Mangoola Coal Continued Operations Project

State Significant Development Assessment
SSD 8642
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Title: Mangoola Coal Continued Operations Project

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Cover image: Mangoola Mine looking at Anvil Hill, Departmental site visit 2019

Glossary

Abbreviation	Definition
AHD	Australian Height Datum
AIP	Aquifer Interference Policy
BCA	Building Code of Australia
BCS	Biodiversity, Conservation and Science Directorate within the Department
CIV	Capital Investment Value
CHPP	Coal Handling and Preparation Plant
Council	Muswellbrook Shire Council
Crown Lands	Crown Lands Group within the Department
DAWE	Department of Agriculture, Water and the Environment (formerly DoEE)
Department	Department of Planning, Industry and Environment
DPI	Department of Primary Industries
EA Guidelines	NSW Government's *Guidelines for the economic assessment of mining and coal seam gas proposals (December 2015)*
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
Heritage NSW	Heritage NSW within the Department of Premier and Cabinet
LEP	Local Environmental Plan
MARNP	Mine Affected Road Network Plan
MEG	Mining, Exploration and Geoscience within Regional NSW

Minister	Minister for Planning and Public Spaces
NPV	Net Present Value
NRAR	Natural Resources Access Regulator
RAPs	Registered Aboriginal Parties
SEARs	Planning Secretary's Environmental Assessment Requirements
Secretary	Planning Secretary of the Department of Planning, Industry and Environment
SEPP	State Environmental Planning Policy
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD	State Significant Development
SSI	State Significant Infrastructure
TfNSW	Transport for NSW
VLAMP	*Voluntary Land Acquisition and Mitigation Policy*

Executive Summary

Background

The Mangoola Mine is an existing open cut coal mine, located 20 kilometres (km) west of Muswellbrook in the Upper Hunter Valley of NSW. The mine was originally approved in 2007 (known then as the Anvil Hill Coal Project) and has been operating in the Muswellbrook community since September 2010.

The mine is operated by Mangoola Coal Operations Pty Limited, a subsidiary of Glencore Coal Pty Limited (Glencore), and currently employs around 400 operational staff (with a maximum limit of 540 operational employees). Coal extracted from the existing operations is processed on site at a dedicated Coal Handling and Processing Plant (CHPP) and transported by way of a private rail spur to the Muswellbrook-Ulan railway line, and on to domestic power stations or the Port of Newcastle for export.

The Project

In July 2019, Glencore lodged a State significant development (SSD) application for the Mangoola Coal Continuation Operations Project (the Project) to extend the life of the existing operations by establishing a new mining area (the Northern Extension Area) to the north of the Mangoola Mine (see **Figure E1**).

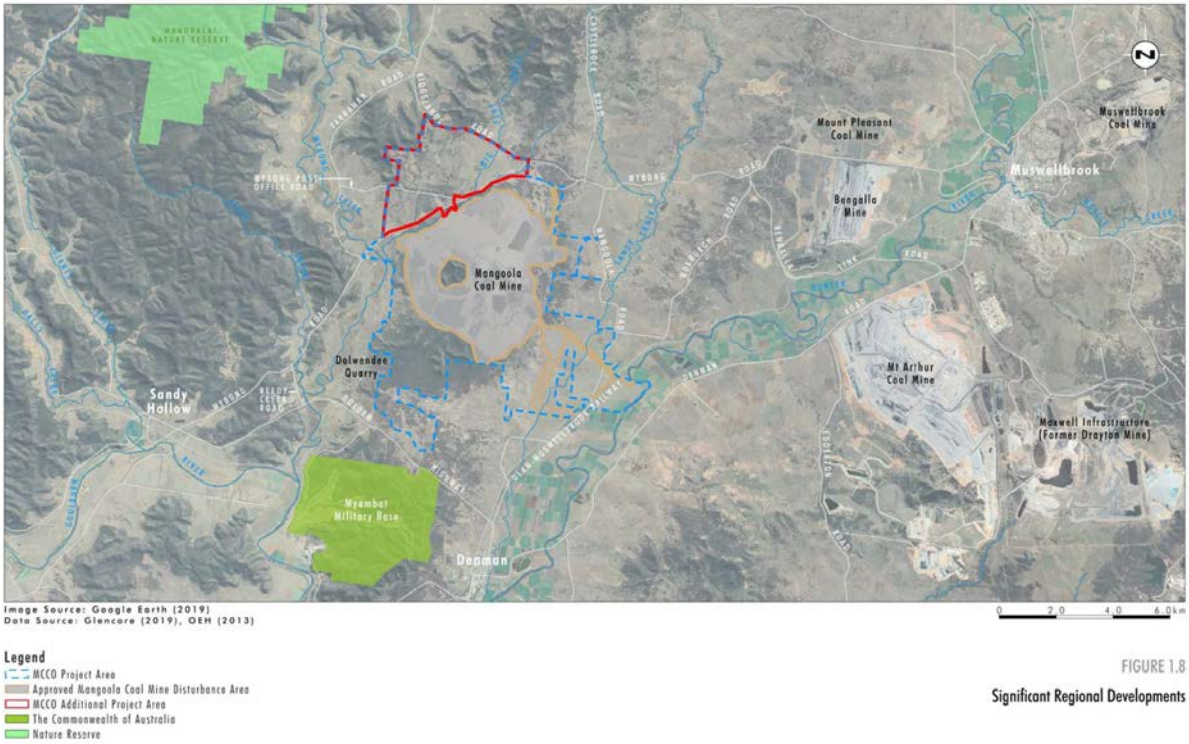

Figure E1 | Project location showing existing Mangoola Mine and the Northern Extension Area

The Northern Extension Area is surrounded by undulating and hilly topography, with dominant ridgelines ringing the site to the north and west. As shown in **Figure E1**, the existing Mangoola Mine is located on the western extent of the Hunter Coalfield and is surrounded by large areas of remnant vegetation, extensive agricultural lands associated with the floodplains of the Hunter River and Wybong Creek and a range of established mining and industrial land uses, particularly to the east.

Development of the Northern Pit is the primary aspect of the Project and would enable the extraction of an additional 52 million tonnes (Mt) of run of mine (ROM) coal while maintaining the annual extraction rate of 13.5 million tonnes per annum (Mtpa) that applies to the existing Mangoola Mine.

The Project would continue to use existing infrastructure including the Mangoola Mine CHPP, rail loop and mining fleet and would involve the development of a new haul road overpass which would also traverse Wybong Road and Big Flat Creek, to connect the Northern Extension Area with the Mangoola Mine.

Glencore considers that by deploying its existing truck and excavator fleet to operate simultaneously across the Northern Pit and the existing Mangoola Mine, it would take approximately 8 years to recover the additional 52 Mt of ROM coal under the Project. Consequently, Glencore is only seeking a 13 month extension, until December 2030, to the already approved operational life of the Mangoola Mine.

Should the Project be approved, Glencore would surrender the existing Mangoola Coal Mine project approval (PA 06_0014), so that the entire site is regulated under a single contemporary and consolidated development consent.

However, if the project is refused, Glencore has indicated that based on anticipated production rates it is likely to exhaust approved coal resources by 2025. While the Mangoola Mine is approved to continue operations until November 2029, Glencore has indicated that without access to the additional 52 Mt of coal resources without the Northern Pit, it would be forced to close and rehabilitate the Mangoola Mine earlier than currently approved. Glencore states that this outcome would result in the continuation of approved amenity impacts at surrounding residents for the remaining life of the existing operations, but would fail to realise the potential for $408 million in net present value (NPV) economic benefits to NSW.

Statutory Context

The Project involves coal mining and is declared to be SSD under clause 8(1)(b) of *State Environmental Planning Policy* (State and Regional Development) 2011. Under section 4.5(a) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 8A of the SRD SEPP, the Commission is the consent authority for the application, as more than 50 unique submissions in the form of objections were made in respect of the Project.

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

On 3 December 2020, the Minister for Planning and Public Spaces directed the Independent Planning Commission of NSW (the Commission) to hold a public hearing prior to its determination of the Project. In making this direction, the Minister requested that the Commission pay particular attention to the Department's Assessment Report and recommended conditions of consent, key issues raised in public submissions during the public hearing and any other relevant information.

Strategic context

Despite recent fluctuations in thermal coal prices associated with the economic impacts of COVID19, society remains reliant on coal to deliver energy security and meet its basic energy needs. Medium term projections indicate that the demand for thermal coal remains relatively stable, with some areas forecast to experience an increase in demand for thermal coal over coming decades, as countries seek to provide access to electricity for their citizens.

In 2019/20, NSW produced around 200 million tonnes of saleable coal, which generated a royalty income for the State in the order of $1.5 billion. While these royalties were somewhat lower those generated in 2018/19, they remain well above the average annual coal royalties generated over the past decade and demonstrate that coal mining continues to play an important role in the NSW export commodity mix.

On 24 June 2020, the NSW Government released its *Strategic Statement on Coal Exploration and Mining in NSW* which sets out its approach for transitioning to a low carbon future, in line with Australia's commitments under the Paris Agreement. This Statement recognises the ongoing importance of the coal industry to NSW and identifies the particular importance of brownfield mining proposals, such as is proposed under the Project, in providing an efficient means of delivering economic returns to the State while reducing environmental impacts.

Engagement

In recognition of the community interest in this proposal, the Department placed the Project on public exhibition for an extended period of 42 days, from Thursday 18 July 2019 until Wednesday 28 August 2019. The Department received 320 public submissions on the Project during the exhibition period, comprising 72 percent in support and 28 percent opposed.

Submissions in support commented on the economic benefits of the Project, including employment generation and the payment of royalties to the NSW Government, as well as the positive environmental track record of the existing Mangoola Mine and its support for local groups and organisations. Those opposed to the Project were primarily concerned with the potential impacts on air quality, noise and social impacts along with broader commentary about the mining industry's impact on climate change.

The Department received detailed technical advice on the Project from 17 NSW Government agencies, infrastructure providers, Muswellbrook Shire Council (Council) and the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC).

While a number of agencies sought additional information or clarity regarding aspects of the Project, they were all satisfied that the Project could be appropriately managed and regulated in accordance with the Department's recommended conditions of consent and other applicable regulatory instruments.

Council provided a detailed submission, but did not object to the Project.

Assessment

In assessing the merits of the Project, the Department has considered the submissions and representations received; the likely environmental, social and economic impacts of the Project; the suitability of the site; relevant environmental planning instruments (EPIs); and the public interest, in accordance with the requirements of the EP&A Act. The Department also obtained independent expert advice on the air quality aspects of the Project, and considered advice provided by NSW Government agencies, the Commonwealth Department of Agriculture, Water and the Environment and the IESC.

Having completed a rigorous and thorough assessment of the impacts of the Project, the Department considers that the key assessment issues relate to noise, air quality, blasting, traffic and transport, water resources, biodiversity, mine rehabilitation, social and economic impacts and land use compatibility.

Amenity

The Project involves a shift in mining operations towards the northwest and would see the envelope of potential amenity impacts extend northwards, commensurate with the progressing mine front.

The Department notes that the amenity impacts of the existing Mangoola Mine were assessed in detail as part of the original approval of the existing operations but remain a significant issue of concern for a number of local residents. The Department has comprehensively considered the cumulative and incremental amenity impacts of the Project on nearby private landowners, including noise, air quality and blasting impacts.

Noise

Noise impacts were a key issue in the determination of the original Mangoola Mine and saw Glencore purchase 54 properties surrounding the existing site. To address the residual impacts of the existing Mangoola Mine, a number of strict conditions were imposed under PA 06_0014, including conditions that afforded affected receivers with acquisition or mitigation rights. Currently there remains 3 private receivers with voluntary acquisition rights, 15 receivers who are eligible for mitigation upon request due to the operational noise and 3 receivers who are eligible for mitigation upon request for traffic noise.

Given that Glencore is proposing to continue to undertake limited operational activities at the existing Mangoola Mine and utilise the existing site infrastructure and CHPP, receivers to the south and east of the mine would be expected to experience similar noise generation to that experienced over the previous decade, albeit over a longer period of time. However, as mining operations progress to the north, those residents on the northern and western boundaries of the Northern Extension Area would be expected to experience an increase in noise levels.

To manage these incremental impacts on northern receivers, Glencore has designed the Project to allow for a staggered transition of mining fleet to the Project area and would not operate the entire fleet in the northern area, but would instead maintain limited fleet and equipment at the Mangoola Mine.

Many of the closest residences who would be affected by this incremental increase in the noise environment have already been affected to some degree by noise emissions from the existing Mangoola Mine and have either been acquired by Glencore or are entitled to request further noise mitigation at their residence. To address impacts on these receivers, Glencore has committed to retain any existing acquisition and mitigation rights for receivers identified under the PA 06_0014 over the life of the Project, even where these impacts are predicted to reduce under the Project.

In addition to people with existing rights, 6 additional residences are predicted to experience significant noise exceedances of more than 5 decibels (dB) over the Environment Protection Authority's (EPA's) project noise trigger levels and would be afforded voluntary property acquisition rights under the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP). Marginal exceedances of between 3 and 5 dB over the project noise trigger levels are also predicted at 8 new residences, who would be offered additional noise mitigation at their residence under the VLAMP.

The Project would involve approximately 16 months of construction. While there would be some exceedances of the *Interim Construction Noise Guideline* standard hours criterion of 45 dB, this would only occur at residences already eligible for voluntary acquisition or mitigation.

The Department and the EPA are satisfied that the noise impacts of the Project could be managed under the recommended conditions and by requiring Glencore to implement real-time monitoring and the application of proactive and reactive mitigation measures to guide the minimisation of noise emissions during sensitive time periods and adverse weather conditions.

Air Quality and Blasting

In the same manner that predicted noise impacts shifted in line with the proposed mining activities, the envelope of amenity impacts arising from particulate matter emissions and blasting would be expected to shift in a northward direction as mining is progressively undertaken in the Northern Extension Area.

However, given the separation distances to nearby residences and the presence of key topographic features that act to attenuate air quality impacts, the Project is predicted to comply with relevant EPA

project specific and cumulative air quality assessment criteria at all privately-owned receivers in the locality. Likewise, the Project is predicted to comply with relevant airblast overpressure and ground vibration criteria at all private residences within 5 km of the Northern Extension Area.

The Department recognises that the air quality impacts of the Project, along with the broader air quality environment in the Hunter Valley, are of concern to the local community. Accordingly, to assist in its consideration of these issues, the Department commissioned ERM Australia Pacific Pty Ltd (ERM) to conduct an independent peer review of the Air Quality Impact Assessment (AQIA). ERM concluded that the methodology used in the AQIA is generally sound, included an acceptable level of conservatism and that the AQIA results are consistent with what would be expected for a project of this nature.

The Department's assessment of direct energy use and associated greenhouse gas emissions has found that the Scope 1 and Scope 2 emissions generated by the Project would be low and comprise a very small contribution towards climate change at both the national and global scale. With respect to Scope 3 emissions that would arise as a consequence of the Project, the Department notes that they are regulated through broader national policies and international agreements, and that the emissions from the Project should be weighed up against the economic and social benefits of the Project to the region and NSW.

Overall, the evidence provided in the EIS and supported by the independent peer review demonstrates that the Project would have minimal impacts on air quality and would meet acceptable levels at nearby residences. Importantly, any air quality impacts associated with the Project would need to be managed and monitored through a combination of proactive and reactive management and monitoring measures outlined in a comprehensive Air Quality and Greenhouse Gas Management Plan to ensure the local residences can have confidence that the predictions in the EIS will be achieved.

As per the existing operations, blasting would occur in the Northern Extension Area at a maximum of 2 blasts per day or 6 blasts per week (averaged over a calendar year), although these blasts are proposed to now occur between the hours of 9 am to 5 pm Monday to Saturday (similar to other mines in the Hunter Valley). The closest privately-owned residences are located more than 1 km from the Northern Extension Area and the blast assessment demonstrates that blasting could be designed to ensure that airblast overpressure and ground vibration criteria would not be exceeded at these sensitive receivers.

While blasting would occur within 500 m of Wybong Road, Wybong Post Office Road (Wybong PO Road) and Ridgelands Road, powerlines and Crown land, temporary road closures would be implemented to manage potential flyrock effects and public safety, and Glencore would be required to repair or replace any damage caused to these infrastructure assets as a result of blasting activities.

The Department's recommended conditions establish blast performance measures for the Project which set strict overpressure and vibration limits for blasting activities at sensitive receivers.

The Department and the EPA are satisfied that the air quality and blasting impacts of the Project can be managed under the recommended conditions which would require Glencore to implement monitoring programs and proactively manage its activities to minimise impacts at sensitive receivers.

Traffic and Transport

As a continuation of an existing coal mine, the Project would continue to transport product coal from the site via the existing rail loop and loading facilities, at the same rate as currently approved. Likewise, employees and heavy vehicle deliveries would continue the use of the existing road network to access to the site and would remain within existing modelled and approved limits.

Traffic surveys indicate that all intersections on key transport routes currently operate with acceptable levels of service during peak periods and that the road network would continue to be capable of accommodating operational traffic over the proposed 13 month extension to the operational mine life.

However, the Project would involve the closure and potential realignment of a 2.7 km section of Wybong PO Road, from its intersection with Wybong Road, as well as the creation of a haul road overpass over Wybong Road and Big Flat Creek. Importantly, all properties whose access is directly affected by the proposed closure of Wybong PO Road are mine-owned.

In May 2020, Council adopted its *Mine Affected Road Network Plan (MARNP)*, which specifically considers the closure of the affected section of Wybong PO Road and identifies Council's preferred alternative of upgrading Yarraman Road in lieu of a realigned Wybong PO Road. Glencore has indicated that it is willing to either realign Wybong PO Road or contribute an amount equal to the cost of the Wybong PO Road realignment to the Yarraman Road upgrade.

The Department notes that both options would increase the travel time by around 1-2 minutes to Muswellbrook for some residents to the west of the Project and that each option has different implications for traffic diversions during flood events where the existing causeway over Yarraman Road becomes submerged. Overall, the Department considers either option would address road network issues and has recommended conditions to allow either option to be pursued, subject to further consultation with Council.

In order to connect the Northern Extension Area with the existing Mangoola Mine, Glencore has proposed to construct a private haul road overpass over Big Flat Creek and Wybong Road. This overpass has been designed and located to minimise impacts to threatened vegetation and the surface water dynamics within Big Flat Creek. In response to comments made by Muswellbrook Council, Glencore has further amended the design of this overpass to increase the clearance height for over-sized over-mass (OSOM) vehicles using Wybong Road.

To minimise traffic disruption during the construction of this overpass, Glencore has committed to construct a bypass road to temporarily divert Wybong Road traffic around the construction site and maintain traffic flow. This bypass would be constructed to meet relevant road design guidelines and would at a minimum be built to the same standard as the existing Wybong Road. Once the overpass has been built this bypass road would be removed from the road network and would be retained on site for future use during the decommissioning of the overpass at the end of the mine life.

The Department considers that the overpass would have limited traffic and transport impacts on the community and has recommended that its construction and decommissioning be managed through a Traffic Management Plan to be prepared in consultation with Transport for NSW and Council.

Final Landform and Rehabilitation

The Project's landform design and rehabilitation strategy generally reflects the existing principles in place at the Mangoola Mine and involves the development of a landform that incorporates topographic relief, hydro-geomorphologically stable drainage lines and flow paths that integrate with the surrounding landscape. These principles have been successfully implemented across the existing Mangoola Mine site and have been subject to industry led case studies into leading practice rehabilitation outcomes.

The proposed Northern Extension Area would also be rehabilitated in a similar manner to the existing Mangoola Mine, with approximately 484 ha of additional disturbance being revegetated with native woodland communities, 82 ha being retained as a final void at the conclusion of mining and remaining lands being rehabilitated to grassland or retained for beneficial future use (e.g. infrastructure areas).

The approved Mangoola Mine void would also be retained, although it would be reduced in size through selective blasting of highwalls and transfer of 50 million back cubic metres of overburden from the Northern Extension Area to the Mangoola Mine site.

The final landform outcome proposed by Glencore was informed by a detailed Mine Plan Options Report which accompanied the EIS and considered several different mining designs and landform outcomes for the site. In assessing the mine plan options presented, the Department carefully considered advice provided by Mining, Exploration and Geoscience within Regional NSW and the Resources Regulator, along with comments made by Council and in public submissions.

