideration of the potential social and economic costs of climate change;
- mitigation measures to be implemented in relation to the potential impacts of the Project on water resources, Aboriginal heritage, land resources, noise, air quality, biodiversity, transport, hazards and risks, greenhouse gas emissions, visual character, economics, social values and surrounding land uses (Section 8);
- implementation of environmental management and monitoring programs (Section 8) to minimise and evaluate potential environmental impacts (which include environmental management and monitoring programs covering the Project life); and
- implementation of biodiversity offsets to compensate for potential localised impacts that have been identified for the development (Section 6.7.6).

The Project would benefit current and future generations through the creation of employment opportunities. It would also provide significant stimulus to local and regional economies and provide NSW export earnings and royalties, thus contributing to current and future generations through social welfare, amenity and infrastructure.

The Project incorporates a range of mitigation measures to minimise potential impacts on the environment and the costs of these measures would be met by Malabar and these costs have been included in the Economic Assessment (Appendix L). The potential benefits to current and future generations have therefore been calculated in the context of the mitigated Project.

Conservation of Biological Diversity and Ecological Integrity

Biological diversity, or “biodiversity”, is considered to be the number, relative abundance, and genetic diversity of organisms from all habitats (including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part) and includes diversity within species and between species as well as diversity of ecosystems (Lindenmayer and Burgman, 2005).

For the purposes of this EIS, ecological integrity has been considered in terms of ecological health and ecological values.

The Maxwell Infrastructure area has been subject to previous open cut mining and land disturbance since 1983, with areas currently undergoing rehabilitation.

The land within the Maxwell Underground is primarily cleared, open paddock grazing land, with some areas of remnant forest and open woodland. This land has been mostly cleared (over 75%) and used for agricultural grazing purposes for well over 100 years. The extant woodland/forest vegetation habitat is fragmented due to past land clearance.

Surveys conducted for the Project have identified threatened ecological communities and habitat suitable for threatened flora and fauna species. Detailed results from recent terrestrial flora and fauna and aquatic ecology surveys are outlined in Appendices E and F.

The environmental assessment in Sections 6.7 and 6.8 (and Appendices E and F) describes the potential impacts of the Project on local and regional ecology.

Greenhouse Gas Emissions, Biological Diversity and Ecological Integrity

Many natural ecosystems are considered to be vulnerable to climate change. Patterns of temperature and precipitation are key factors affecting the distribution and abundance of species (Preston and Jones, 2006). Projected changes in climate will have diverse ecological implications. Habitat for some species will expand, contract and/or shift with the changing climate, resulting in habitat losses or gains, which could prove challenging, particularly for species that are threatened.

Anthropogenic Climate Change is listed as a key threatening process under the BC Act, and *Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases* is listed as a key threatening process under the EPBC Act.

It is acknowledged that (subject to the efficacy of national and international greenhouse gas abatement measures) all sources of greenhouse gas emissions in NSW, irrespective of their scale, will contribute in some way towards the potential global, national, state and regional effects of climate change.

The Project's potential contribution to global climate change would be proportional to its contribution to global greenhouse gas emissions. Consistent with the approach adopted for the GHG Protocol (WBCSD and WRI, 2015), the Project's Scope 1 emissions would be attributed to Malabar, whereas the Project's Scope 2 emissions and Scope 3 emissions are the Scope 1 emissions of another party (e.g. the Project's Scope 2 emissions associated with purchased electricity would be the Scope 1 emissions of the power generator).

At the Conference of Parties 21 (in 2015), parties to the United Nations Framework Convention on Climate Change (UNFCCC) reached an agreement to combat climate change at a global level (the *Paris Agreement*). The goal of the *Paris Agreement* is to limit global temperature increases to well below 2°C (UNFCCC, 2019a).

This is to be achieved by reaching peak global emissions as soon as possible, so as to achieve a "*balance between anthropogenic emissions by sources and removals by sinks of GHGs* [greenhouse gases] *in the second half of the century*" (UNFCCC, 2019a).