The Department is satisfied that the proposed final landform and rehabilitation outcomes are reasonable and appropriate, and reflect the detailed consideration of potential mining planning options and void configurations. The Department considers that the preferred option finds an appropriate balance between efficient mining operations and providing a safe and stable landform with suitable micro relief over the majority of the site.

The Department has consulted with the Resources Regulator to develop recommended conditions which clearly stipulate the rehabilitation objectives to be met and require the development of a Rehabilitation Strategy to guide the life-of-mine landform planning for the Project and a Rehabilitation Management Plan to be prepared in consultation with the Resource Regulator.

Biodiversity

Much of the land in the vicinity of the Mangoola Mine has been historically cleared of native vegetation, primarily for agricultural enterprises. While the existing Mangoola Mine has also contributed to previous clearing in the local area, this clearing has been compensated for through the establishment of strategically located and substantial biodiversity offset areas throughout the Hunter Valley and managed through the implementation of leading practice biodiversity management and rehabilitation outcomes on site.

Extensive areas of remnant vegetation still existing to the west of the mine (see **Figure E1**) and represent a link between remnant patches of vegetation along the Great Eastern Ranges to the west of the Hunter Valley and on the valley floor, with the Wollemi National Park to the south.

While the Project would necessitate clearing of native vegetation, Glencore has implemented a range of avoidance and mitigation measures to reduce the impacts of the Project on biodiversity and key listed threatened species. The final Project design largely avoids the highest quality remnant forest and woodland communities present on the slopes to the north and north-west of the Northern Extension Area. Nevertheless, 570 ha of native vegetation, consisting of 356 ha of woodland or open forest and 214 ha of derived native grassland would be cleared.

To compensate for these impacts, Glencore has proposed a Biodiversity Offset Strategy which includes a combination of in-perpetuity conservation of land-based offset sites, the retirement of biodiversity credits that Glencore already holds in surplus from other nearby offset sites, the establishment of 456 ha of ecological mine rehabilitation and residual payments into the Biodiversity Conservation Fund.

In considering these biodiversity impacts and the proposed biodiversity offset approach, it is noted that a delegate of the Commonwealth Minister for the Environment has determined that the Project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999,* due to potential significant impacts on *Matters of National Environmental Significance* for listed threatened species and communities, and water resources.

In assessing these impacts, the Department has sought expert advice from the Biodiversity, Conservation and Science Directorate (BCS) and carefully considered the expert report on ground orchids prepared by Dr Stephen Bell, in consultation with the BCS.

The Department and BCS are both satisfied that the biodiversity impacts of the Project could be acceptably managed subject to the Department's recommended conditions and note that the proposed Biodiversity Offset Strategy would be adequate address the Project's offset obligations at both the State and Commonwealth level.

Water Resources

In considering the impacts of the Project on water resources, the Department has considered the advice of the IESC , EPA, BCS and DPIE Water, including in relation to water licensing, flood modelling, water quality, groundwater drawdown, changes in catchment areas and impacts on tributaries.

The development of the Northern Extension Area would extend the existing Mangoola Mine water management and monitoring system into part of the catchment area for Wybong Creek, an unregulated tributary of the Goulburn River, which subsequently flows into the Hunter River to the south of the site.

The Project would increase the total area of surface water runoff captured by the Mangoola Mine water management system, however with the implementation of the proposed mitigation and monitoring measures the Project is not predicted to result in any significant water quality risks to downstream receiving environments or material reductions to flow volumes in downstream watercourses.

While high value alluvial floodplains occur to the west and east of the site, the water resources within the Northern Extension Area have limited existing stock or domestic uses. The aquifers in this area primarily comprise shallow colluvium and alluvial deposits adjacent to major creeks and drainage lines, and a deeper highly saline system associated with the Triassic bedrock and Permian coal measures.

The extraction of coal from the Northern Extension Area is predicted to slightly extend drawdown from the existing Mangoola Mine operations along Big Flat Creek, but this drawdown is not expected to materially impact flow volumes in Big Flat Creek. The drawdown from the Project is predicted to comply with the Level 1 minimal impact criteria under the *NSW Aquifer Interference Policy* at all but one privately-owned bore within a 3 km radius of the site. The Department notes that most of the drawdown impacts on this bore are associated with the existing Mangoola Mine and that this landowner is already subject to acquisition rights under PA 06_0014. Nevertheless, the Department has recommended conditions that this bore owner be eligible for compensation for any loss of water as a result of the Project.

Overall, the Department and relevant agencies are satisfied that Project's impacts are manageable and able to be licensed. While the Project would result in the disturbance and diversion of additional surface water catchments, the Department is satisfied that these impacts would not be dissimilar to the nature of impacts associated with the existing Mangoola Mine.

The Department, including its Water Group, considers that water-related impacts can be appropriately managed and mitigated through the recommended conditions, which include the need for a comprehensive Water Management Plan, strict performance measures, a detailed monitoring network and Trigger Action Response Plans to proactively identify and manage potential impacts.

Economics

Glencore estimates that the Project would generate an overall benefit to the NSW community of approximately $408 million NPV assuming a discount rate of 7%, which includes $129.5 million NPV in royalties to the NSW Government.

While the economic analysis confirmed that the Project's forecast benefits are most susceptible to coal price variations, sensitivity analysis undertaken for the Project shows that even under a "lower coal price" scenario the Project would still provide a net benefit to the NSW community. These benefits to the NSW community include the ongoing employment for up to 480 operational employees and temporary employment of 145 construction workers.

Glencore has also proposed a Voluntary Planning Agreement (VPA) to Council, which would provide for ongoing contributions over the operational mine life in the order of $5 million and includes funding for a community enhancement program and road maintenance. This contribution value effectively represents a continuation of the existing VPA agreement between Glencore and Council in relation to the existing Mangoola Mine, and has been calculated based on the values in the existing VPA, adjusted for CPI indexations, over the extended Project life. The Department considers this to be a reasonable basis for calculating the VPA and understands that Council has advised that it is generally supportive of the VPA but is yet to formally agree to the final terms.

Social

While the potential impacts arising from the Project are predicted to remain within relevant assessment criteria or could be appropriately addressed in accordance with established NSW Government policies and guidelines, the Department acknowledges that people may experience the Project's impacts differently and that these individuals may still have concerns about the potential for the Project to impact their lifestyles, amenity or wellbeing.

While most residences in close proximity to the Mangoola Mine have previously been acquired by Glencore, several large rural properties and lifestyle blocks remain in the area including 10 on the floodplains of Wybong Creek to the west, 18 to the north of the mine and south of Wybong Creek and 11 to the northeast of the Mangoola mine and along Wybong Road. Many of these properties are already entitled to voluntary acquisition and/or mitigation rights under the existing project approval.

These residents are concerned that mining may cause changes in social dynamics, community cohesion and amenity impacts of the area. The Department has carefully considered these concerns and the Project's social and environmental impacts throughout its assessment.

Overall, the Department considers that the social impacts of the Project on the local and broader community would be similar to the existing operations and have been adequately assessed and minimised through Project design and the proposed mitigation and management strategies. While the Department acknowledges the concerns of local residents, it considers that the residual social impacts of the Project can be appropriately managed through adherence to strict environmental criteria and the implementation of the various management plans and monitoring programs required under Department's recommended conditions.

Other Issues

In addition to the above, the Department has carefully considered the Project's predicted greenhouse gas emissions, impacts to Aboriginal cultural heritage and historic heritage items, management of hazardous materials, impacts to agricultural lands and soil resources and land use compatibility.

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

Evaluation

The Department has undertaken a comprehensive assessment of the Project in accordance with the relevant requirements of the EP&A Act, with a particular focus on issues raised in public submissions and Government agency advice.

The Project represents a reasonable 'brownfield' extension of the existing coal mine that would enable the economic and beneficial reuse of existing infrastructure and provide for the efficient recovery of a significant coal resource, with a relatively minor 13 month extension to the approved mine life and residual amenity impacts at surrounding receivers that are either consistent with or only marginally higher than those associated with the existing approved operations.

If approved, the Project would facilitate ongoing mining operations to 2030, preventing the potential early closure of the existing mining operations, provide ongoing employment for operational employees and would help to improve the existing final landform outcomes of the Mangoola Mine.

Overall, the Project would deliver wide-ranging economic benefits for the region and the State, and is expected to generate net benefits to NSW of over $408 million NPV. The Department considers that the Project is in the public interest, and is approvable, subject to comprehensive conditions.

Contents

1 Introduction

1.1 Background

1.1.1 The Mangoola Coal Mine (the Mangoola Mine) is an operating open cut coal mine located 20 kilometres (km) west of Muswellbrook in the Upper Hunter Valley of NSW (see **Figure 1** and **Figure 2**). The mine is owned and operated by Mangoola Coal Operations Pty Limited, a subsidiary of Glencore Coal Pty Limited (Glencore).

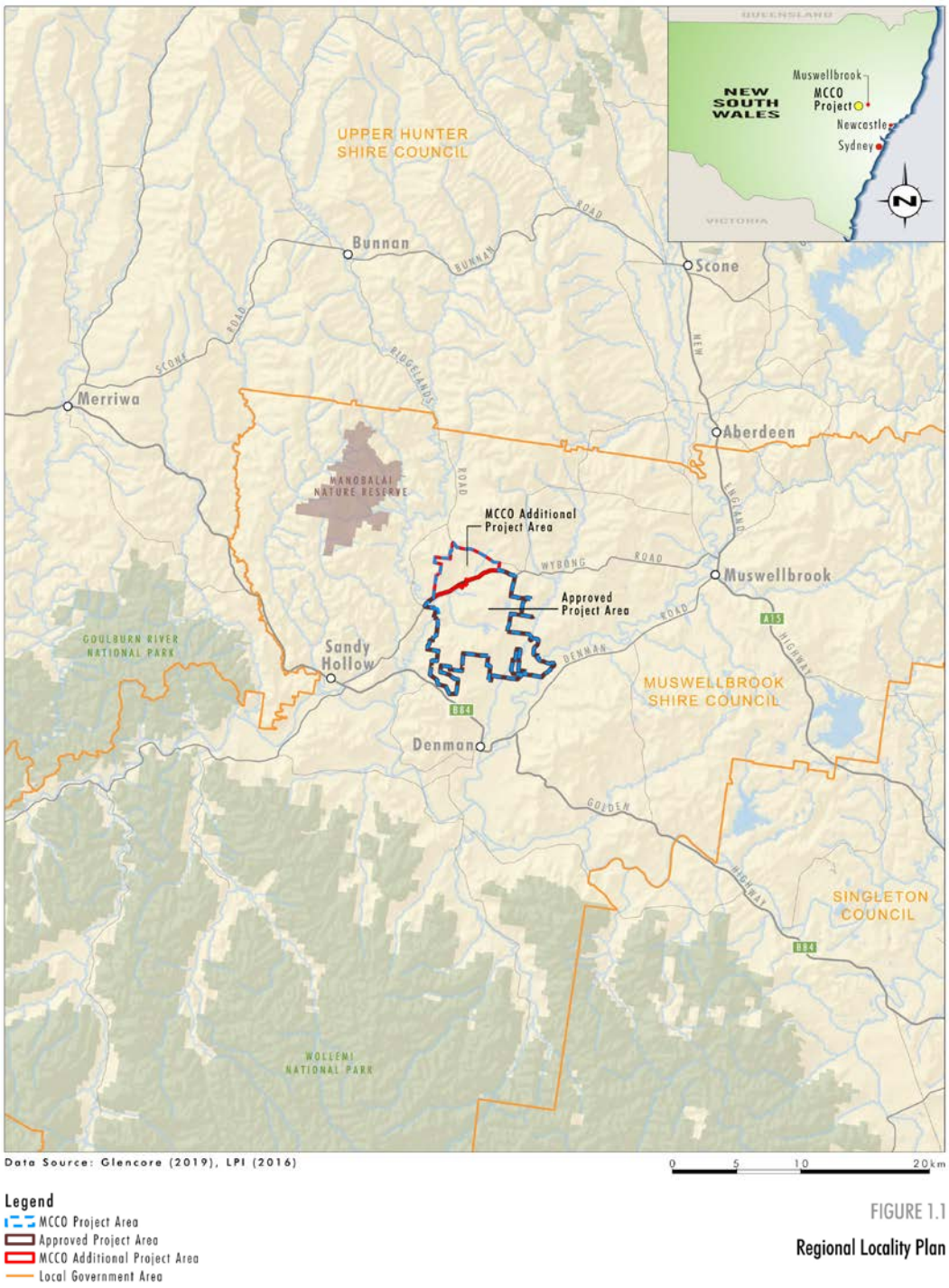

Figure 1 | Project Location

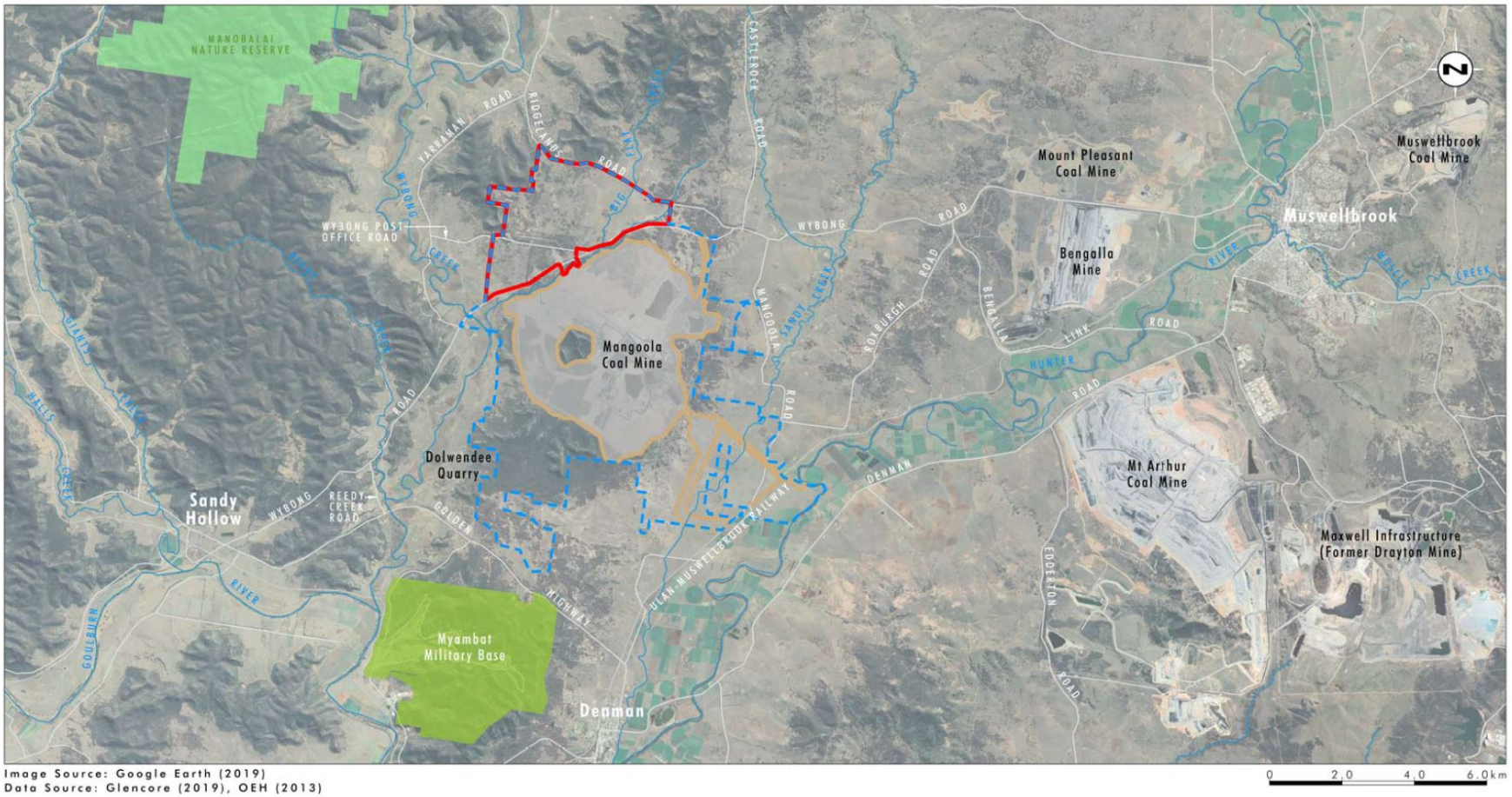

Image Source: Google Earth (2019)
Data Source: Glencore (2019), OEH (2013)

Legend
- MCCO Project Area
- Approved Mangoola Coal Mine Disturbance Area
- MCCO Additional Project Area
- The Commonwealth of Australia
- Nature Reserve

FIGURE 1.8

Significant Regional Developments

Figure 2 | Local Context Map

1.1.2 Glencore is proposing to extend the life of the existing Mangoola Mine through the establishment of a new open cut satellite pit (the Northern Pit) to the north of the existing operations (see **Figure 1**). This new mining area (hereafter the Northern Extension Area) would act as a brownfield extension to the existing open cut operations, utilise a range of existing infrastructure at the Mangoola Mine and would be connected to the existing Mangoola Mine site via a proposed haul road over Wybong Road.

1.2 Existing Operations

1.2.1 Approval for the Mangoola Mine (PA 06_0014) was granted by the then Minister for Planning on 7 June 2007 under the *Environmental Planning and Assessment Act 1979* (EP&A Act), at which time it was known as the 'Anvil Hill Coal Project'.

1.2.2 In October 2007, Glencore purchased the Anvil Hill Coal Project from Centennial Coal and renamed it the Mangoola Coal Mine. Mining operations at the Mangoola Mine started in September 2010, and Glencore has since modified PA 06_0014 on 8 occasions.

1.2.3 Under the existing approval (as modified) Glencore is authorised to:

- extract up to 13.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, 24 hours per day 7 days per week;
- extract and crush up to 50,000 tpa of gravel material for use on site during limited operational hours;
- process up to 13.5 Mtpa of ROM coal through the Mangoola Mine Coal Handling and Processing Plant (CHPP); and
- transport product coal via rail, to the Port of Newcastle for export and/or to domestic power stations, at a rate of up to 10 trains per day.

1.2.4 Mining operations at the Mangoola Mine are approved to continue until November 2029, however based on anticipated production rates, Glencore has indicated that it is likely to exhaust approved coal resources by 2025.

1.2.5 The Mangoola Mine is supported by a range of surface infrastructure facilities which include:

- administration buildings (ie offices and bathhouse facilities);
- conveyors, stockpiles and CHPP;
- workshops and warehouses and laydown areas;
- parking and wash down stations;
- tailings and water management infrastructure; and
- rail loop and loadout facilities.

1.2.6 Road access to the site occurs via a private access road off Wybong Road. As the existing approval restricts the ability of Mangoola Mine-related traffic to use Wybong Road west of the site, almost all the traffic to and from the site uses Bengalla Link Road and Denman Road to the east.

1.2.7 A large proportion of the existing workforce of 400 employees reside in the Upper Hunter (approximately 73%), comprising approximately 51 percent in the Muswellbrook LGA and approximately 22 % in the regional centres of Singleton and Scone. Access to these areas would be via Thomas Mitchell Drive (which bypasses Muswellbrook), the Golden Highway, and/or the New England Highway.

1.2.8 Key infrastructure surrounding the site includes the Muswellbrook-Ulan railway line which is used to transport coal from the site to the Port of Newcastle for export, and a 500kV transmission line owned by Transgrid.

1.3 Regional Context

1.3.1 The region surrounding the Mangoola Mine is characterised by a range of existing and historical land uses that have coexisted with mining for many decades in this region. The area comprises undulating and hilly topography, with numerous drainage lines and several dominant ridgelines which are an important aspect of the surrounding environment, as they help shield a number of residential receivers from views of the Project and help to attenuate a range of project-related amenity impacts on receivers to the north and south.

1.3.2 Land uses in the region include a long history of agriculture dating back to early European settlement of the Hunter Valley in the mid-19th century. These agricultural land uses primarily comprise a mix of cropping and grazing, but also include other activities such as viticulture to the south-west and east and small olive groves to the north-west.

1.3.3 As shown in **Figure 2**, the Mangoola Mine is also situated on the western extent of the Hunter Coalfield and is surrounded by a range of established mining and industrial land uses, particularly to the east. Coal mining operations have occurred in the area since the 1890's. Since this time, the Upper Hunter has grown into one of the largest coal and energy producing regions of NSW.