The *Paris Agreement* does not specify how global emission reductions are to be achieved. It requires countries that are parties to the *Paris Agreement* to prepare, communicate and maintain nationally determined contributions (NDCs) and to pursue domestic measures to achieve them (UNFCCC, 2019a). The NDCs are to be communicated every five years, with each successive NDC to represent a progression beyond the previous NDC.

Australia's first NDC is a greenhouse gas emission reduction target of 26 to 28% on 2005 levels by 2030 (Commonwealth of Australia, 2015).

Coal from the Project is primarily expected to be used overseas, and emissions associated with the end use of Project coal would, therefore, be managed under the NDCs of these countries. The first NDCs of projected Project client countries are described in Section 9.4.2.

A greenhouse gas assessment for the Project has been undertaken by Todoroski Air Sciences (Appendix J). Section 6.19 provides a description of the potential greenhouse gas emissions of the Project.

Measures to reduce the Project's direct (Scope 1) greenhouse gas emissions are described in Section 8. However, approximately 94% of the estimated total Scope 1, 2 and 3 emissions are associated with the end use of the Project product coal by customer organisations (i.e. primarily for steelmaking).

Valuation of potential impacts of Project Scope 1 and Scope 2 greenhouse gas emissions has been incorporated into the Economic Assessment (Appendix M) for the Project. Further consideration of the Scope 3 emissions associated with the use of Project product coal is provided in Section 9.4.2.

The potential implications of climate change on local groundwater and surface water resources are addressed in Appendices B and C, respectively.

Measures to Maintain or Improve the Biodiversity Values of the Surrounding Region

A range of measures would be implemented for the Project to maintain or improve the biodiversity values of the surrounding region in the medium to long-term. As summarised below and detailed in Section 6, these measures include impact avoidance, minimisation, mitigation and offsets (for residual impacts).

In addition to the use of underground mining methods, Project surface infrastructure has been located and designed to avoid or minimise impacts to vegetation and habitat disturbance through (Section 9.2):

- the use of the substantial existing Maxwell Infrastructure (including the CHPP and rail loop), limiting the requirement to develop new infrastructure;
- locating multiple infrastructure elements within the same transport and services corridor between the Maxwell Underground and Maxwell Infrastructure (site access road, covered overland conveyor, power supply and other ancillary infrastructure and services);
- the emplacement of CHPP reject material from coal processing within existing mine voids left behind by previous mining activities at Maxwell Infrastructure;
- locating the MEA predominately within an area of derived native grassland, rather than woodland;
- considering and avoiding the location of records of threatened flora species (i.e. the Pine Donkey Orchid [*Diuris tricolor*]) for the location of the MEA;
- minimising the disturbance footprint required for the MEA; and
- incorporating the continued rehabilitation of previous mining disturbance areas at Maxwell Infrastructure, and eventual relinquishment of areas not required to support the Project.

Sections 6, 7 and 8 summarise a number of Project measures that would assist in maintaining the biodiversity of the region, including measures such as clearance protocols, weed management and rehabilitation of disturbed areas.

Residual impacts of the Project to biodiversity are also provided for by a biodiversity offset that would comply with the BC Act. All residual impacts have been conservatively assessed and an offset strategy is proposed as part of the Project to maintain or improve biodiversity values of the region in the medium to long-term.

Valuation

One of the common broad underlying goals or concepts of sustainability is economic efficiency, including improved valuation of the environment. Resources should be carefully managed to maximise the welfare of society, both now and for future generations.

In the past, some natural resources have been misconstrued as being free or under-priced, leading to their wasteful use and consequent degradation. Consideration of economic efficiency, with improved valuation of the environment, aims to overcome the under-pricing of natural resources and has the effect of integrating economic and environmental considerations in decision-making, as required by ESD.

While environmental costs have been considered to be external to development costs historically, improved valuation and pricing methods attempt to internalise environmental costs and include them within Project costing.

The Economic Assessment (Appendix M) undertakes an analysis of the Project and incorporates environmental values via direct valuation where practicable (e.g. greenhouse gas costs). Furthermore, wherever possible, direct environmental effects of the Project are internalised through the adoption and funding of mitigation measures by Malabar to mitigate and offset potential environmental impacts (e.g. biodiversity offsets and subsidence management costs).

Greenhouse gases directly generated by the Project (i.e. Scope 1 emissions) on average are estimated to be approximately 0.37 Mt CO_2-e per year (Appendix J). Indirect emissions associated with the on-site use of fuel and electricity (i.e. Scope 2 emissions) are estimated on average to be 0.04 Mt CO_2-e per year (Appendix J).

The Economic Assessment in Appendix M indicates a net benefit of $1,010 million in NPV terms to the State of NSW would be forgone if the Project is not implemented (i.e. net of the value of externalities including Scope 1 and 2 greenhouse gas emissions).

The value of externalities from indirect (Scope 3) greenhouse gas emissions are not considered in the net benefit calculation of the Project's impacts on the NSW economy. This is consistent with economic assessment convention, where the potential negative and positive economic impacts of an activity are considered together, in the country where the activity takes place (e.g. economic positives and externalities of Japanese steel manufacturing in a customer industrial facility, including the Scope 1 greenhouse gas emissions of that facility). This approach is consistent with the GHG Protocol which seeks to preclude double counting of emissions (WBCSD and WRI, 2015).

Notwithstanding, Scope 3 greenhouse gas emissions that may be emitted by other parties, such as from the use of the product coal produced by the Project, are considered in this EIS. On average, over the life of the Project, the indirect (i.e. Scope 3) emissions from these activities are estimated to be approximately 12 Mt CO_2-e per year (Appendix J).

These (typically manufacturing-related) greenhouse gas emissions would be accounted for by customer country international greenhouse gas abatement obligations (e.g. under the *Paris Agreement*) (Section 9.4.1).

9.3.6 Other Policies and Strategic Objectives

Other policies and strategic objectives are described in Section 4 and Attachments 7 and 8. The Project is generally consistent with applicable relevant policies and strategic objectives.

9.4 EVALUATION OF KEY IMPACTS AND BENEFITS

9.4.1 Key Potential Benefits

The potential for the Project to create increased local employment options and benefit local businesses was a key benefit identified in local community and other stakeholder engagement (Section 5 and Appendix L).

The Economic Assessment indicates the Project would result in a total net benefit to the NSW economy of $1,010 million in NPV terms (Appendix M), which:

- is inclusive of the estimated costs for environmental externalities and internalisation of environmental management costs by Malabar; and
- conservatively excludes any indirect economic impacts associated with benefits to workers or suppliers.

This tangible net benefit comprises (Appendix M):

- $524 million of net producer surplus attributable to NSW shareholders (NPV);
- $168 million to $259 million[1] in company tax attributable to NSW (NPV), equivalent to $22 million to $30 million per annum on average to NSW; and
- $369 million to $459 million[1] paid to the NSW and local governments, in the way of coal royalties, payroll tax, land taxes and council rates (NPV), equivalent to $41 million to $48 million per annum on average.

In addition, the Project would produce the following other socio-economic benefits:

- generation of approximately 350 new direct, long-term jobs for the region, with consequent social benefits at family and community levels (Appendix L);
- development of local workforce capacity with Malabar's proposed focus on local employment and the recruitment of personnel from outside of the underground mining sector (including females and Indigenous people) (Section 6.17.5 and Appendix L);
- indirect (flow-on) employment as the result of increased wages and participation of regional businesses in the supply chain (Appendix L);

[1] Range is based on coal price forecasts used by Deloitte Access Economics and Malabar's coal price forecasts.