1.3.4 These industrial land uses are evidenced by the operation of several other nearby mines including the Bengalla, Mt Arthur and Mount Pleasant open cut coal mines around 8 km to the east and south-east of the Mangoola Coal Mine (see **Figure 2**). In addition to these existing operations, much of the land to the north, east and south of the current Mangoola Mine is subject to coal exploration leases or proposed future mining developments, such as the Maxwell Underground Coal Project which has recently been approved by the Independent Planning Commission.

1.3.5 Other nearby developments include the Dolwendee Quarry and Myambat Military Base, located approximately 4 km to the south-west and south, and AGL Macquarie's Liddell and Bayswater Power Stations approximately 25 km south-east of the mine.

1.3.6 As a requirement of the existing approval, Glencore has secured over 3,000 hectares (ha) of biodiversity offsets in the areas surrounding the mine. These areas are predominately located on land adjacent to Mangoola Mine and have been designed to enhance connectivity with nearby areas of Crown land, the Manobalai Nature Reserve and Wollemi National Park National Park reserve system to the northwest and southwest of the site (see **Figure 2** and **Figure 26**).

1.3.7 The closest towns to the Project include Denman and Sandy Hollow, approximately 10 km to the south and south-west respectively. While most residences in close proximity to the Mangoola Mine have previously been acquired by Glencore, several large rural properties and lifestyle blocks remain in the area including 10 on the floodplains of Wybong Creek to the west, 18 to the north of the mine and south of Wybong Creek and 11 to the northeast of the Mangoola mine and along Wybong Road. Many of these properties are already entitled to voluntary acquisition and/or mitigation rights under the existing project approval.

2 Project

2.1 Description of the Project

2.1.1 On 5 July 2019, Glencore lodged a State significant development application for the Mangoola Coal Continuation Operations Project (the Project) under divisions 4.1 and 4.7 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*.

2.1.2 The Project involves the extraction of an additional 52 Mt of ROM coal by establishing a new open cut mining area (the Northern Extension Area) to the north of Wybong Road (see **Figure 3**). Mining operations would be connected to the existing Mangoola Mine CHPP by a new private haul road overpass to be constructed over Wybong Road and Big Flat Creek.

2.1.3 Glencore is seeking to maintain the annual extraction rate of 13.5 Mtpa that applies to the existing Mangoola Mine operations and would therefore require approximately 8 years to recover this additional coal resource. Consequently, Glencore is seeking approval to undertake mining operations at the Mangoola Mine until December 2030, which equates to a 13 month extension beyond that already approved under PA 06_0014.

2.1.4 Mining operations under PA 06_0014 would continue to occur in a generally similar fashion to the existing approved plans, however in order to facilitate a smooth transition to the Northern Extension Area and provide for improved final landform outcomes, operations in the existing Mangoola Pit would continue at a slower rate over an extended period of time.

2.1.5 The Project would continue to use the same truck and excavator open cut mining methods that have been successfully implemented at the Mangoola Mine and would share the use the existing Mangoola Mine CHPP, rail loop and mining fleet. The Project would continue to employ the 400 employees currently working at the Mangoola Mine, provide for an additional 80 ongoing operational jobs (which would easily remain within the Mangoola Mine's approved limit of 540 full time equivalent (FTE) employees) and generate an additional 145 short term construction jobs.

2.1.6 To link the existing operations with the Northern Extension Area, Glencore proposes to construct a haul road overpass across Big Flat Creek and Wybong Road. This would enable haulage of ROM coal to the CHPP as well as allowing some overburden from the Northern Extension Area to be hauled to the existing Mangoola Mine site to improve topographic relief and reduce the size of the approved final void to be retained at the existing Mangoola Mine.

2.1.7 Topsoil and overburden extracted in the initial development of the Northern Pit would be used on site to create an out of pit emplacement and visual screen to the east of the Northern Pit (see **Figures 3** and **4**). Following establishment of this visual screen, around 50 million bank cubic metres (Mbcm) of overburden would be hauled to the Mangoola Mine for use in the development of improved site drainage and final landform outcomes.

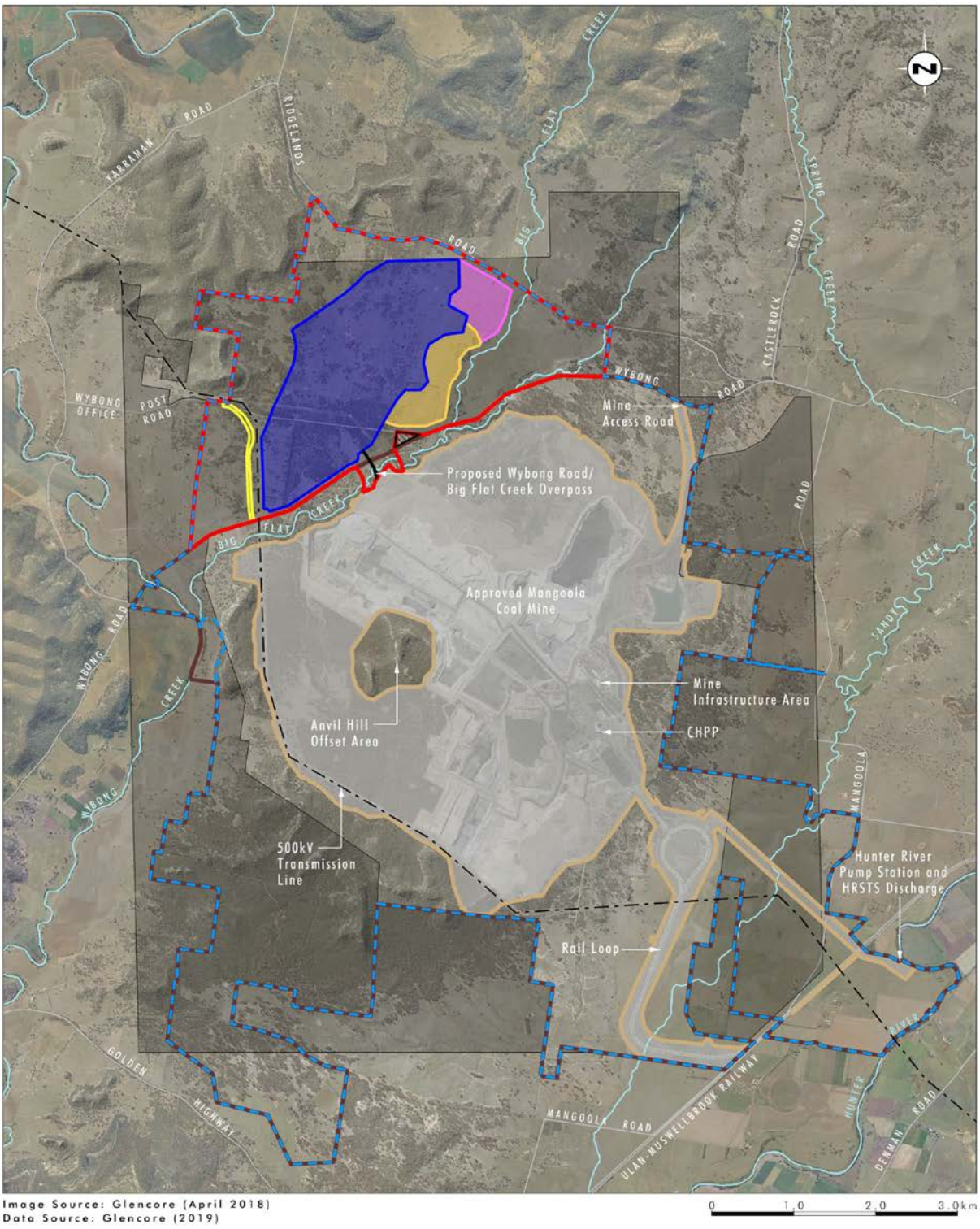

Figure 3 | Overview of the Project

2.1.8 This process would continue until the Northern Pit is sufficiently progressed to commence in pit backfilling behind the active mine front, with emplacements progressively shaped, stabilised and rehabilitated as mining progresses towards the west. A total of 50 Mbcm of overburden extracted in the Northern Pit area would be transferred to the Mangoola Mine to help shape the final landform and partially fill and shape an existing final void.

2.1.9 Should the Project be approved, Glencore has proposed to surrender the existing Mangoola Coal Mine development consent (PA 06_0014), so that the entire site is regulated under a single contemporary and consolidated development consent.

2.1.10 Key elements of the Project are summarised in **Table 1** below and described in detail in Glencore's Environmental Impact Statement (EIS) and Submissions Report (see **Appendices A** and **C**).

Table 1 | Main Components of the Project compared to the Mangoola Mine

Aspect	Approved under PA 06_014	Proposed Project
Total Recoverable Reserve	150 million tonnes of ROM coal	52 million tonnes of additional ROM coal
Extraction Rate	Maximum of 13.5 Mtpa ROM coal	No change
Disturbance Area	Approximately 2,294 hectares (ha)	Approximately 623 ha of additional disturbance
Life of Mine	21 years from approval of Mining Lease 1626 (ie until November 2029)	An approximate one year extension to the existing mine life, until December 2030 (representing 8 years of mining in the Northern Pit if mining commences in 2022)
Mining Methods	Open cut mining using truck and excavator	No change
Mine Infrastructure and Equipment	Mine infrastructure includes: - CHPP; - stockpiles; - train loading facilities - administration and amenities buildings - workshops; and pipelines and power systems.	Continued use of existing mine infrastructure Construction of a haul road overpass over Wybong Road and Big Flat Creek. Construction of additional water truck fill points Ongoing relocation of mining support infrastructure as mining progresses
Operating Hours	24 hours per day, 7 days per week	No change
Operational Employees	Up to 540 full time equivalent (FTE) employees (annual variation of employee numbers based on operations, currently 400 FTE employees)	Continued employment of existing Mangoola Mine employees, with peak employment of 480 operational employees
Construction Employees	200 construction employees	145 construction employees

Blasting	A maximum of 2 blasts per day and 6 blasts per week (when averaged over a calendar year). Blasting may occur between 9 am and 3 pm Monday to Saturday (Blasting until 5 pm approved by EPA). Blasting is not permitted on Sundays or public holidays.	No change in blast frequency or restrictions on blasting on Sundays and public holidays. Blasting proposed to occur between 9 am and 5 pm Monday to Saturday.
Rehabilitation and Final Landform	Development of a final landform incorporating appropriate natural landform design principles. Retention of a 52 ha final void. Progressive rehabilitation of the site including establishment of woodland habitat and native grassland areas.	Development of a final landform incorporating appropriate natural landform design principles. Overburden material to be distributed between the Northern Pit and Mangoola Mine. Retention of an 82 ha void in the Northern Pit and a 48 ha void at the existing Mangoola Mine. Progressive rehabilitation of the site including establishment of woodland habitat and native grassland areas.
Tailings and Rejects	Tailings emplaced in approved tailings dams. Coarse reject disposal within overburden emplacement areas.	No change in tailings or coarse reject management. Approved tailings dams have capacity to accommodate additional tailings streams.
Transport	Rail transport of product coal from Mangoola train loading facility, up to 10 trains per day.	No change
Site Access	Mine access from Wybong Road. Mine related traffic not to use Reedy Creek Road, Mangoola Road, Roxburgh Road or Castlerock Road.	No change in primary road transport arrangements. Realignment (or closure) of a section of Wybong Post Office Road **(**Wybong PO Road). Additional access via Wybong PO Road and Ridgelands Road for construction activities, environmental monitoring and property management.
Power	11 kilovolt (kV) powerlines located outside of existing mining areas, servicing mine-owned and private properties.	Relocation of sections of 11 kilovolt (kV) powerlines to remain outside the proposed Northern Extension Area.
Water Management	Mine water management system involving dams and pipelines. Approval to discharge excess water to Hunter River through	Continued use of existing water management infrastructure and HRSTS discharge point.

	Hunter River Salinity Trading Scheme (HRSTS). Water abstraction as required as authorised by water licences.	Construction of additional water management infrastructure including mine water and sediment dams, flood protection from Big Flat Creek and mine water reticulation system.
Gravel	Crushing of 50,000 tonnes (t) per year of gravel for operational requirements.	No change to existing gravel crushing rates during operations Short term increase in gravel crushing of up to 200,000 t for construction. If not sourced on-site, gravel may be imported via truck along Wybong Road and the Mangoola Site Access road.

2.1.11 **Figure 4** and **Figure 5** depict the sequence of mining in the Northern Pit and key components of the Project, including interactions with the existing Mangoola Mine.

2.2 Construction Activities

2.2.1 The Project has been designed to utilise the existing Mangoola Mine infrastructure where possible, but would still require the construction and relocation of various infrastructure to establish access and operate within the Project area.

2.2.2 Project construction is predicted to occur over a 16-month period, and would include the following activities (see **Figure 6**):

- establishment of construction access and temporary office/equipment laydown areas within the Project area;
- relocation of an 11 kV transmission line to avoid the Project area;
- construction of a haul road overpass over Big Flat Creek and Wybong Road to connect the Mangoola Mine to the Project area;
- realignment of a portion of Wybong PO Road to the west of the Project area; and
- construction of water management infrastructure, including dams and clean water diversions, and upgrades to the existing culverts beneath Wybong Road.

2.2.3 Construction activities would occur 24 hours per day, 7 days per week, with the exception of the Wybong Road realignment, culvert upgrades and haul road overpass. Construction of these elements would be restricted to 7.00 am and 6.00 pm Monday to Friday and 8.00 am to 1.00 pm on Saturdays, Sundays and public holidays.

2.2.4 A peak construction workforce of approximately 145 personnel would be required to undertake the proposed works.

2.2.5 During the construction phase, access to/from Wybong Road, Wybong PO Road and Ridgelands Road would be required for employees, along with temporary access over Big Flat Creek, linking the Project area to the Mangoola Mine.