- continued support for the vitality and growth of local and regional businesses (e.g. through the provision of non-labour inputs such as maintenance supplies and professional services) (Section 5.4.5);
- support and funding contributions to local community programs and groups during the life of the Project (Section 5.4.4);
- support for local community objectives and aspirations (including objectives to support job growth and diversify from reliance on thermal coal production) (Appendix L);
- positive economic flow-on effects associated with the use of the Hunter Valley coal rail network and coal export terminals at the Port of Newcastle (Section 9.1.3); and
- certainty over future development plans at the Maxwell Infrastructure and within EL 5460.

The Project would also support continued rehabilitation activities at the Maxwell Infrastructure, including reduction in the volume of final voids through emplacement of reject material generated by coal processing activities.

9.4.2 Key Potential Impacts

Regulatory and community engagement identified key assessment issues for the Project (Section 5). Key potential Project direct impacts and indirect adverse impacts are described below.

Potential Adverse Direct Impacts

Key potential adverse direct impacts associated with the Project include:

- potential subsidence impacts on public infrastructure, which would be managed with standard monitoring and mitigation measures implemented in consultation with relevant infrastructure owners;
- potential noise impacts at a small number of residences in the Antiene and East Antiene residential areas associated with activities at the Maxwell Infrastructure, which would be managed in accordance with NSW Government policy;
- minor changes to road use and traffic conditions on roads surrounding the Project, which would not materially affect the capacity, safety or efficiency of the road network;
- potential subsidence impacts on unnamed ephemeral and intermittent drainage lines, such as ponding, surface cracking, knickpoint formation and stream channel alignment change, which would not materially affect downstream water quality with the implementation of monitoring and remediation measures;
- potential impacts on Aboriginal heritage sites, which would be managed in consultation with the Aboriginal community through salvage and other management measures;
- limited views of Project infrastructure from Edderton Road and elevated locations on Coolmore and Godolphin Woodlands Studs, which have been significantly mitigated through Project design and would have a low dynamic landscape impact in the context of existing mining in the locality, sub-region and region;
- potential for negative perceptions or reservations of nearby equine enterprises to persist, despite the significant measures implemented to avoid the potential for any land use conflict;
- potential for social impacts (such as stress, anxiety or community conflict) due to uncertainties or concerns about the environmental or social impacts associated with the Project, which would be managed through ongoing community engagement during the life of the Project; and
- the potential for increased demand or competition for rental housing and skilled labour if the Project overlaps with other local and regional developments, which would be managed through a cumulative impact monitoring framework.

Other potential adverse direct impacts would be mitigated or offset, such that potential impacts would be very low, negligible or nil. For example, biodiversity impacts have been assessed in accordance with the BAM (Biodiversity Assessment Method), which sets a standard that would result in no net loss of biodiversity values in NSW.

A consolidated summary of proposed mitigation measures for the Project is provided in Section 8.

Potential Adverse Indirect Impacts

Most potential indirect impacts of the Project identified in Project engagement have been positive in nature (e.g. direct employment effects and local business benefits).

Although it has not been a significant issue raised during consultation specifically for this Project, it is noted that general consultation in the Hunter region has identified that people have concerns regarding the potential for Scope 1 and Scope 2 greenhouse gas emissions from coal mining developments, and Scope 3 greenhouse gas emissions (e.g. overseas greenhouse gas emissions from the use of Project product coal) to contribute to global climate change effects (Appendix L).

It is acknowledged that (subject to the efficacy of national and international greenhouse gas abatement measures) all sources of greenhouse gas emissions will contribute in some way towards the potential global, national, state and regional effects of climate change (Section 9.3.5).

The Project's contribution to global climate change effects would be proportional to its contribution to global greenhouse gas emissions. Greenhouse gases directly generated at the Project (i.e. Scope 1 emissions) and indirect emissions associated with the on-site use of fuel and electricity (i.e. Scope 2 emissions) have together been estimated at approximately 0.41 Mt CO_2-e per year (Section 6.19.2).