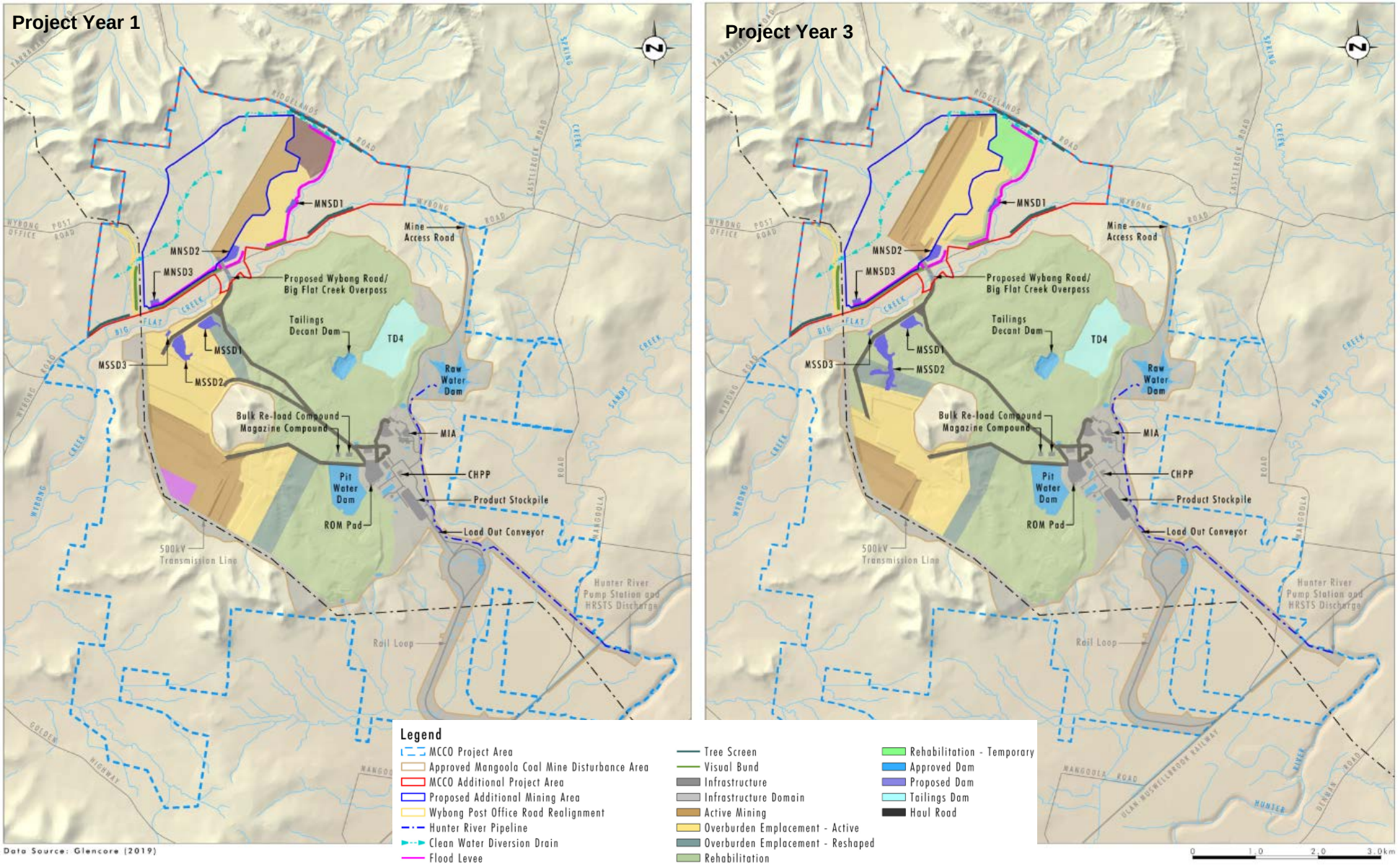

Figure 4 | Conceptual Layout of Project Years 1 and 3

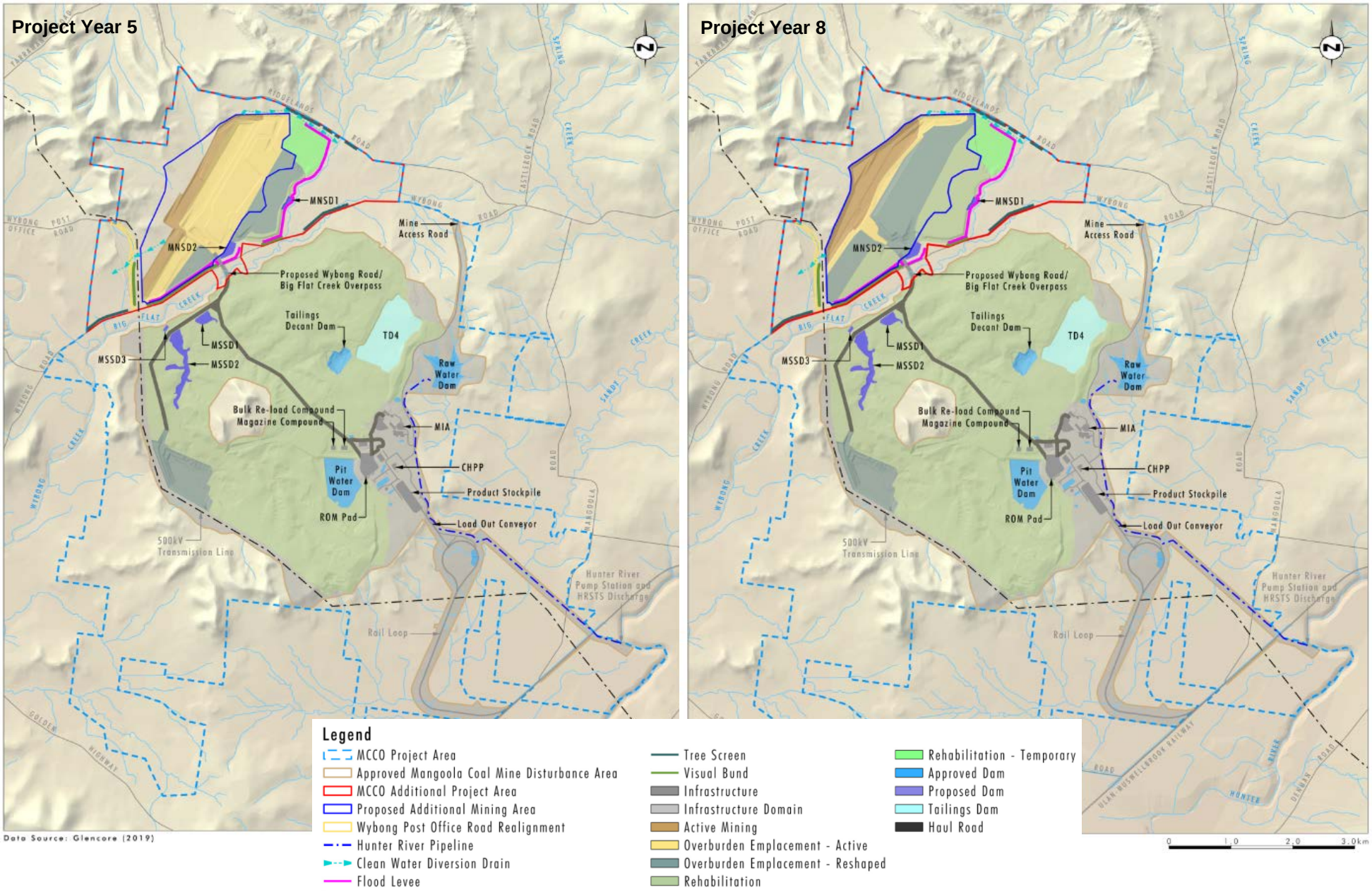

Figure 5 | Conceptual Layout of Project Years 5 and 8

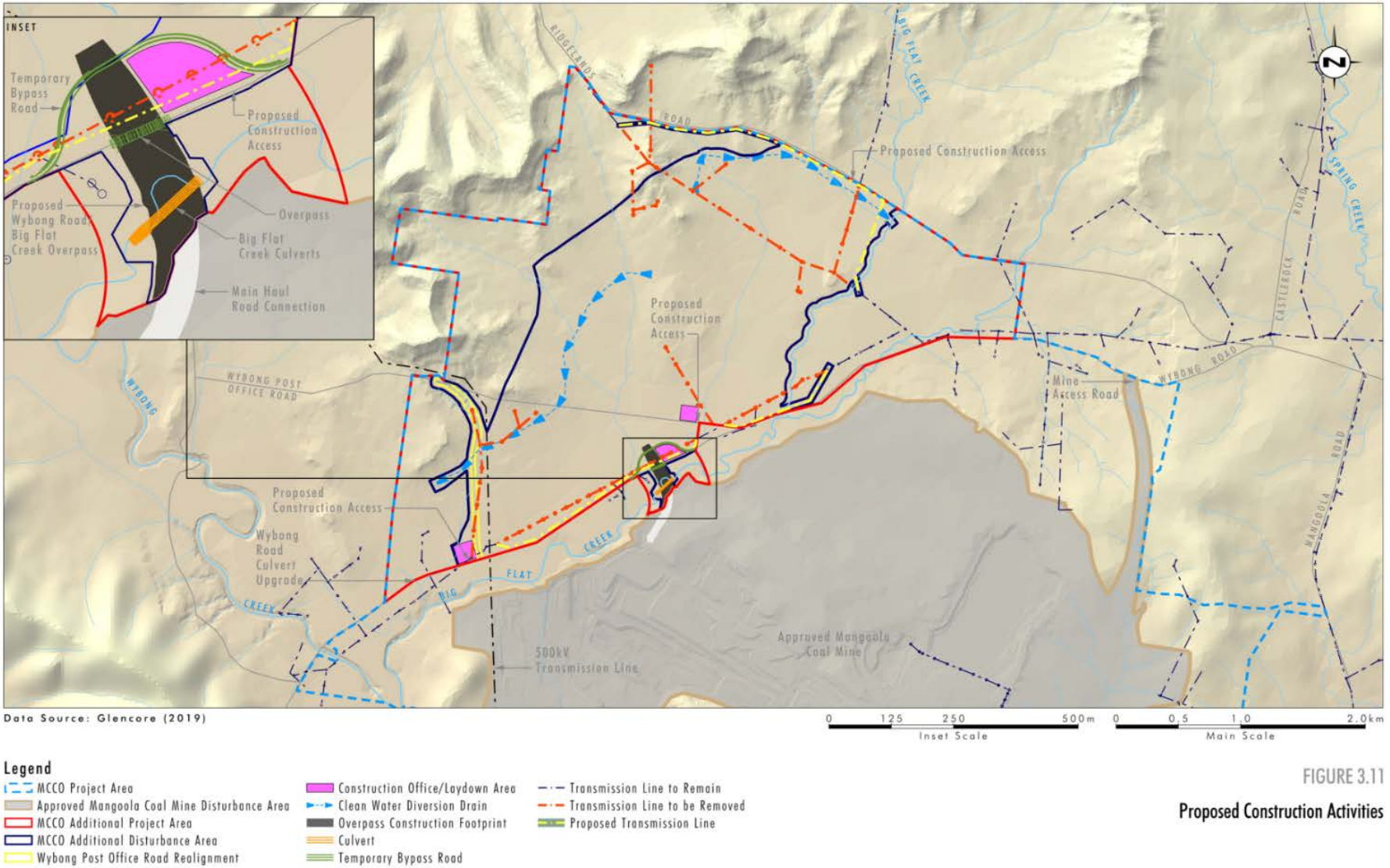

Figure 6 | Proposed Construction Activities

2.3 Surrounding land ownership and use

2.3.1 The majority of the land and residences surrounding the Mangoola Mine and Northern Extension Area are owned by Glencore. The Northern Extension Area is adjacent to Crown owned land (used for recreational purposes) on the north-western boundary.

2.3.2 The privately-owned residences closest to the Northern Extension Area can be categorised into three groups based on their position relative to the Northern Extension Area (ie North, East and West).

2.3.3 To the north of the Northern Extension Area a vegetated ridgeline dominates the landscape and provides some separation between privately-owned residences and the Northern Extension Area (see **Figure 7**). These residences represent the largest group of privately-owned properties close to the Northern Extension Area. The two closest receivers (R157 and R139) are located 1.1 and 1.3 km from the Northern Extension Area boundary.

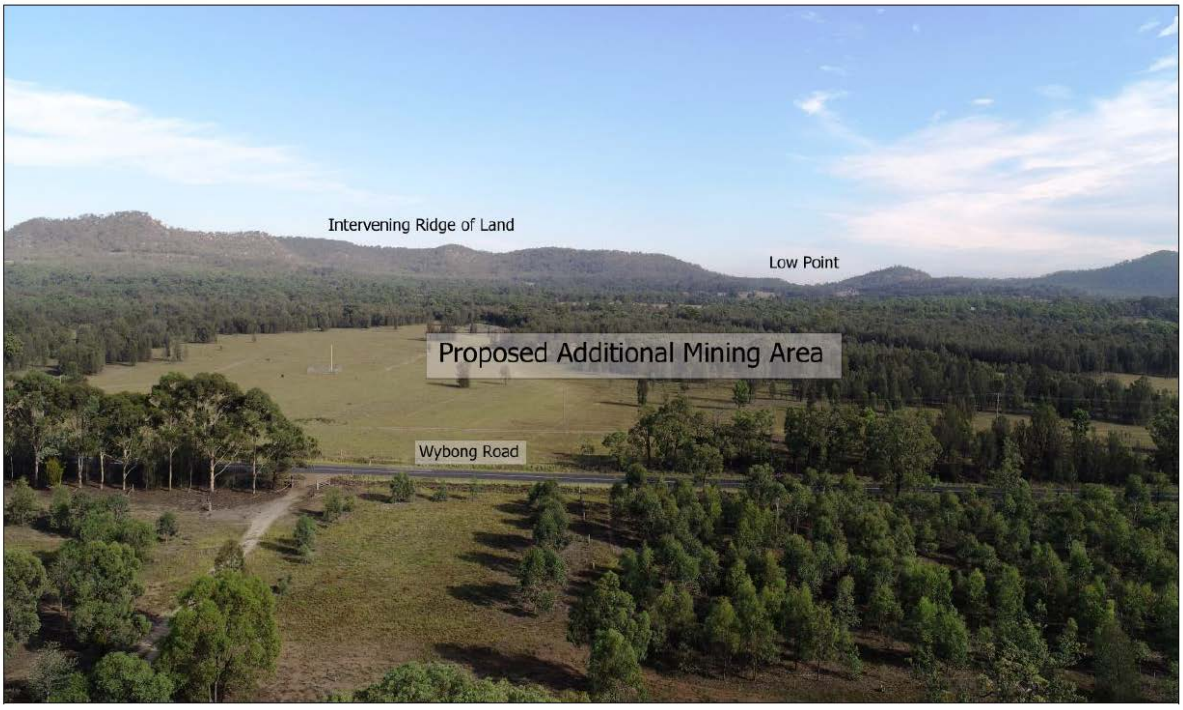

Figure 7 | View North from Wybong Road showing ridgeline

2.3.4 While the closest residences to the west are owned by Glencore, additional privately-owned residences and the Wybong Hall are situated beyond the current buffer of mine-owned properties. Two unoccupied private residences remain within the acquisition zone (R83 and R25). Glencore has notified these landholders of their acquisition rights under PA 06_0014.

2.3.5 On the eastern side of the Project, around Spring Creek, the closest residences are owned by Glencore. The remaining residences are a mix of either privately owned properties, including an Anglican Church, or are owned by another mining company (see **Figure 8**).

2.3.6 The Project area does not contain any Biophysical Strategic Agricultural Land (BSAL) or Critical Industry Cluster (CIC) lands, as defined by the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

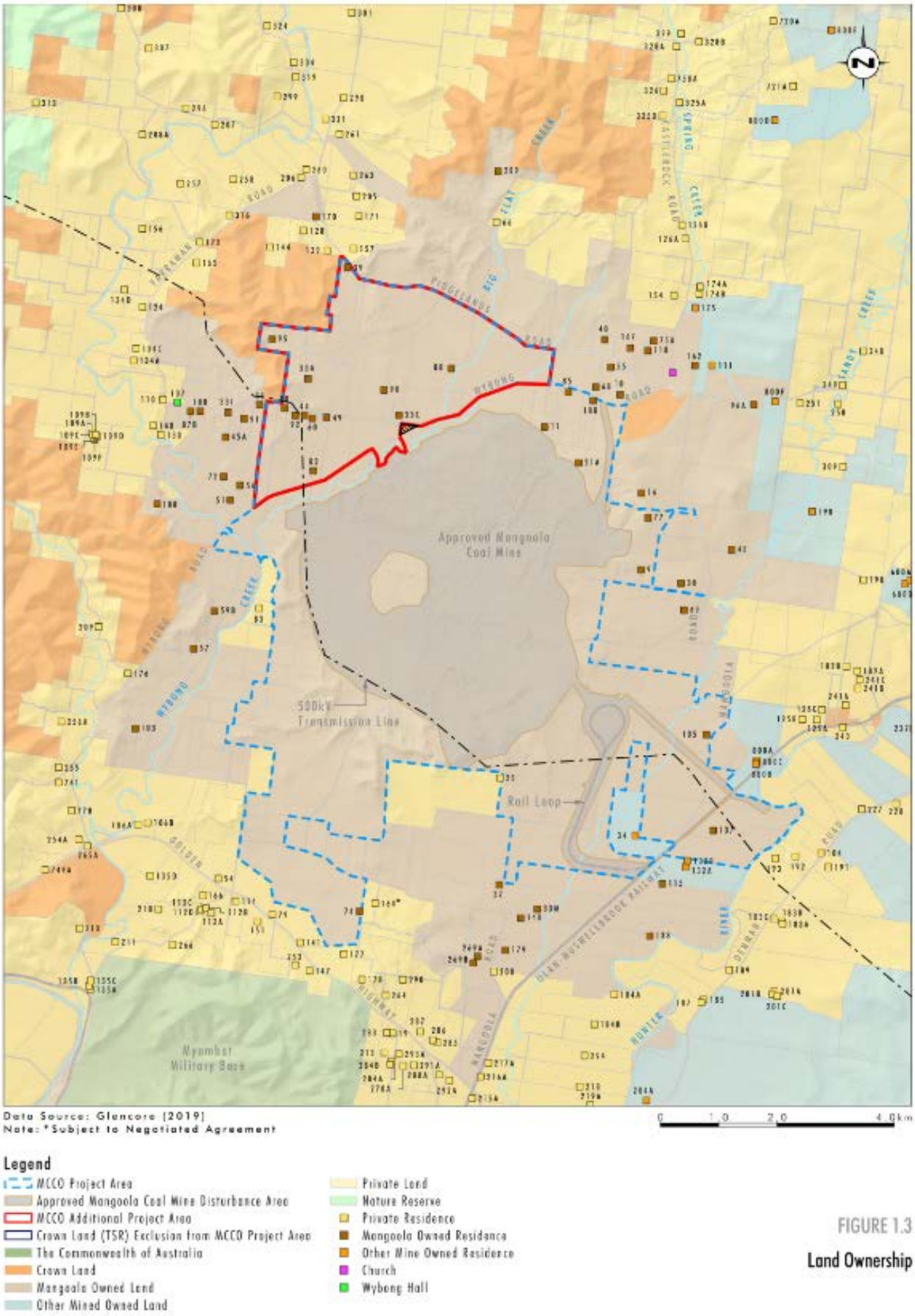

Figure 8 | Land ownership and use surrounding the Project

2.3.7 However, an area of land adjoining the northern most point of the Northern Extension Area has been identified as mapped CIC lands. Glencore has advised that while this land is not currently used as an equine operation, it was previously the site of Nightingale Thoroughbred Stud, which closed in 2012. The closest operating horse studs, Coronet Farm and Golden Grove Thoroughbred, are located around 4 km to the northwest and 6 km to the southwest of the Project.

2.3.8 Some areas of indicative viticulture CIC mapped land also occur along parts of Wybong and Sandy Creeks, however much of this land has not been historically used for viticultural purposes. Wybong Estate Winery is the closest viticulture establishment to the site and is located approximately 3 km to the northwest of the Northern Extension Area, behind a dominate ridgeline. The former Yarraman Vineyard, approximately 3 km to the west of the Northern Extension Area is not operating as a vineyard and is subject to a proposal for redevelopment as a feedlot.

2.4 Alternatives Considered

2.4.1 In developing the Project, Glencore considered a variety of alternative mining options, layouts, overburden emplacement and infrastructure arrangements to optimise the economic recovery of coal resources while using the existing mining fleet.

2.4.2 The EIS includes a Mine Plan Options Report which describes the iterative process adopted by Glencore in developing the preferred mine plan option and final landform design (see Appendix A – Environmental Impact Statement).

2.4.3 Options considered during the development of the mine plan include a larger mining footprint extending the Project area to the west and east, an additional out-of-pit emplacement to the east and associated infrastructure realignments including roads and a section of the 500 kV transmission line easement (see **Figure 9**).

2.4.4 Factors considered by Glencore during the mine options and final landform evaluation process included:

- maximising the efficient recovery of the coal resource and access to the best coal seams;
- mining methods (open cut vs underground);
- beneficial reuse of existing facilities, plant and equipment;
- consistency with approved rehabilitation and final landform features (final void, Anvil Hill Creek restoration, relief/topography and revegetation);
- size and number of voids retained in the final landform;
- overburden handling efficiency (transport distances and rehandling);
- duration of the project;
- amenity impacts on private residences;
- impacts on biodiversity, water resources and cultural heritage;
- potential infrastructure relocations (500 kV and 11 kV electricity transmission lines, Wybong PO Road, Ridgelands Road, telecommunications); and
- the cost of the options considered and effects on the economics of the Project.

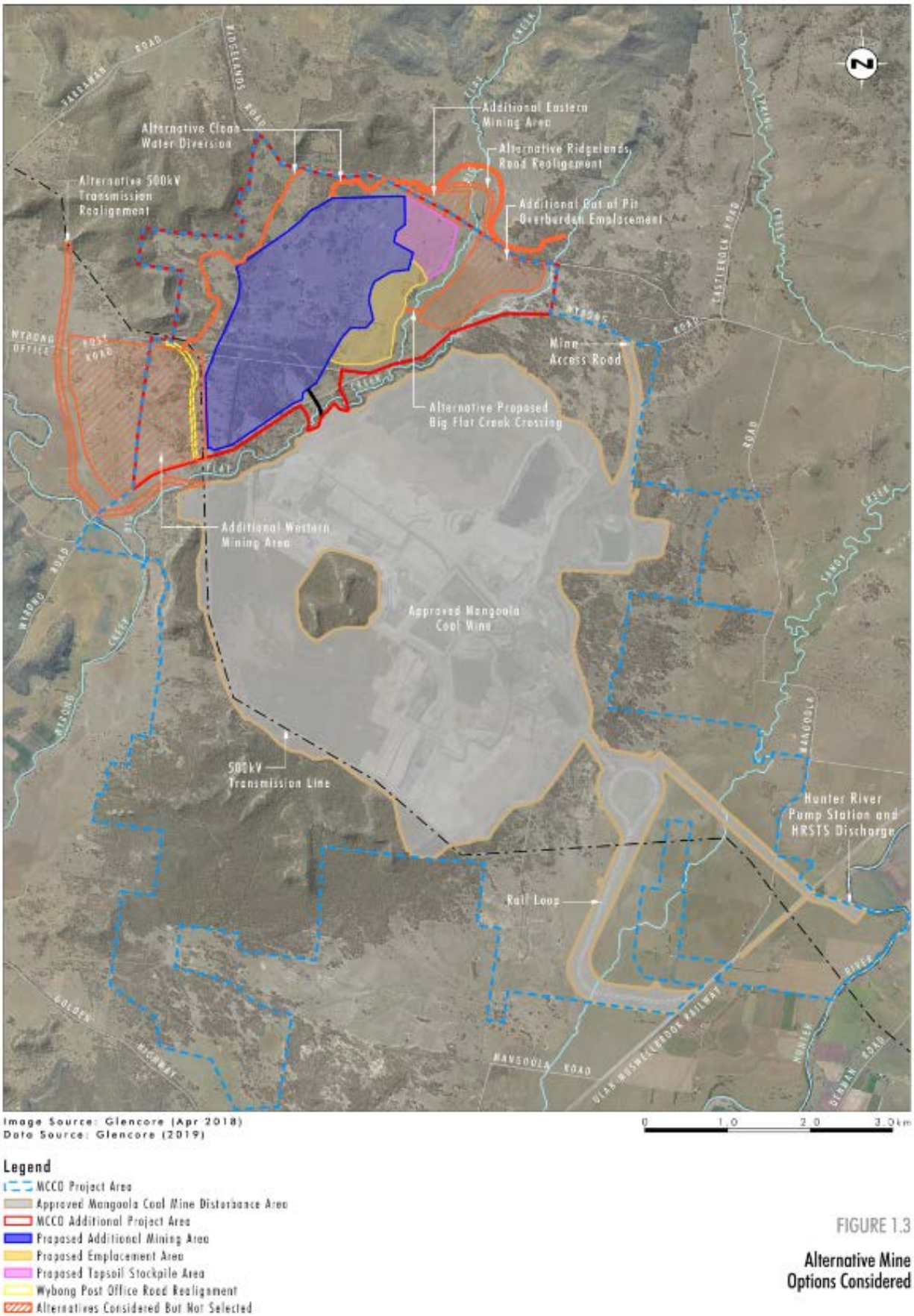

Figure 9 | Alternative mine options

2.4.5 In response to Council's input into the Secretary's Environmental Assessment Requirements (SEARs), Glencore considered designing the mine plan to avoid relocating Wybong PO Road. However, this option was discounted based on the additional cost of infrastructure crossings and fragmenting the open cut which reduced access to the coal resource.

2.4.6 Additionally, an out of pit emplacement to the east of Big Flat Creek which was included in the preliminary mine plan, was removed in the proposed Project. Glencore notes this decision was made following concerns raised by Council during the SEARs process about the amenity impacts to private residences on Castlerock Road.

2.4.7 The preferred option was selected based on a balance between maximising resource recovery and a reduced area of impact, avoiding the relocation of the 500 kV transmission line and Ridgelands Road and the additional out-of-pit overburden emplacement.

2.4.8 Glencore further refined the preferred option, analysing alternative road and creek realignments, overpass alternatives and clean water diversions. The preferred option reduces the disturbance footprint, impacts on threatened species and cultural heritage sites and amenity impacts on receivers along Castlerock Road.

2.4.9 Key findings of the Mine Plan Options Report include:

- the option of backfilling both voids was found to be uneconomic and would result in the Project not proceeding;
- the option of backfilling one void (in the existing approved mining area) was achievable, however it would have resulted in a poorer landform outcome with a much larger void and visually poorer outcome in the Project area and is therefore not proposed; and
- the proposed conceptual final landform, including the potential re-handling of 5 Mbcm of material in the Project area at the end of mining to improve the overall shape and reduce the total void area, is more costly to achieve than other landform options that were viable, however it is considered to achieve an appropriate balanced outcome.

2.4.10 The final design, as presented in the EIS, was selected due to:

- financial viability and resource recovery efficiency;
- efficient use of existing infrastructure and equipment;
- minimising noise and dust emissions at private receivers;
- minimising biodiversity impacts on threatened orchid species;
- avoiding the need to realign additional key infrastructure (i.e. Ridgelands Road and a 500 kilo volt (kV) transmission line); and
- decreased overburden volumes and final void size.

2.4.11 The Department's further consideration of the final landform is discussed in **Section 6.6**.

Infrastructure relocation

2.4.12 Glencore proposes to relocate or construct a range of infrastructure associated with the Project and Mangoola Mine. This includes :

- realignment of the local Wybong PO Road;
- construction of an overpass over Wybong Road and Big Flat Creek;
- realignment of an 11 kV Ausgrid electricity transmission line along Wybong Road;
- relocation of linear telecommunications infrastructure; and

- movement of existing Mangoola Mine water management infrastructure, including water storage and distribution, diversion and sediment control structures.

2.4.13 With the exception of the Wybong PO Road relocation and works associated with the Wybong Road overpass, all changes to the mining infrastructure would be carried out within existing approved disturbance areas of the Mangoola Mine and confined to the proposed Northern Extension Area.

2.4.14 These changes are necessary to enable the economic recovery of an additional coal resource adjacent to an approved mining operation. Overall, the Department is satisfied that impacts to these existing infrastructure assets have been reasonably and feasibly minimised where practical and that the residual impacts on infrastructure assets are appropriate and necessary for the Project to proceed.

Wybong Post Office Road

2.4.15 As identified above, Glencore is seeking approval to realign a section of Wybong PO Road, a local road under the control of Muswellbrook Shire Council. Accordingly, Glencore must obtain approval from Council as the relevant Roads Authority under section 138 of the *Roads Act 1993* to undertake works within the road reserve.

2.4.16 In May 2020, Council resolved to adopt a revision to its former 2015 *Mine Affected Road Network Plan* (MARNP), which outlines Council's position on the consideration of mine-related traffic on the Council's local road network. Council's 2020 MARNP expressly considers the potential for Glencore to realign Wybong PO Road and also provides for an alternative network solution to manage traffic flows in this area that involves the upgrade of a section of Yarraman Road between Wybong Road and Wybong PO Road.

2.4.17 Council's preferred option as expressed in the MARNP is to close the same section of Wybong PO Road that is currently proposed to be closed by the Project and to invest in the upgrade of Yarraman Road.

2.4.18 In response to this position, Glencore has offered to either pay the full cost of realigning Wybong PO Road as proposed in the EIS or provide a funding contribution to Council, equivalent to what would otherwise have been spent on the Wybong PO Road realignment, that Council can contribute towards the closure of the identified section of Wybong PO Road and upgrade Yarraman Road, if Council determines this to be the optimal outcome for the local road network under the MARNP (see **Figure 10**).

2.4.19 The Department considers either option would deliver appropriate road network outcomes as both options maintain access to residences that would otherwise be affected by the closure of Wybong PO Road. The Department notes that all properties whose access is directly affected by the closure of Wybong PO Road are mine-owned. Further consideration of the proposed Wybong PO Road realignment is provided in **Section 6.5**.

2.4.20 Given Council is the relevant roads authority, the Department recommends that the preferred road closure and upgrade option be determined through a road upgrade strategy to be agreed between Council and Glencore. Should the option recommended in the MARNP be adopted by Council then Glencore should be required to make a contribution towards the upgrade of Yarraman Road equivalent to the predicted cost of the Wybong PO Road realignment as proposed in the EIS.

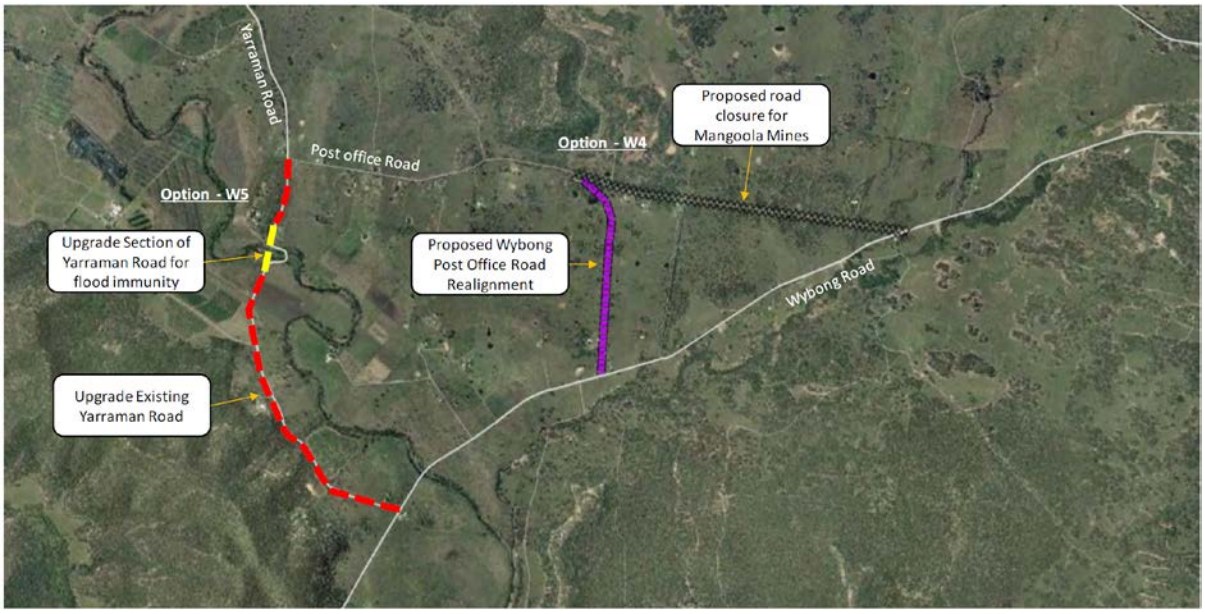

Figure 10 | MARNP options – Wybong PO Road and Yarraman Road

2.5 Justification for the Project

2.5.1 Glencore states that the Project would provide for the employment of up to 480 operational employees and the generation of 145 short term construction jobs. This would result in continued positive socio-economic benefits from ongoing employment and indirect flow-on effects to the local area, region and State.

2.5.2 Glencore has argued that the Project has been designed to provide continuity of coal production by optimising resource recovery and integrating mining operations in an environmentally and socially responsible manner. The existing environmental management and mitigation strategies would continue to be implemented for the Project.

2.5.3 The Project would use the approved mining infrastructure where possible, including the approved capacity within the Mangoola CHPP and train loading facilities, avoiding the need for new infrastructure.

2.5.4 Glencore states that the Project fits within its self-imposed corporate cap on coal production (i.e. to limit coal production to 150 Mtpa across Glencore's global operations) and is focused on replacing and sustaining existing levels of coal production.

2.5.5 Overall, Glencore considers the Project would have positive socio-economic benefits for the local region. However, if the project is refused, Glencore has indicated that based on anticipated production rates it is likely to exhaust approved coal resources by 2025.

2.5.6 While the Mangoola Mine is approved to continue operations until November 2029, Glencore has indicated that without access to the additional 52 Mt of coal resources without the Northern Pit, it would be forced to close the Mangoola Mine early and rehabilitation the site. This outcome would result in the continuation of approved amenity impacts at surrounding residents for the remaining life of the existing operations, but would fail to realise the potential for $408 million in net present value (NPV) economic benefits to NSW.

3 Strategic context

3.1 Strategic Statement on Coal Exploration and Mining in NSW

3.1.1 Society remains primarily reliant on coal to meet its basic energy needs, both at the domestic and international level, with coal delivering energy security and providing approximately 80 % of NSW's electricity needs, 56 % of Australia's electricity needs and 38 % of the world's electricity needs.

3.1.2 Steps are being taken across the world to increase renewable energy generation and reduce society's reliance on fossil fuels for electricity generation to meet commitments under the Paris Agreement. However, this will take some decades to complete, and coal currently remains a critical energy source globally, supplying over a third of all electricity.

3.1.3 In the short to medium term, coal mining for export will continue to have an important role to play in NSW.

3.1.4 On 24 June 2020, the NSW Government released its *Strategic Statement on Coal Exploration and Mining in NSW* (the Statement) which sets out its approach to transition to a low carbon future (consistent with Australia's commitments under the Paris Agreement), and how to manage the impact on coal-reliant communities.

3.1.5 Despite short term reductions in demand caused by the economic impacts of COVID19, medium term projections indicate that demand for thermal coal is likely to remain relatively stable. Additionally, some developing countries in South East Asia and elsewhere are likely to increase their demand for thermal coal as they seek to provide access to electricity for their citizens. Under some scenarios, this could see the global demand for thermal coal sustained for the next two decades or more.

3.1.6 Reducing demand for thermal coal in line with the Paris Agreement by progressively replacing coal-fired electricity with cleaner energy sources, as has been seen in Europe, will be more effective in reducing global emissions than reducing NSW coal supplies. The transition to new energy sources is a long-term economic change that will continue to reshape our regional communities that currently rely on the export coal industry. These communities are resilient and can adapt but need time and support to diversify their economies and develop new sources of employment.

3.1.7 The Statement seeks to reduce the impacts of mining on regional communities, by:

- supporting the improved management of impacts on air quality and water resources;
- facilitating the beneficial re-use of land following the conclusion of mining;
- reducing fugitive greenhouse gas emissions; and
- ensuring that affected communities receive an appropriate share of the benefits of mining.

3.1.8 The Statement also recognises the benefits of brownfield mining proposals, adjacent to existing mining operations, as a means of delivering economic returns to the State while reducing environmental impacts.

3.2 NSW Coal Industry

3.2.1 The Department recognises that the NSW coal industry has been affected by fluctuations in export coal prices in recent years and particularly in the wake of the Covid19 pandemic. However, export coal prices have begun to recover in recent months, demonstrating importance of long-run price forecasts and reflecting the continuance of ongoing global demand for NSW coal products, which will remain a significant State resource and important export commodity over the near to medium term.

3.2.2 The NSW coal industry currently generates around 80% of the value of the State's mineral production and represents about around 45 percent of the state's merchandised goods exports, making coal by far NSW's biggest mineral and export commodity. NSW coal production has grown steadily over the past decade, primarily to meet demand from Asian markets.

3.2.3 Some 85 per cent of the coal mined in the state is exported, mainly to Japan, China, South Korea and Taiwan, where it is mostly used to generate electricity. Although NSW is an important coal producer, our exports of coal represent around 3 per cent of total global coal consumption.

3.2.4 In 2019/20, NSW produced around 200 million tonnes of saleable coal, which generated around $1.5 billion in royalties, which are used to fund public services and infrastructure. While these royalties were somewhat lower those generated in 2018/19, they remain well above the average annual coal royalties generated over the past decade and demonstrate that coal mining continues to play an important role in the NSW export commodity mix.

3.2.5 Port and rail capacity throughout the State is continuing to be developed, with refurbishments at the Port Kembla Coal Terminal and future expansions of the Newcastle coal terminals which aim to facilitate around 230 Mt of coal exports from Newcastle each year. NSW coal production and exports are expected to rise in line with this capacity in the short to medium term, subject to market demand and fluctuations.

3.2.6 At present, the Hunter Coalfield is the most significant coalfield in NSW, producing around 54% of the State's coal. It comprises 16 large mining complexes, including the Project site connected via a rail network to Newcastle.

3.2.7 The NSW coal industry employs just over 22,700 people, with the Hunter Coalfield accounting for approximately half of the coal mining jobs in NSW. The Project represents a secure employment opportunity for the continuation of mining jobs in the Hunter Coalfield with up to 400 ongoing and 80 new operational positions, 145 construction jobs and would contribute additional export income to NSW.

3.2.8 Glencore is one of the world's largest natural resource companies, which owns and operates in three broad sectors: Metals and Minerals, Energy Products and Glencore Agriculture Australia. Glencore has been operating in Australia for 20 years and is Australia's largest coal producer, with 17 mining operations across New South Wales and Queensland. Product coal from Glencore's NSW operations is exported from the Port of Newcastle and Port Kembla.

3.2.9 Glencore has recently announced that it will limit coal production to 150 Mtpa across its global operations in order to limit its total GHG emissions. The Project fits within Glencore's coal production cap commitment as it is focused on sustaining current coal production.

3.3 Hunter Strategic Plans and Policies

Upper Hunter Strategic Regional Land Use Plan

3.3.1 The *Upper Hunter Strategic Regional Land Use Plan* (SRLUP, September 2012) provides a framework for balancing strong economic growth in the coal industry with the protection of high value agricultural land in the Upper Hunter region. The plan identifies key regional planning challenges as:

- improving the balance between agricultural land uses and resource development proposals, focusing on achieving co-existence between mining, coal seam gas and agriculture;
- maintaining or enhancing opportunities for environmentally responsible mining and coal seam gas development to deliver reliable energy supplies to the State that reduce energy costs and carbon emissions and that generate economic wealth for the State;
- maintaining or enhancing future opportunities for sustainable agriculture; and
- defining and protecting strategic agricultural land.

3.3.2 One of the first steps in achieving these outcomes was the identification and mapping of three categories of strategic agricultural land in the region. These categories include Biophysical Strategic Agricultural Land (BSAL), which is essentially the best farming land in the region, and the Equine and Viticulture Critical Industry Clusters (CICs), which represent unique concentrations of productive agricultural enterprises associated with two iconic agricultural industries in the Upper Hunter region.

3.3.3 To ensure that potential impacts on these strategic agricultural lands are appropriately considered, any mining or coal seam gas proposals located on strategic agricultural land outside an existing mining lease must be either issued with a site verification certificate or be referred to the independent Mining and Petroleum Gateway Panel. This Gateway Process allows for the early identification of potential impacts on agricultural land and water resources and the determination of any additional information or assessment requirements necessary to inform the merit assessment of the proposed development.

3.3.4 While the Northern Extension Area is not located on mapped BSAL or CIC land, it would require the issue of a new mining lease. Consequently, Glencore undertook soil testing to validate the presence or absence of BSAL in the Extension Area. Glencore was issued a Site Verification Certificate (SVC) on 10 December 2018 in accordance with the SRLUP, which confirms that the proposal will not affect BSAL.

Hunter Regional Plan 2036

3.3.5 The Department's *Hunter Regional Plan 2036* sets out the Government's strategic vision for the Hunter Region based on four key goals, which are to establish a leading regional economy in Australia, a biodiversity-rich natural environment, thriving communities and

greater housing choice and jobs. These goals are to be achieved by delivering on a range of directions and actions set out in the Plan.

3.3.6 In broad terms, the Plan's directions and actions aim to support new and established industries in the Hunter Valley and leverage their proximity to Asian markets. The directions recognise the strategic importance of the established coal mining industry and its infrastructure links to the export market via the Port of Newcastle, as well as recognising the important role that industries including renewable energy, agriculture, viticulture and equine operations play in delivering a diversified regional economy.

3.3.7 Importantly, the Plan emphasises the need to manage these different land uses in pursuit of complementary outcomes and attainment of the overriding goals of the Plan. The Department considers that this has been achieved in its assessment of the application, which balances the environmental, social and economic costs and benefits of the Project.

Upper Hunter Strategic Assessment

3.3.8 The Upper Hunter Strategic Assessment (UHSA) is a joint initiative of the NSW and Commonwealth Governments to improve the assessment of new or expanded coal mines which have the potential to impact on biodiversity values in the Upper Hunter Valley. The UHSA involves upfront identification of biodiversity values present within identified areas, the biodiversity impacts associated with potential mining activities within these areas and the development of a co-ordinated offsetting strategy that would be secured through the establishment of an Upper Hunter Offsets Fund (UHOF).

3.3.9 The UHOF is proposed to use funds paid by individual mining companies to identify, acquire and secure offset lands that meet each company's respective biodiversity offset obligations, while delivering a more coordinated and strategic approach to biodiversity management and conservation across the Hunter Valley. This coordinated approach aims to support the cumulative assessment of biodiversity values in the Upper Hunter and deliver improved outcomes by establishing strategic corridors, which may not have been possible through the alternate provision of individual offsets by each mining company.

3.3.10 The Project area lies within the targeted UHSA survey area and has been previously surveyed for the Mangoola UHSA. The information from the approved Mangoola UHSA assessment has been used by Glencore in its assessment of biodiversity impacts for the Project. This approach has been supported by BCS.

4 Statutory context

4.1 Background

4.1.1 In line with the requirements of section 4.15 of the EP&A Act, the Department's assessment of the Project has given detailed consideration to a number of statutory requirements, including the:

- objects found in section 1.3 of the EP&A Act; and
- the matters listed under section 4.15(1) of the EP&A Act, including applicable environmental planning instruments and regulations.

4.1.2 The Department has considered all of these matters in its preliminary assessment of the Project and has provided a summary of this consideration below. Further consideration of the objects and other relevant provisions of the EP&A Act and environmental planning instruments is found in **Appendix F**.

4.2 State Significant Development

4.2.1 The proposed development involves coal mining and is declared to be State significant development under section 4.36 of the EP&A Act as it triggers the criteria in clause 5 of Schedule 1 to *State Environmental Planning Policy (SEPP) (State and Regional Development) 2011*.

4.2.2 The EIS was prepared in accordance with SEARs issued in August 2017 and supplementary SEARs issued in February 2019.

4.3 Permissibility

4.3.1 The Project disturbance area is located in the Muswellbrook local government area and is predominantly zoned RU1 (Primary Production) under the *Muswellbrook Local Environmental Plan 2009* (Muswellbrook LEP), with the remaining 12 % of the Northern Extension Area being zoned E3 (Environmental Management) (see **Figure 11**).

4.3.2 Under the Muswellbrook LEP open-cut mining is permissible with consent in the RU1 zone. However, the open cut mining is not a permissible land use for land zoned E3 Environmental Management. Notwithstanding, clause 7(1)(b)(i) of the *State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007* (Mining SEPP) permits mining to occur with development consent on land where agriculture is also permitted.

4.3.3 As the Muswellbrook LEP permits extensive agriculture within E3 zoned land, mining within the Northern Extension Area is permissible with development consent. Accordingly, all components of the Project are permissible with development consent.

4.3.4 In addition to being permissible, the Department has also considered the compatibility of the proposal with the subject lands. In particular, it is noted that the areas of E3 zoned land that would be disturbed by the Project have been largely subject to historical land clearance for grazing purposes and contain similar geography and remnant vegetation to that of the surrounding R1 zoned land.