These emissions would be significantly less than the Scope 3 emissions produced by customers using Project product coal. It is anticipated that a significant majority of the Scope 3 emissions from the use of Project coal would occur overseas.

Under the *Paris Agreement* each country is required to determine NDCs that will contribute to the long-term goals of the *Paris Agreement* to achieve a balance between anthropogenic emissions by sources and removal by sinks of greenhouse gases in the second half of this century (UNFCCC, 2019b).

It is important to note that under the *Paris Agreement* each climate plan reflects the country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities (UNFCCC, 2019b). Each country will have its own range of opportunities and priorities to trade off various alternative emission reduction (and carbon sink) options that relate to the economic status and physical attributes of the country.

A description of the expected export markets for Project coal is provided in Section 9.1.3. Table 9-6 provides a summary of the current NDCs under the *Paris Agreement* (i.e. first NDCs) of the expected customer countries for Project product coal. It should be noted that, under the *Paris Agreement*, these NDCs are interim steps that are updated every five years, with the next round of NDCs due by 2020 (UNFCCC, 2019b). The review mechanisms under the *Paris Agreement*, therefore, provide for the ratcheting up of emission control measures as required over time to achieve the goals of the *Paris Agreement*.

Any small quantities of Project product coal sold on the domestic market (e.g. to AGL's Liddell or Bayswater Power Stations) would be substituting supply from existing sources and, therefore, would already be reflected in Australia's greenhouse gas accounting.

It is recognised that international measures to 'decarbonise' global economies may alter the future demand for and/or supply of coal. Expected global trends are factored into coal price forecasts considered in the Economic Assessment (Appendix M). The Economic Assessment also includes sensitivity analysis for variations in export coal prices and the social cost per tonne of carbon emissions. The sensitivity analysis shows that the Project would still generate a substantial net benefit to NSW under the scenarios considered (Appendix M).

Malabar would manage its contribution to Australian greenhouse gas emissions inventories through participation in the NGERS, as well as other applicable government initiatives and policies implemented to manage emissions at the national level under Australia's progressive NDCs. As mentioned above, the Australian Commonwealth Government has committed to reducing greenhouse gas emissions by 26 to 28% below 2005 levels by 2030 under its first NDC (Commonwealth of Australia, 2015).

Table 9-6
Potential Customer Country Current Nationally Determined Contributions

Destination Country/State	Summary of First NDC
Japan	26% reduction in greenhouse gas emissions compared to 2013 emissions by 2030, or a total of approximately 1,042 Mt CO_2-e in 2030.
India	A 33-35% reduction in greenhouse gas emissions per unit of GDP from the 2005 level by 2030.
South Korea	37% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 536 Mt CO_2-e in 2030.
China	Achieve peak greenhouse gas emissions in 2030, with a 60% to 65% reduction in greenhouse gas emissions per unit of GDP from the 2005 level in 2030.
Taiwan (Republic of China)	While not a party to the UNFCCC or the *Paris Agreement*, Taiwan has committed to a 50% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 214 Mt CO_2-e in 2030.
Vietnam	8% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 724 Mt CO_2-e in 2030 (unconditional with domestic resources). 25% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 591 Mt CO_2-e in 2030 (conditional with international support).
Brazil	37% reduction in greenhouse gas emissions compared to 2005 emissions by 2025, or a total of approximately 1,300 Mt CO_2-e in 2025. 43% reduction in greenhouse gas emissions compared to 2005 emissions by 2030, or a total of approximately 1,200 Mt CO_2-e in 2030.
Indonesia	29% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 2,037 Mt CO_2-e in 2030 (unconditional with domestic resources). 41% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 1,693 Mt CO_2-e in 2030 (conditional with international support).
Malaysia	A 35% reduction in greenhouse gas emissions per unit of GDP from the 2005 level in 2030 (unconditional with domestic resources). A 45% reduction in greenhouse gas emissions per unit of GDP from the 2005 level in 2030 (conditional with international support).