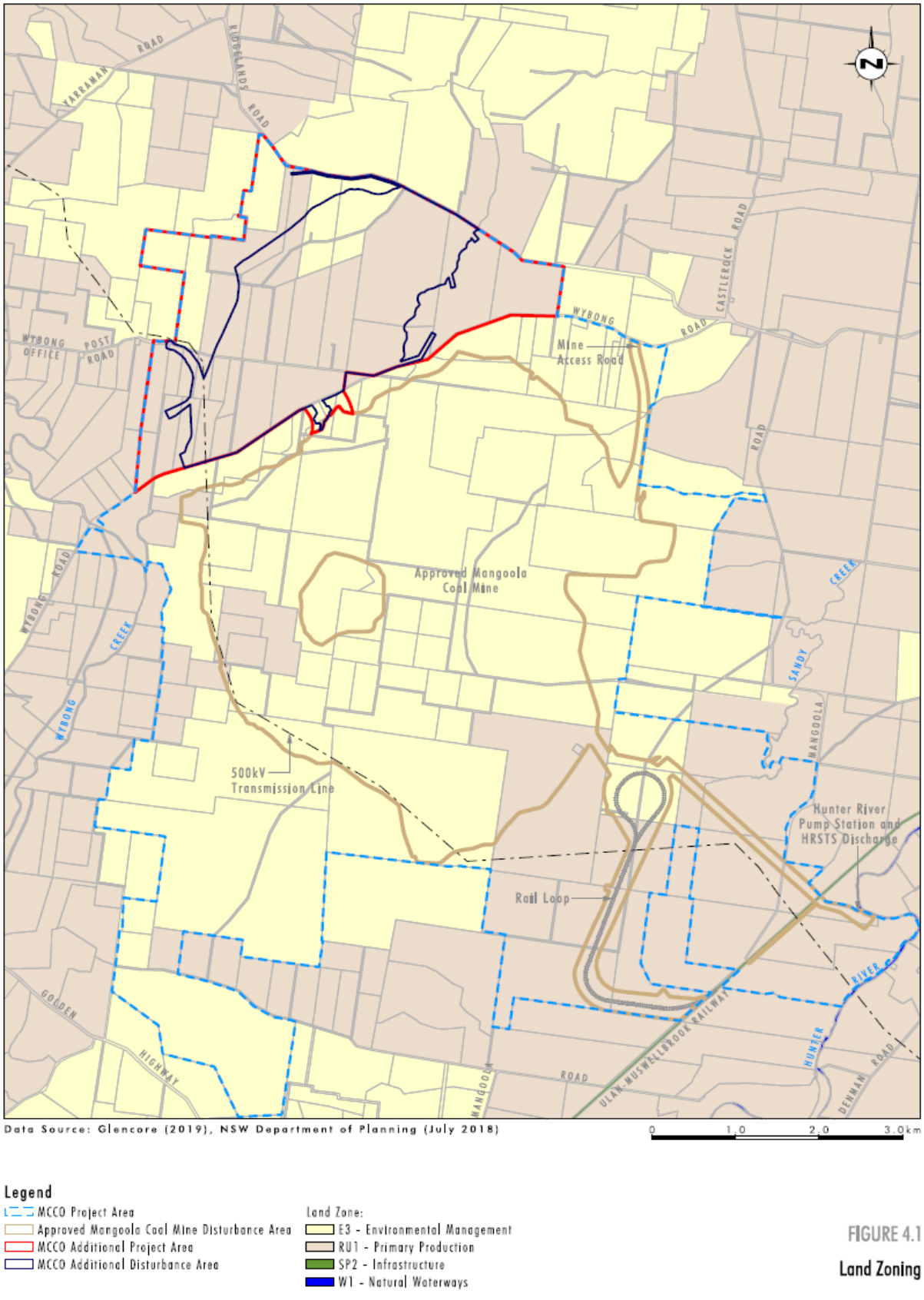

Figure 11| Land Zoning – Existing Mangoola Mine and Northern Extension Area

4.3.5 Furthermore, the proposed final landform has been designed to replicate the existing topography and will be rehabilitated with native woodland communities that would enhance the biodiversity values of this land in the long term. Accordingly, the Department considers that over the long term, the Project would not be inconsistent with the objective of managing adverse impacts to the environmental and scenic quality of the existing landscape.

4.4 Site Verification Certificate

4.4.1 Glencore holds existing mining tenements over the approved disturbance areas at Mangoola Mine, but would require a new mining lease to be granted in order to undertake proposed open cut mining activities in the Northern Extension Area.

4.4.2 In accordance with clause 50A of the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation), Glencore is therefore required to obtain either a gateway certificate or a site verification certificate that certifies that the land on which the proposed development is to be carried out is not biophysical strategic agricultural land (BSAL).

4.4.3 On 10 December 2018, Glencore obtained an SVC verifying that the subject land is not BSAL.

4.5 Integrated & Other Approvals

4.5.1 Under section 4.41 of the EP&A Act, a number of approvals are not required to be separately obtained for the Project. These include:

- various heritage approvals required under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*;
- an authorisation under the recently repealed *Native Vegetation Act 2003* for the clearing of native vegetation; and
- certain water approvals under the *Water Management Act 2000*.

4.5.2 The Department has considered the matters covered by this legislation in consultation with the relevant agencies and considers that conditions could be developed and imposed to mitigate and/or offset the potential impacts of the Project on these matters.

4.5.3 Under section 4.42 of the EP&A Act, a number of further approvals are required, but must be granted substantially consistent with any development consent granted for the Project. These include:

- a new mining lease under the *Mining Act 1992*;
- variations to the site's existing Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act); and
- consent for road works under section 138 of the *Roads Act 1993*.

4.5.4 The Department has consulted with the authorities responsible for granting these approvals during the assessment process (see **Section 5**).

4.6 Commonwealth Approval

4.6.1 On 21 January 2019, a delegate of the Commonwealth Minister for the Environment determined that the Project is a 'controlled action' under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (see Appendix 24 of the EIS), on the basis that the Project is likely to have a significant impact on the following Matters of National Environmental Significance (MNES):

- listed threatened species and communities (sections 18 & 18A of the EPBC Act),
- a water resource in relation to coal seam gas development and large coal mining development (under sections 24D & 24E).

4.6.2 The Commonwealth Government has previously accredited the State's environmental assessment processes under the EP&A Act, via a Bilateral Agreement between the Commonwealth and NSW Governments. As part of its controlled action determination, the Department of Agriculture, Water and Environment (DAWE) advised that the assessment of the Project would be undertaken by the NSW Government in accordance with the Bilateral Agreement. However, the Commonwealth's decision-maker maintains a separate approval role, which will be exercised following the Independent Planning Commission of NSW's (the Commission) determination of the development application.

4.6.3 Following clarification of DAWE's assessment requirements, on 15 February 2019 the Department issued revised environmental assessment requirements for the Project, including an attachment covering the Commonwealth's matters.

4.6.4 The Department has assessed the potential impact of the Project on the relevant MNES in accordance with the requirements of the bilateral agreement. This assessment is provided in **Sections 6.7** and **6.8** and **Appendix E** of this report and includes sufficient detail for the Commonwealth decision-maker to fully consider these impacts when determining whether to approve the controlled action.

4.6.5 The Project was jointly referred by the Department and DAWE to the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC) for advice on surface and groundwater impacts, as well as potential impacts on downstream watercourses and receiving environments. The IESC's advice of 23 August 2019 is summarised in **Section 5**, has been considered in **Section 6** and informed the conclusions in **Section 7**.

4.6.6 Following the NSW determination of the development application, the matter will be referred to DAWE for Commonwealth determination in accordance with the relevant provisions of the EPBC Act.

4.7 Surrender of Development Consent

4.7.1 Section 4.63 of the EP&A Act provides that if a development consent is surrendered as a condition of a new development consent and the new consent includes continuation of development that was authorised, then the consent authority:

- is not required to re-assess the likely impact of the continued development to the extent that it could have been carried out but for the surrender of the consent;

- is not required to re-determine whether to authorise that continued development under the new development consent (or the manner in which it is to be carried out); and
- may modify the manner in which that continued development is to be carried out for the purpose of the consolidation of the development consents applying to the land concerned.

4.7.2 If the Project is approved, Glencore would be required to surrender the Mangoola Mine project approval prior to starting mining operations in the Northern Extension Area, and all mining operations on the site would be regulated under a single contemporary development consent.

4.7.3 While the consent authority is not required to re-assess the impacts of the Mangoola Mine, both the EIS and the Department's assessment have considered worst-case cumulative impact scenarios to ensure the full range of impacts are considered.

4.7.4 This approach has been reflected in the recommended conditions of consent which incorporate the relevant requirements of the existing Mangoola Mine, including existing noise and air quality mitigation/acquisition obligations, water performance measures, rehabilitation objectives and biodiversity offset obligations.

4.8 Consent Authority

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

4.9 Public Hearings

4.9.1 On 3 December 2020, the Minister for Planning and Public Spaces directed the Commission to hold a public hearing in relation to the Project.

4.9.2 The Minister's Terms of Reference request the Commission to:

1. Conduct a public hearing into the carrying out of the Mangoola Coal Continued Operations Project (SSD 8642) prior to determining the development application for the project under the *Environmental Planning and Assessment Act 1979*, paying particular attention to:

   a) the Department of Planning, Industry and Environment's assessment report, including any recommended conditions of consent;

   b) key issues raised in public submissions during the public hearing; and

   c) any other documents or intimation relevant to the determination of the development application.

2. Complete the public hearing and make its determination of the development application within 12 weeks of receiving the Department assessments report in respect of the project, unless the Planning Secretary agrees otherwise.

5 Engagement

5.1.1 Glencore implemented a comprehensive community engagement program during the preparation of the EIS, which began in 2017, to inform and receive feedback from the local community. The program involved:

- community information sessions;
- newsletters;
- meetings with adjacent landholders; and
- consultation with local landholders, community and indigenous groups, Council, Government agencies and infrastructure providers.

5.1.2 Glencore states that this engagement program allowed it to identify perceived impacts (both positive and negative) relating to the existing Mangoola operations and the Project. Glencore notes that it has used outputs from the engagement program to inform the Social Impact Assessment (SIA), Project design and proposed mitigation strategies.

5.1.3 Glencore completes a community perception survey every three years across the areas of NSW and Queensland it operates in. While this survey was not specifically part of the engagement program for the Project, Glencore considered the survey is useful in identifying community perceptions in and around the Project.

5.1.4 Glencore's engagement program is detailed in Section 5.2 of the EIS (see **Appendix A**).

5.2 Exhibition and Notification

5.2.1 After accepting the EIS for the Project, the Department:

- publicly exhibited the EIS from 18 July 2019 until 28 August 2019:
  - on the Department's website;
  - at the Department's office or at a Service NSW Centre;
  - at the Muswellbrook Shire Council's office;
  - at the Upper Hunter Regional Library; and
  - at the Nature Conservation Council of NSW's office;
- advertised the exhibition in the Sydney Morning Herald, Daily Telegraph, Hunter Valley News, Scone Advocate and Muswellbrook Chronicle;
- notified adjacent landowners in accordance with the EP&A Regulation;
- advertised the exhibition in accordance with the requirements of the Bilateral Agreement (Clause 3.3 of Schedule 1);
- notified relevant public authorities (NSW Government agencies and Muswellbrook Shire Council); and
- notified relevant authorities in accordance with the Mining SEPP and the Infrastructure SEPP.

5.2.2 During the assessment process, the Department also made an extensive range of documents relevant to the assessment of the Project available on its website.

5.2.3 In addition to seeking advice from relevant NSW Government agencies, the Department and DAWE jointly referred the proposal to the Commonwealth's IESC for advice on surface

and groundwater impacts, as well as potential impacts on downstream watercourses and receiving environments.

5.2.4 On 21 August 2019, Departmental officers visited the site with NSW Government agencies and Council representatives and met with local residents.

5.2.5 The Department considers that its engagement process met the notification and community participation requirements under the EP&A Act and associated EP&A Regulation. The Department also considers that this process has fulfilled the State's obligations under the Bilateral Agreement with the Commonwealth Government.

5.2.6 During the exhibition period, the Department received a total of 337 submissions comprising:

- advice from 17 NSW Government agencies, infrastructure providers, Council and the IESC;
- 230 public and special interest group submissions in support of the Project;
- 90 public and special interest group submissions objecting to or commenting on the project, of which 87 were considered to be unique.

5.2.7 A summary of the issues raised in submissions is provided below. A full copy of these submissions is provided in **Appendix B.**

5.2.8 On 10 September 2019, the Department requested that Glencore prepare a Submissions Report responding to agency and Council advice, community submissions and the Department's review of the EIS.

5.2.9 Glencore submitted its Submissions Report on 18 December 2019. On 14 February 2020 Glencore provided its response to the IESC advice (see **Appendix D**).

5.3 Key Issues Raised in Agency Submissions

5.3.1 No public authorities objected to the Project. However, most raised issues or expressed concerns with specific aspects of the Project and/or provided recommendations relating to their administrative and regulatory responsibilities. The following summary provides an overview of the key comments made by public authorities.

5.3.2 The Department's **Biodiversity, Conservation and Science Directorate** (BCS) requested additional information, clarification and justification on a range of biodiversity, Aboriginal cultural heritage and flooding issues associated with the Project.

5.3.3 In relation to the Biodiversity Development Assessment Report (BDAR), BCS requested further mapping and assessment of specific plant species; re-running of the credit calculator with specific landscape selectors; provision of measurable and targeted performance indicators and completion criteria; and confirmation of proposed offsetting options.

5.3.4 BCS also commented on Dr Stephen Bell's expert report on two orchid species, seeking clarification and further specific data on orchid habitat in the offset areas and information on the cultivation history of the species. BCS also requested further detail regarding the assessment of credits for threatened orchids and vegetation zoning.

5.3.5 The Submissions Report included confirmation of identified specific plant species from the National Herbarium of NSW and a revised orchid report by Dr Stephen Bell. In response, BCS confirmed it was satisfied with the additional information and recommended conditions to include performance indicators of post-mine rehabilitation and require the development of an Offset Management Plan. As discussed in **Section 6.7**, the Department accepts these recommendations and has recommended conditions to give them effect.

5.3.6 In relation to flooding and flood risk, BCS raised concerns with the flood modelling and recommended a peer review of the flood model and mapping.

5.3.7 In response, Glencore engaged Mr Glenn Mounser, Principal Water Engineer at Umwelt to peer review the flood modelling and Hydro Engineering and Consulting (HEC) provided additional flood modelling to address comments from the peer reviewer and BCS. The peer reviewer considered that this modelling was sufficient to characterise the Project's flood impacts and recommended minor updates to the flood modelling to inform the future detailed design of the haul road crossing and design of flood mitigation measures.

5.3.8 Following review of the additional information, BCS made several recommendations to manage potential flood risks. The Department has reflected these recommendations in the conditions of consent (see **Appendix G**).

5.3.9 **DPIE Water** recommended that the Mangoola Mine Water Management Plan be revised to include the Northern Extension Area and detail the monitoring, management and mitigation of drawdown to registered water users and leachate generation from out of pit spoil emplacement beside Big Flat Creek. It also recommended monthly monitoring of shallow groundwater quality along the eastern flank of the out of pit emplacement area at least 12 months before mining starts.

5.3.10 Glencore committed to revising the Water Management Plan and completing baseline monitoring as recommended, should the Project be approved. The Department has considered the Project's impacts to water resources in **Section 6.8**.

5.3.11 The **NSW Natural Resources Access Regulator** (NRAR) recommended that any works on waterfront land should be carried out in accordance with the *Guidelines for Controlled Activities for Waterfront Land (2012)* and rehabilitation of Big Flat Creek at the end of the Project, following the procedure set out in *A Rehabilitation Manual for Australian Streams*.

5.3.12 NRAR also recommended that Glencore report any exceedance of harvestable rights as licensable take, and account for peak predicted groundwater take (including both groundwater seepage from mine spoil areas and pit inflows) against its licences.

5.3.13 In the Submissions Report, Glencore committed to remediate and rehabilitate the parts of Big Flat Creek impacted or altered by the construction and operation of the haul road overpass. It is intended that the haul road overpass would be removed as part of closure works for the Project.

5.3.14 Glencore also noted that the works would be consistent with the *Guidelines for Controlled Activities (2012)* and it would revise its Water Management Plan, including erosion and sediments controls to manage construction works in and around Big Flat Creek.

5.3.15 In relation to water take and licencing, Glencore committed to report any water volumes exceeding harvestable rights and confirmed that it holds sufficient water licence allocations for the Project.

5.3.16 The Department has reflected the recommendations from NRAR in the conditions of consent and has considered impacts to water resources in **Section 6.8**.

5.3.17 The **Environment Protection Authority** (EPA) requested additional information in relation to modelling of noise and air quality impacts and the proposed mitigation measures and out of hours construction works. It also requested clarification of aspects of the surface water management system and off-site discharges.

5.3.18 Glencore provided a detailed response addressing the EPA's concerns in its Submissions Report and subsequent additional information (see **Appendices C** and **D**). Following the EPA's review of the additional information it advised that it had no further comments in relation to the Project and provide recommended conditions.

5.3.19 The Department has considered the EPA's advice in assessment of noise (see **Section 6.2**), air quality (see **Section 6.3**) and surface water (see **Section 6.8**) and has reflected this advice in the recommended conditions of consent (see **Appendix G**).

5.3.20 **Mining, Exploration and Geoscience** (MEG, formerly the Division of Resources and Geoscience) advised that it was satisfied that the Project represents efficient development and use of coal resources and the proposed mine design and mining method would provide an appropriate return to the State. MEG estimated the Project would generate approximately $160 million net present value (NPV) in royalties. The Department has further considered the economics of the Project in **Section 6.9**.

5.3.21 MEG questioned whether the proposed landform design was the best option and recommended an independent expert examination of the proposed final landform.

5.3.22 Glencore commissioned Integrated Environmental Management Australia (IEMA) and Xenith Consulting to review the proposed final landform, paying particular attention to the feasibility of overburden handling to establish the final landform and profile of the final voids.

5.3.23 The Department has considered the Mine Plan Options report and the findings of the peer reviews in **Section 6.6**. The Department and MEG are satisfied that Glencore has undertaken sufficient analysis of the mine plan alternatives and concurs with the conclusions of the peer reviews.

5.3.24 The **NSW Resources Regulator** requested further information detailing highwall design and landform safety following mine closure. In response, Glencore commissioned Lambert Geotech Pty Ltd to complete a geotechnical stability assessment of the proposed final landform. This assessment reviewed the final highwall stability and determined that a Factor of Safety (FoS) of 1.2 was achievable at the completion of mining, provided minimum bench widths and overburden emplacement dump setbacks are included in the final landform design.

5.3.25 Glencore noted that highwall design and use of safety berms would be subject to ongoing geotechnical investigation and refinement throughout the life of the Project. Final design of both the highwall and safety berms would also be detailed in a Rehabilitation Management Plan (required by the Resources Regulator) and Mine Closure Plan.

5.3.26 Following the Submissions Report, the Resources Regulator requested further detail on bench heights and slopes. Glencore confirmed that bench widths, minimum setbacks and highwall slopes for the Mangoola Coal Mine void would be as already approved. Bench heights and slopes were provided for the proposed Project void (see **Appendix D**).

5.3.27 In relation to Aboriginal cultural heritage, **Heritage NSW**[1] recognised that Glencore has an existing formal arrangement for the Mangoola Mine known as Care Agreement C0003885. This agreement has been made in consultation with Registered Aboriginal Parties, for the safekeeping of artefacts salvaged onsite. At the end of mining operations, the location and type of final storage for the salvaged artefacts will be the subject of further consultation with relevant Aboriginal parties and Heritage NSW.

5.3.28 Heritage NSW has recommended that the current Mangoola Care Agreement C0003885 be extended to include Aboriginal sites salvaged in the extension footprint with the salvage of Aboriginal sites to occur in consultation with Registered Aboriginal Parties.

5.3.29 Heritage NSW also recommended that the Aboriginal cultural values identified in the Mangoola Aboriginal Cultural Values Assessment Report should be included as management actions in the Aboriginal cultural heritage management plan.

5.3.30 However, Heritage NSW did not agree with the proposed test excavations at rock shelters outside the development footprint. Glencore confirmed that it no longer intends to carry out test excavations (see **Appendix D**). Following this commitment from Glencore, Heritage NSW advised that it had no further comments in relation to Aboriginal heritage.

5.3.31 Heritage NSW also advised that it agreed with Glencore's proposal to manage any unexpected archaeological resources and provide induction training on heritage matters for relevant employees, contractors and sub-contractors working on the Project.

5.3.32 The Department has recommended a condition requiring Glencore to develop an unexpected finds protocol for heritage items (see **Appendix G**). Heritage NSW advised that it was satisfied with the Department's recommended conditions for both Aboriginal cultural heritage and archaeological heritage. The Department's consideration of the Project's impacts on heritage is discussed further in **Section 6.11**.

5.3.33 The **Department of Primary Industries – Agriculture** (DPI – Agriculture) advised that it does not support the use of BSAL for biodiversity offset purposes and raised concerns with aspects of the Agricultural Impact Statement, including that:

- it does not demonstrate how agricultural impacts would be avoided and/or mitigated;
- mitigation measures discussed are not focussed on agriculture;
- information on stocking rates or crop yield are not provided;
- the impact on agricultural employment in the region is not adequately assessed; and
- there is no investigation of the cumulative impact of mining on the loss of agricultural land.

5.3.34 In its Submissions Report, Glencore confirmed that the 148 ha of mapped BSAL within the proposed Wybong Heights offset area has been verified non-BSAL and reiterated that the Project's impacts to agriculture are considered to be low as the land is only suitable for grazing with limited stock numbers. Glencore noted that progressive rehabilitation is a key

[1] *Heritage NSW within the Department of Premier and Cabinet was formerly the Heritage Branch of BCS.*

mitigation measure and post mining the Land and Soil Capability (LSC) Classes are predicted to be between 3 and 6, such that the post mining land use would be suitable for native vegetation, final voids and retained infrastructure.