After: Government of Japan (2015), Government of India (2016), Government of South Korea (2015), Department of Climate Change, National Development & Reform Commission of China (2015), Government of Taiwan (2015), Government of Vietnam (2015), Government of Brazil (2015), Government of Indonesia (2016) and Government of Malaysia (2015).

9.4.3 Consideration of the Consequences of Not Carrying Out the Project

Were the Project not to proceed, the following consequences are inferred:

- approximately 350 direct operational employment opportunities would be foregone and the associated flow-on effects would not be created;
- an approximate average of 90 direct construction employment opportunities and the associated flow-on effects would not be created;
- the opportunity to reduce the volume of the legacy East Void at the Maxwell Infrastructure would not be realised;
- the substantial existing Maxwell Infrastructure would be decommissioned and the potential benefits of its continued use would be lost;
- the coking coal resource would remain available to be extracted by other means; however, the efficiencies associated with access to the Maxwell Infrastructure may be lost;
- substantial corporate tax contributions and royalties (in the order of $110 million to $140 million[2] per annum on average) would not be generated (Appendix M);
- a net benefit of $1,010 million to the State of NSW in NPV terms would be forgone (Appendix M);
- the potential incremental environmental impacts described in this EIS would not occur;
- economic and social benefits to the region (including to the Muswellbrook and Singleton LGAs) associated with the Project (Section 9.4.1) would not be realised; and
- the incremental benefits of the Project biodiversity offset strategy would not be realised.

9.5 CONCLUSION

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

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

The Project site:

- is within existing exploration and mining tenements under the NSW *Mining Act, 1992* and is consistent with the relevant conditions of these tenements;
- is located on freehold land that is either owned by Malabar, or covered by access arrangements with AGL;
- allows for underground mining as a permissible land use;
- allows for the beneficial use of the substantial existing Maxwell Infrastructure for coal handling and processing (akin to a 'brownfields' project); and
- has access to existing rail and port infrastructure.

Potential impacts of the Project have been assessed against established thresholds of acceptability contained in relevant guidelines and policies, including for noise, air quality, road transport, groundwater and surface water. Potential impacts have been avoided or minimised as far as is reasonable or feasible. Mitigation measures and offset strategies are proposed where residual impacts are predicted.

Throughout the Project design and EIS process, Malabar has carefully considered the feedback provided by the local community, government agencies and other stakeholders. This has included feedback on projects previously proposed by other companies at the Project site, as well as feedback received since Malabar announced its intention to acquire the Project site in early 2017.

[2] Range is based on coal price forecasts used by Deloitte Access Economics and Malabar's coal price forecasts.

Malabar's comprehensive recognition of stakeholder feedback has been reflected in its commitment to underground mining and other significant Project design measures (Section 5.2). Malabar has also sought to demonstrate genuine community engagement and successful environmental management over time. This has included making substantial progress rehabilitating the Maxwell Infrastructure area to date.

Through the voluntary adoption of the proposed Project design measures and operating philosophy, Malabar is confident that the Project would not be incompatible with existing and future surrounding land uses, including existing equine and viticulture enterprises (Section 9.1).

Engagement with the Muswellbrook Shire Council has identified the benefits of the Project's proposed coking coal product and underground mining techniques in providing industry diversity in the Muswellbrook LGA. The potential for the Project to create increased local employment options and benefit local businesses is also a key benefit identified in local community and other stakeholder engagement.

The Project would generate a significant net benefit to the State of NSW. Economic benefits potentially forgone if the Project does not proceed amount to a net benefit of $1,010 million to the State of NSW in NPV terms (Appendix M).

In weighing up the main environmental impacts (costs and benefits) associated with the proposal as assessed and described in this EIS, the Project is, on balance, considered to be in the public interest.