5.3.35 In relation to stocking rates, Glencore provided additional assessment of stocking rates across the Project and offset areas, (noting that destocking of the existing cattle operation had recently occurred due to drought conditions) resulting in the same conclusion that the Project is not predicted to significantly impact either the existing cattle operation or agricultural productivity in the region.

5.3.36 Regarding the impacts of cumulative mining and loss of agricultural employment, Glencore again reiterated the conclusions drawn in the EIS, that no discernible impacts (i.e. as a result of air, noise, blasting emissions) are predicted for any agricultural enterprises located in the locality or region, and there is a negligible anticipated loss of agricultural employment as a result of the Project. Following a review of the Submissions Report, DPI – Agriculture advised that it had no further comments.

5.3.37 **Transport for NSW** (TfNSW) and the former **Roads and Maritime Services** (now part of TfNSW) advised that its interests relate to the efficiency and safety of the classified road network, the security of property assets and the integration of land use and transport. TfNSW requested additional information to clarify construction worker car parking arrangements, cumulative impacts from any other approved development in the area and the suitability of the temporary bypass road design for large vehicle access. TfNSW also questioned why the New England Highway / Denman Road (Sydney Street) intersection was not included in the Project's traffic assessment.

5.3.38 Glencore clarified that the exact locations of construction offices, parking, facilities and laydown areas within the Project area would be dependent on the final design. Glencore committed to ensure no construction worker car parking within public road easements and proposed to manage construction impacts through a Construction Traffic Management Plan.

5.3.39 Regarding cumulative impacts, Glencore notes that the traffic surveys captured vehicle activity associated with existing approved developments in the area including Mangoola Coal Mine, Bengalla Coal Mine and the Mount Pleasant Mine. An annual growth rate of 1.5% was applied to the traffic volumes to account for traffic growth in the area.

5.3.40 Glencore provided design details of the temporary bypass to demonstrate its suitability for large vehicle access and additional assessment of the New England Highway / Denman Road (Sydney Street) intersection.

5.3.41 TfNSW subsequently raised no objection to the proposal and made no further comments. The Department has considered the Project's traffic impacts in **Section 6.5**

5.3.42 **NSW Health – Hunter New England Local Health District** (NSW Health) provided comments on the Project's air quality and noise assessments.

5.3.43 Regarding air quality impacts, NSW Health noted that from a health perspective, annual particulate matter (PM) criteria are more important than daily PM criteria. The air quality assessment for the Project does not predict exceedances of the annual air quality criteria at any private receivers.

5.3.44 Based on the predicted noise impacts on private receivers, NSW Health advised that Glencore engage in clear and open consultation with the owners/occupiers of impacted residences to ensure they are aware of the additional impacts and their options.

5.3.45 Glencore advised that it had consulted with these residents during preparation of the EIS and committed to continue to engage with any potentially impacted residents. The Department has further considered noise and air quality impacts in **Sections 6.2 and 6.3.**

5.3.46 **DPIE – Crown Lands** advised that Glencore would need to enter into a compensation agreement or access arrangement under the *Mining Act 1992* prior to undertaking mining operations or prospecting activity on Crown land or roads.

5.3.47 Glencore confirmed that it had lodged an application to purchase a Crown road (account number 610540) with the Department. The Department has recommended a condition to ensure the relevant agreements are in place prior to any mining activities taking place.

5.3.48 The **NSW Dams Safety Committee** (DSC) confirmed that the Project area is not located within a DSC Notification Area. DSC noted that any dams required to be constructed for water management will be subject to assessment in accordance with Dam Safety NSW requirements, to determine if any will be Declared Dams.

5.3.49 **Ausgrid** advised that it would require a site specific assessment during the design phase for any assets impacted by the Project to ensure reliable supply to nearby communities is maintained.

5.3.50 Ausgrid also noted its design certification process would ensure that specific design and access requirements are met during relocation. Glencore advised that it has consulted with Ausgrid in relation to the powerline relocation and would continue its consultation to ensure the relevant requirements are met.

5.3.51 **Transgrid** advised that the Project was acceptable subject to compliance with specified operating limits within its transmission line easements and around transmission towers. Glencore noted that Transgrid would extend its current agreement for blasting limits to include the Project area. The Department has further considered blasting impacts in **Section 6.4.**

5.3.52 The **Commonwealth's IESC** provided advice on the Project to both the Department and DAWE. The IESC advised that it considered the key potential impacts of the Project to be:

- contribution to cumulative impacts on groundwater-dependent vegetation and associated biota in the vicinity of Big Flat Creek;
- presence of a final void in the rehabilitated landscape which will have impacts on water quantity and may also impact on groundwater quality;
- potential ongoing water quality issues associated with sedimentation from both the proposed infrastructure and the unquantified impacts from uncontrolled discharges from sediment dams;
- potential impacts from water discharges on erosion and water quality in Big Flat Creek; and
- drawdown in 4 private bores of >2 m.

5.3.53 The IESC identified several areas where it considered further work was required and requested information on the presence of GDEs, particularly within the Project's 0.2 m

drawdown contour. Likewise, the IESC considered the groundwater model could benefit from further clarification and sensitivity analysis of hydraulic parameters, as well as consideration of how geological faults may influence groundwater flow. Additionally, the IESC considered that the storage of mine water had not been appropriately included in the numerical modelling.

5.3.54 Further information was requested about aquatic fauna and habitat, including the presence or absence of groundwater dependent ecosystems in riparian corridors downstream of the Project.

5.3.55 The IESC suggested several monitoring and management measures to minimise potential risks of the Project including the development of Trigger Action Response Plans (TARPs) with site specific criteria used to refine trigger values. Further monitoring was also recommended to manage potential effects on water quality and GDEs.

5.3.56 Glencore responded to the IESC's advice in its Submissions Report. The Department has considered the IESC's advice, Glencore's response to these matters and further advice from BCS in completing its assessment of water resources in **Section 6.8** and biodiversity in **Section 6.7**.

5.3.57 Lastly, **Muswellbrook Shire Council** (Council) did not object to the Project but provided a detailed two-part submission. The first part of the submission provided comments on the planning process and assessment approach for mining proposals in NSW, particularly issues related to cumulative impacts of mining projects and the need for strategic planning over the future of the Hunter Valley.

5.3.58 The Department has considered Council's comments as they are relevant to the Project throughout this assessment, but notes that concerns with the general planning process and broader government policy decisions are not within the scope of this assessment.

5.3.59 The second part of Council's submission provided detailed comments on the Project and raised concerns with, and requested further information on, a range of issues including social and community impacts and traffic and transport impacts.

5.3.60 In relation to social and community impacts, Council raised concerns about:

- engagement with the community during Project design, management of complaints, and the impacts of mental health and noise impacts;
- reductions in local populations and housing supplies, including impacts on the ability of emergency service organisations to attract members;
- the need to maintain the local community post-mine closure;
- indigenous participation in the Mangoola workforce; and
- the need to maintain public access to public land.

5.3.61 Glencore responded to these concerns in its Submissions Report, noting its stakeholder engagement program and clarifying its consideration of the Project's impacts on the community's mental health, social cohesion, post mine closure and indigenous workforce.

5.3.62 While Council acknowledged the additional information provided by Glencore, it has maintained it concerns over the Project's impacts on the community. The Department has considered Council's concerns in its assessment of social impacts in **Section 6.10**.

5.3.63 In relation to traffic and transport impacts, Council raised concerns regarding:

- the likely traffic impacts associated with increased vehicle movements (e.g. impacts on road condition, capacity, safety and efficiency);
- consideration of MSC's Road Asset Management Plan;
- its self-imposed position of not approving changes to the local road network until the *Mine Affected Roads Network Plan (2015) (MARNP)* has been reviewed and updated;
- design specifications for the proposed haul road overpass of Wybong Road and Big Flat Creek;
- the use of Wybong Road East and Kayuga Road and the need to impose road usage restrictions similar to those imposed on other nearby mines; and
- consideration of the most recent crash data available and associated recommendations from the State Coroner.

5.3.64 Following adoption of the MARNP on 26 May 2020, Glencore has proposed an alternative option to the closure of Wybong PO Road. The alternative option is consistent with Council's MARNP and is discussed in more detail in **Section 6.5**.

5.3.65 The Department has considered the Council's advice and Glencore's response to these matters (including the additional assessment information and alternative option provided), along with the Glencore's proposed VPA offer, in completing its assessment of traffic and transport impacts in **Section 6.5**.

5.4 Community and Special Interest Group Submissions

5.4.1 In total, the Department received 320 submissions from members of the public and special interest groups. Of these, 230 submissions (approximately 72 %) were in support of the Project. Generally, these submissions considered that the Project would deliver local and regional socio-economic benefits, job security and a range of community benefits, including supporting local sports groups. Many of these submitters considered that there would be adverse local socio-economic impacts if the Project was not approved and believed that the mine had a good record of environmental performance.

5.4.2 The Department identified that 45 % of the submissions received in support of the Project came from locations close to the Project including Denman, Hollydeen and Muswellbrook. The remaining supporting submissions were largely from residents in the wider Hunter region (22 % from Singleton) and Central Coast.

5.4.3 The Department also received 90 submissions (87 unique submissions) objecting to the Project. The key concerns raised in these community and Special Interest Group (SIG) submissions are shown in **Figure 12**.

5.4.4 An analysis of objections by location shows that a third of objections were from submitters within 5 km of the Project. Meanwhile, nearly half of the objectors (49 %) were located more than 50 km from the Project.

5.4.5 **Figure 13** shows the difference in the concerns raised between submitters located within 5 km of the Project and those located at greater distances.

5.4.6 The key concerns raised by those closest to the Project reflect the direct impacts that would potentially be experienced, including negative socio-economic impacts on the community, and amenity and health impacts from noise and dust emissions.

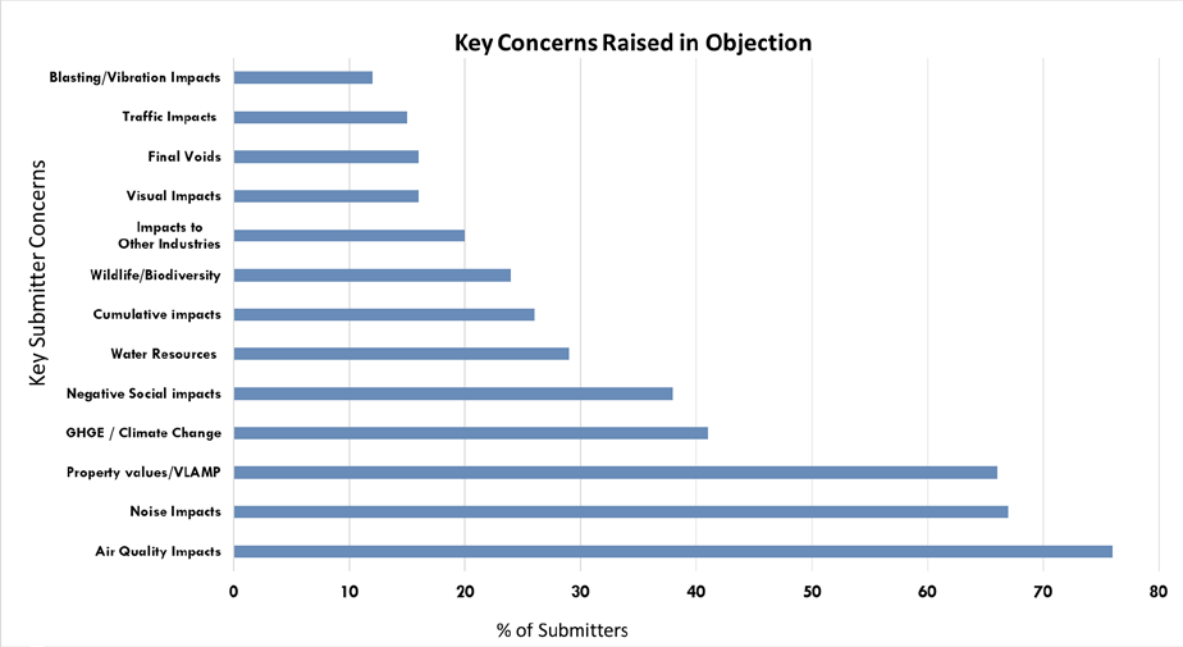

Figure 12 | Issues Raised in submissions objecting to Project

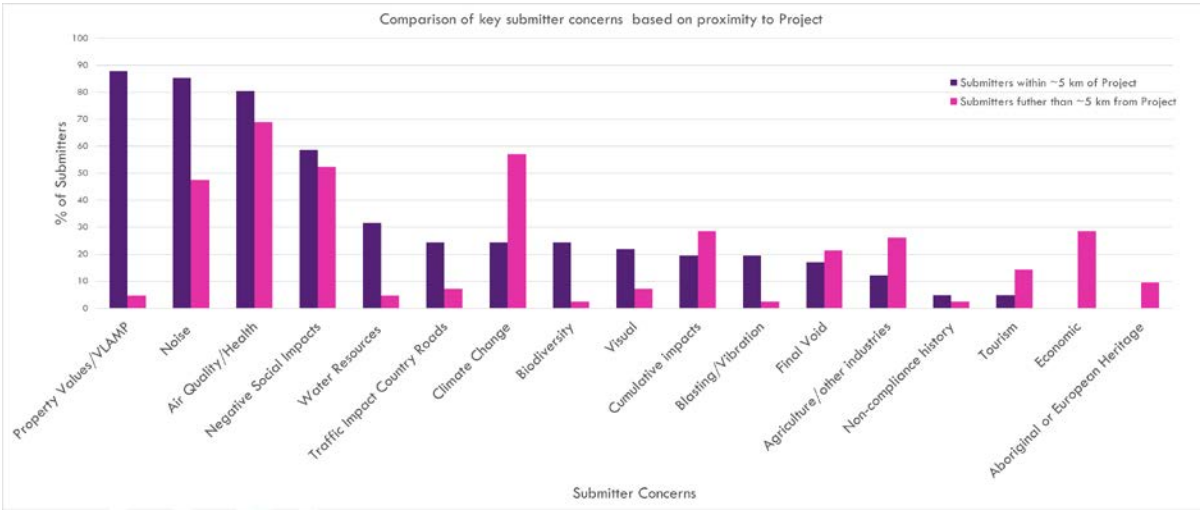

Figure 13 | Submitter concerns by distance from the Project

5.4.7 The concerns raised by those located at some distance from the Project more broadly align to regional issues such as air quality impacts, cumulative impacts of mining and global issues like climate change.

5.4.8 The Department acknowledges the key concerns of submitters objecting to the Project and has summarised these concerns below.

5.4.9 Submitters located near the existing Mangoola Mine raised concerns about noise impacts from the existing operations and raised concerns over the potential increased noise impacts of the Project. Concerns were also raised about how complaints from the existing operations are handled and how monitoring and compliance of noise emissions from the

Project would be undertaken. The Department's assessment of noise impacts is discussed in **Section 6.2**.

5.4.10 Submitters raised concerns about the existing air quality around the Project area and considered that the Project would contribute additional dust to an area already subject to high levels of dust. The concerns over air quality were also linked to health concerns from respiratory illnesses, amenity impacts such as not being able to open windows and dust accumulation on solar panels, in swimming pools and water tanks. The Department has further considered air quality impacts in **Section 6.3.**

5.4.11 The Project's potential socio-economic impacts were also a significant concern to those submitters located close to the Project area. These concerns include claims that the Project will impact private property values, reduce the local rural and village populations and cause a loss of social cohesion resulting from property acquisitions and inadequate benefits.

5.4.12 The Department has further considered the Project's social impacts in **Section 6.10** and economic impacts in **Section 6.9**.

5.5 Submissions Report

5.5.1 Glencore submitted a Submissions Report responding in detail to the issues raised in agency advice and public submissions in December 2019. The Submissions Report was published on the Department's website and copies were provided to relevant agencies for further comment.

5.5.2 In addition to responding to a number of issues raised in submissions, Glencore's Submissions Report incorporated two key refinements to aspects of the Project design which sought to address issues raised in advice from Council and NSW agencies. These changes related to the:

- overpass design – following comments from MSC, Glencore revised the clearance height of the proposed Wybong Road Overpass to ensure it meets the requirements for Over Size Over Mass (OSOM) vehicles; and
- final void design – Glencore has committed to remove highwall sections at the margins of the final voids, which would improve the integration of the voids into the final landform and slightly decrease the overall void size.

5.5.3 A copy of the Submissions Report is provided in **Appendix C**.

6 Assessment

6.1 Key Assessment Issues

6.1.1 The Department has considered the following in its assessment of the Project:

- the EIS accompanying the development;
- current conditions of consent for the Mangoola Mine;
- advice received from the IESC and government agencies;
- advice received in the independent air quality peer review;
- submissions received from the public and special interest groups;
- Glencore's Submissions Report and additional information provided by Glencore;
- applicable environmental planning instruments (EPIs), policies and guidelines.

6.1.2 The Department has assessed the full range of potential impacts of the project, but considers that the key assessment issues relate to noise, air quality and greenhouse gas emissions, blasting and vibration, traffic and transport, biodiversity, water resources, social and economic impacts, land use compatibility and mine rehabilitation, as described in detail in **Sections 6.2** to **6.10** below. A summary of the Department's assessment of other issues is provided in **Table 23** in **Section 6.11**.

6.2 Noise

6.2.1 The EIS included a Noise Impact Assessment (NIA), prepared by Global Acoustics, that predicted the potential worst-case noise levels at sensitive receivers during construction and operation of the Project. The NIA was undertaken in accordance with the EPA's *NSW Noise Policy for Industry* (NPfI), *Interim Construction Noise Guideline* (ICNG), *NSW Road Noise Policy*, *Rail Infrastructure Noise Guidelines* and the VLAMP.

6.2.2 Noise impacts, including night time noise impacts arising from the existing operations, was a frequently raised issue in public objections to the Project (see **Section 5**). The potential for increases or changes to the existing noise environment was also identified as an issue of concern to nearby residents in the Social Impact Assessment.

6.2.3 As described in **Section 2.1**, Glencore would stagger the transition of the mining fleet to the Project area and would continue to operate a limited fleet and equipment at the Mangoola Mine as well as the existing CHPP facilities, conveyors and rail loop. Accordingly, those receivers to the south and east of the existing Mangoola Mine would be expected to experience similar noise generated by the existing operations.

6.2.4 However, given the Project involves an incremental shift in mining operations to the northwest, the envelope of noise impacts arising from the Project are expected to extend northwards in line with this change in noise sources.

6.2.5 In considering the impact this shift in noise sources would have for surrounding residences, it is important to understand the topography and landscape surrounding the site. The most significant feature involves a prominent and heavily wooded ridge line, approximately 100

to 150 m above the surrounding land that wraps around the north and north west of the Northern Pit mining area.

6.2.6 This ridgeline is primarily situated on Crown Land or land owned by Glencore and acts as a natural barrier that would attenuate noise generated at the Northern Pit and mitigate the degree of noise impacts propagating to the north and northwest of the Northern Extension Area. While natural variations in the height of the ridgeline would allow for some noise to propagate through low points along the ridgeline, these impacts would only be experienced in limited areas to the north of the site.

6.2.7 In designing the Project, Glencore has afforded further consideration to measures that could be employed to mitigate noise impacts, including:

- using alternative shielded overburden areas for use during night-time or adverse weather conditions;
- reducing overall mining intensity to minimise mining equipment required in the Northern Extension Area;
- locating key haul roads below ground and/or proposing bunds to shield haul trucks and equipment; and
- the use of noise attenuation on plant and equipment.

6.2.8 The NIA used environmental noise modelling to predict operational noise levels for four key operational years (Year 1, 3, 5 and 8) under both neutral and noise-enhancing weather conditions (see **Figure 4** and **Figure 5**). The NIA also modelled predicted construction, traffic and rail noise levels.

6.2.9 In considering the impacts of the Project on surrounding receivers, the Department has included careful consideration of the existing operation of the mine, options to minimise noise generation through the design of the Project and the implementation of reasonable and feasible mitigation measures to reduce noise emissions.

Existing Operations

6.2.10 Noise emissions from the existing Mangoola Mine are regulated in accordance with noise criteria set in PA 06_0014 and reflected in the existing EPL for the site. The criteria as they apply to current privately owned residences are summarised **Table 2**.

Table 2 | Existing Noise Impact Assessment Criteria PA 06_0014

Receiver ID	Day	Evening	Night	
	L Aeq(15 minute)	L Aeq(15 minute)	L Aeq(15 minute)	LA1(1minute)
176	38	38	38	45
25, 66, 110, 130, 148 154, 164*	37	37	37	45
106C, 174A, 174B	36	36	36	45
109, 134A, 134B, 177, 190, 251	35	35	35	45
All other privately-owned land	35	35	35	45

Anglican Church, Castlerock Road	41	41	41	-

**Glencore has a negotiated agreement in place with this receiver*

6.2.11 Noise impacts were a carefully considered aspect of the original Mangoola Mine and resulted in Glencore purchasing 54 properties surrounding the existing site. To address the residual impacts of the original Mangoola Mine Project, a number of additional receivers, particularly along the floodplains to the east, were afforded acquisition or mitigation rights under PA 06_0014.

6.2.12 Following a previous modification to PA 06_0014 in 2014, a number of receivers who had been originally afforded acquisition rights were identified as experiencing reduced noise impacts from the modified project and were provided with an optional 12 month period to trigger the voluntary acquisition process. This period has now lapsed, and these receivers are no longer eligible for acquisition rights under PA 06_0014.[2]

6.2.13 Accordingly, PA 06_0014 currently identifies 3 remaining private receivers with voluntary acquisition rights as a result of the residual noise impacts at the existing operations. These receivers include Receivers 25, 83 and 164, although the Department is aware that Glencore has entered into a negotiated agreement with Receiver 164.

6.2.14 Additionally, 15 receivers are currently eligible for mitigation upon request due to the operational noise of the existing Mangoola Mine. A further 3 receivers along Wybong Road (Receivers 246, 249 and 251) are also eligible for mitigation rights on the basis of approved traffic noise impacts under PA 06_0014[3].

Performance Monitoring

6.2.15 As described in **Section 2,** the Project would maintain the existing production rate and approved operational workforce limit and therefore the operational traffic volumes and approved rail limits would not change. The proposed construction activities may however temporarily increase road traffic noise.

6.2.16 The Department notes that operational noise has been an issue at the site, with attended noise monitoring between 2014 and 2017 recording 9 exceedances of the relevant noise criteria in PA 06_0014. Monitoring has recorded no further exceedances of the noise criteria since 2017, however the mine continues to receive noise complaints, albeit the Department understands the frequency of noise complaints has reduced over time. A review of recent noise complaints (between January 2018 and December 2019) shows that they are most frequently made during the night and early morning.

6.2.17 It is accepted that noise is generally more disturbing in the evening and night due to:

- more noise sensitive activities occurring (ie socialising, relaxing and sleeping); and
- more residents are at home and noise is more intrusive due to lower background levels during the evening and night.

[2] Acquisition rights lapsed within 12 months of the approval of Modification 6 for the following receivers (R66,R164,R121,R132, Lot 1 DP 414239 and Lots 68, 69, 70, 71, 76 & 77 DP 750924).

[3] Unless those receivers have a negotiated agreement in place. It is noted that mitigation has been installed for R246.

6.2.18 It is also accepted that the effects of adverse meteorological conditions (ie wind and temperature inversions) can amplify noise impacts, particularly temperature inversions which only occur during the night-time period.

Noise mitigation measures

6.2.19 Glencore currently implements a Noise Management Plan which outlines its procedures to manage and mitigate noise impacts from the existing Mangoola Mine. To reduce its noise impacts during the most sensitive time periods, Glencore has already revised its mitigation procedures to include:

- installation of noise attenuation features on mining equipment (ie replacing reversing beepers on mobile equipment with 'quackers');
- restrictions on activities during sensitive time periods or adverse weather conditions;
- covering the running and maintenance costs of air conditioners for private residences with mitigation or acquisitions rights; and
- using real-time noise monitors that incorporate automatic alarms so control measures can be implemented.

6.2.20 Glencore considers that these procedures have been effective in reducing noise emissions from the Mangoola Mine and would continue to implement these measures during the operation of the Project.

6.2.21 In addition to the above mitigation measures, the existing Noise Management Plan outlines the mine design considerations and operational controls currently used by Glencore to minimise noise impacts. These include:

- using natural topographical shielding of the CHPP, coal stockpiles, rail loop and associated infrastructure;
- enclosing the CHPP and crushers; and
- construction of a noise bund to the south of the operation and a 4 m high noise barrier on sections of the railway track.

6.2.22 A noise monitoring network including both attended and unattended monitoring is used along with meteorological monitoring and TARPs to ensure the mine's noise emissions at receivers remain within the noise criteria.

6.2.23 The Department notes the improvement in Glencore's management of noise emissions and considers that the additional mitigation and control measures along with TARPs and the noise monitoring network are operating effectively to ensure compliance with the noise criteria.

6.2.24 Notwithstanding the above measures, the EPA requested further analysis of Glencore's feasible and reasonable mitigation measures. Glencore provided further information in the Submissions Report (see **Appendix C**), noting that in addition to the existing noise mitigation measures currently in use at the Mangoola Mine, Glencore proposes to manage noise emissions from the Project through:

- 'property specific mitigation measures' at selected receivers;
- mine design allowing use of alternative haul routes and overburden emplacement areas during adverse meteorological conditions;

- scheduling mining activities to distribute noise generated by the existing equipment fleet across the Northern Extension Area and existing Mangoola Mine, and progressively reduce the number of excavators operating in the Northern Extension Area over time;
- attenuation on mobile plant and limiting or restricting fleet operations during adverse meteorological conditions;
- installing and maintaining low noise rollers on conveyor systems;
- constructing an 8 m noise bund on the haul road on the southern side of Wybong Road (near the overpass) to reduce noise emissions to the north and west; and
- only operating the mobile crushing plant during daytime in locations that are shielded from receivers.

6.2.25 Following review of the Submissions Report, the EPA did not make any further comments in relation to the proposed noise mitigation measures.

6.2.26 Glencore also proposes to extend and update its noise monitoring network and noise management plan to include the Project. Noise management strategies would include a range of proactive and reactive measures informed by the real-time noise and weather monitoring systems.

6.2.27 To manage noise impacts from construction, Glencore proposes to develop a construction noise management plan for the Project, particularly where construction work is required outside of standard hours.

6.2.28 The Department is satisfied that the noise mitigation and management measures proposed by Glencore would reduce the Project's noise impacts, including limiting or ceasing operations when necessary. The Department has recommended that these commitments to manage, monitor and mitigate noise impacts are detailed in a Noise Management Plan for the operations.

Operational Noise

Project Trigger Noise Levels

6.2.29 The NIA accompanying the EIS for the Project identified and established a range of contemporary assessment criteria in accordance with the NPfI. Importantly, the NPfI conservatively establishes Project Noise Trigger Levels (PNTLs) based on the more stringent value of the project intrusiveness noise level and project amenity noise level. Using the more stringent level ensures that intrusive noise is limited, and amenity protected.

6.2.30 In this case, the PNTLs for private receivers are based on the intrusiveness criteria. As the Wybong Hall and Anglican Church are not residences, the PNTLs are based on the recommended amenity criteria when in use (see **Table 3**).

6.2.31 Global Acoustics noted that the PNTLs have been used to evaluate the significance of residual noise impacts. This is because under the NPfI, feasible and reasonable mitigation measures, the PNTLs and residual noise impacts are considered together to assess and manage noise impacts from a project.

Table 3 | PNTL dB(A) LAEQ 15 minute

Receiver	Time Period		
	Day	Evening	Night
Private Receiver	40	35	35
Wybong Hall and Anglican Church	48	48	48

6.2.32 The EPA did not raise any concerns with the PNTLs for the Project and the Department is satisfied with the proposed PNTLs.

Construction Noise

6.2.33 As described in **Section 2.2**, a 16 month construction period would commence prior to Year 1 of the Project, but concurrently with the existing Mangoola Mine. Global Acoustics considered the worst-case noise impacts from peak Project construction during noise enhancing weather conditions, in accordance with the ICNG. Construction noise modelling also included the existing Mangoola Mine operating at current consent limits (see **Table 8**).

6.2.34 During standard construction hours Glencore has committed to manage construction activities to ensure construction noise complies with the ICNG 45 dBA "Noise Affected" noise management level at affected receivers. The EPA accepted the assessment of daytime impacts against this criterion.

6.2.35 For the majority of receivers, construction noise is predicted to be less than the PNTL (see **Table 3**). While eight receivers are predicted to experience construction noise above the PNTL but within the ICNG noise affected criterion (ie between 40 and 45 dB) during adverse meteorological conditions, only three of these receivers (Receivers 66, 148 and 130) are predicted to experience construction noise greater than the ICNG noise affected criterion during adverse weather conditions.

6.2.36 The Department notes that Receivers 66, 148 and 130 are already eligible for voluntary mitigation and acquisition rights due to the Project's operational noise, and would have the opportunity to request noise mitigation or acquisition during the construction period.

6.2.37 Similarly, the remaining 8 receivers predicted to experience an exceedance of the PNTL would also be eligible for either mitigation of acquisition for operational noise (see **Table 4**).

Table 4 | Worst case predictions for construction noise within standard hours (db, exceedances highlighted in bold text)

Receiver ID	Standard hours construction criteria	Maximum predicted noise during calm weather conditions	Maximum predicted noise during adverse weather conditions	Acquisition/mitigation rights for operational noise
66	45	41	**47**	Acquisition
148	45	38	**47**	Acquisition
130	45	38	**46**	Acquisition

110	45	37	45	Acquisition
83	45	36	44	Acquisition
134A	45	35	44	Mitigation
109A-F	45	36	43	Mitigation
139	45	36	42	Acquisition
261	45	35	42	Mitigation
263	45	35	42	Mitigation
205	45	35	41	Acquisition

6.2.38 While most construction works would be undertaken within the standard construction hours outlined in the ICNG, Glencore advised that some works may need to occur outside standard construction hours. These out of hours works would include:

- delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads;
- construction that may be directly affected by wet weather (ie culvert construction in Big Flat Creek) and may be required to reduce environmental impacts;
- concrete pours and roadworks which need to be completed as a single event to ensure structural integrity;
- roadworks to avoid peak travelling times, limiting impacts to other road users;
- connection of relocated local power supply and fibre optics/communications network to limit impacts to users; and
- delivery and placement of overburden material from the existing Mangoola operation for use in construction (dependent upon whether mining operations are intercepting appropriate overburden at that time).

6.2.39 Where works are proposed outside of standard hours, Glencore has proposed to comply with the existing noise criteria of PA 06_0014 (see **Table 2**). Glencore contends that construction outside of standard construction hours is justified, as it would reduce overall construction time and limit impacts to the local community (ie road users during peak traffic periods) and may be necessary to ensure the integrity of structures or to minimise environmental impacts (ie continuity of concrete pours).

6.2.40 The EPA requested further information to justify the need for construction outside of standard hours and confirmation that those activities could be managed to satisfy the ICNG out of standard construction hours noise management levels.

6.2.41 Glencore provided a detailed response to the EPA's request in its Submissions Report, which detailed the need and justification to undertake these activities outside of standard hours (see **Appendix C**). Following review of the Submissions Report, the EPA advised that these activities could be managed under conditions and limits imposed on the EPL.

6.2.42 The Department considers that Glencore has justified the need to complete some construction activities outside of standard construction hours. In such circumstances, the Department has recommended conditions requiring Glencore to seek the Planning

Secretary's agreement for a temporary construction noise limit, which must also include a Construction Environmental Management Plan that must describe the relevant noise limits and management measures in accordance with the ICNG.

6.2.43 Finally, the Department notes that while the proposed construction activities would be expected to cause some disruption for nearby receivers, these impacts would be of limited duration and would occur within a background environment that includes operational noise from the existing Mangoola Mine. Consequently, these impacts would be expected to blend into the background operational noise environment for the majority of receivers. For the 8 receivers who are located closer to construction activities and expected to experience elevated construction noise, the Department notes that these receivers are all eligible for either mitigation of acquisition for operational noise under the recommended conditions and are already able to request the instillation of noise mitigation treatments.

6.2.44 The Department considers that the management of construction noise impacts to comply with the daytime ICNG during standard construction hours would provide an appropriate basis for regulating noise impacts from the Project and has also recommended that Glencore manage and minimise operational noise impacts through a detailed Noise Management Plan which requires monitoring of noise emissions from the site.

Operational Noise

6.2.45 The NIA predicted that with the application of relevant noise mitigation measures discussed above, the worst-case noise from the mining operations would exceed the PNTLs at a number of private receivers at least once over the four modelled operational years.

6.2.46 **Figure 14** shows the worst-case noise contours for the modelled operational years.

6.2.47 In considering these impacts, the Department recognises that most of these exceedances are predicted to be negligible in nature and are unlikely to result in a discernible difference from the PNTLs (ie less than 2 db above the PNTL). As discussed in **Section 2**, many of these noise exceedances are associated with the continued operation of infrastructure at the Mangoola Mine and would not be discernibly different to those impacts already approved under PA 06_0014.

6.2.48 The Department also recognises that while a development should aim to achieve its PNTLs, it is not always possible to achieve these levels and residual noise impacts may sometimes occur. The VLAMP provides that in such circumstances voluntary acquisition and/or mitigation rights can be afforded for private receivers to reduce the operational noise impacts of a development where there is a broader public interest argument to justify these impacts.

6.2.49 Based on the modelling, 6 additional receivers (Receivers 66,110, 130, 148, 139 and 205) would be eligible for voluntary acquisition rights in accordance with the VLAMP, while 8 new receivers (Receivers 123, 144, 171, 193, 261, 263, 125A and 182B) would be eligible for voluntary mitigation under the VLAMP. The Department has recommended conditions to afford these receivers with these rights.

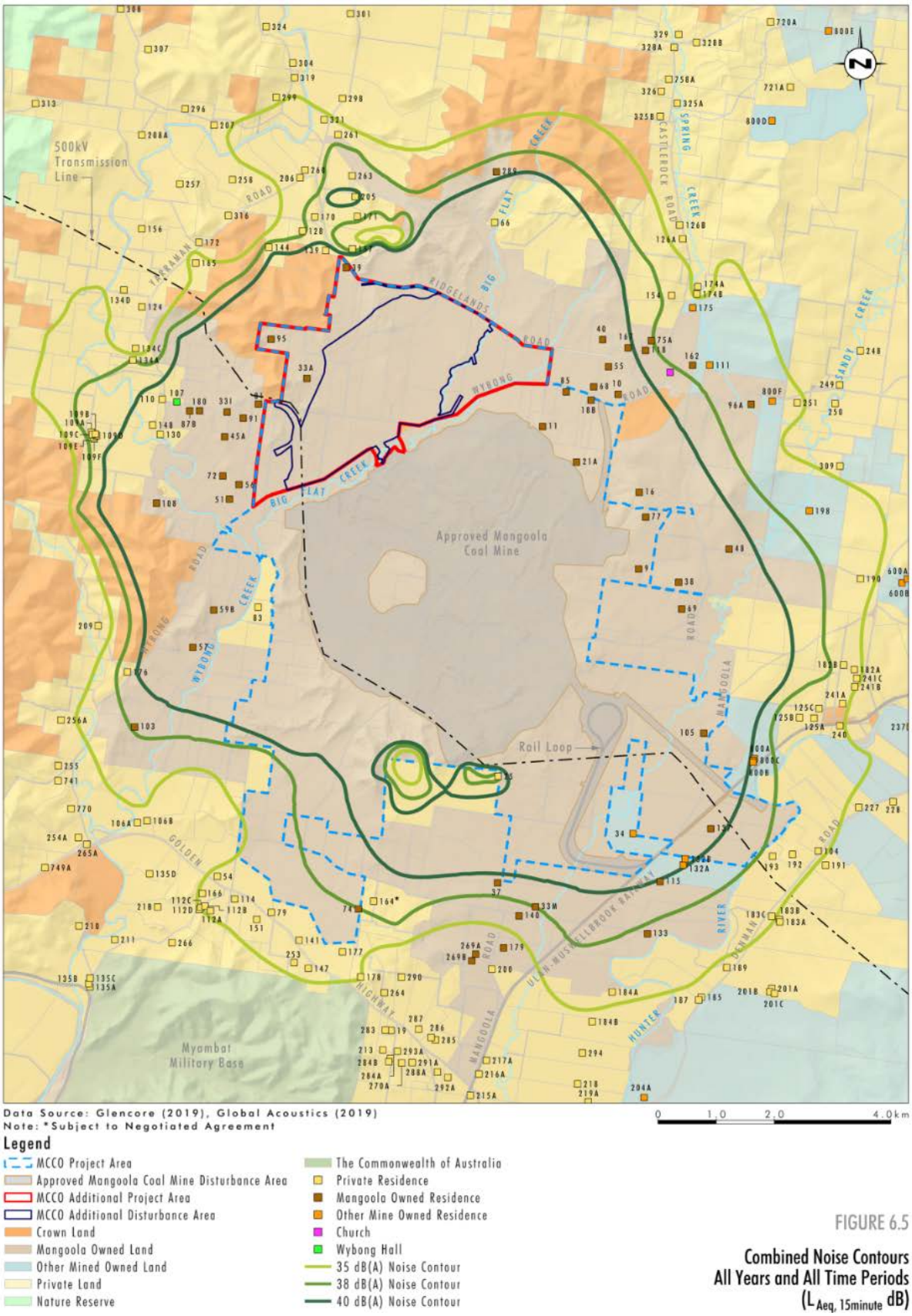

Figure 14 | Predicted Worst Case Noise Contours for all Project Years and Time Periods

6.2.50 In addition to these more substantial exceedances, the Project would be expected to result in negligible exceedances of up to 2 dB above the PNTLs at 31 receiver locations in the broader Project area. The VLAMP notes that exceedances of this magnitude would not be discernible by the average person and would not be distinguishable above the PNTLs. Therefore, in accordance with the VLAMP, the Department does not consider that any further mitigation measures or treatments are required at these receiver locations.

6.2.51 Overall, the Project is predicted to result in 6 new receivers experiencing significant exceedances of more than 5 dB above the PNTL, relative to the existing operations and 8 new receivers experiencing marginal exceedances of between 3 to 5 dB above the PNTLs (see **Table 5**).

6.2.52 When considered together with those receivers who are already impacted by the Mangoola Mine, the overall impact of the Project would result in significant exceedances at 7 residences and marginal exceedances at 18 residences (see **Table 5**).

Table 5 | Private receivers subject to acquisition or mitigation for noise impacts

Receiver ID	Existing Acquisition or Mitigation rights under PA 06_0014	VLAMP Significance Category	Recommended Voluntary Acquisition / Mitigation Rights
66	Acquisition rights lapsed, eligible for mitigation	Significant	Acquisition rights
83	Acquisition rights		
110,130 and 148	Mitigation rights		
139, 205	N/A		
25	Acquisition rights	Marginal	Acquisition rights under PA 06_0014 to be retained
154,176,109A,109B,109C,109D,109E,109F,134A	Mitigation rights		Mitigation Rights
128,144, 171,193,261,263,125A,182B	N/A		

6.2.53 While some of these existing receivers would experience reduced impacts under the Project, Glencore has committed to retain the minimum acquisition or mitigation rights afforded to receivers under the existing PA 06_0014. Consequently, Glencore would continue to offer voluntary acquisition rights to Receiver 25 and voluntary mitigation rights to Receivers 164, 174A, 174B, 177, 190 and 251.

6.2.54 Glencore previously provided the right to request additional noise mitigation measures to Receiver 157 (as identified under PA 06_0014). While this receiver is not eligible for mitigation under the Project, Glencore has committed to maintain the mitigation measures.

6.2.55 The commitments made by Glencore in regard to mitigation and acquisition have been reflected in the Department's recommended conditions.

Cumulative Noise

6.2.56 Industrial noise from neighbouring mining operations (Bengalla and Mt Arthur) can be audible at some receivers located south and southeast of the existing Mangoola Mine. However, Global Acoustic has contended that when noise enhancing weather conditions are from the direction of Mangoola Mine, this mitigates noise from the neighbouring mining operations in the other direction, and vice versa.

6.2.57 Consequently, Global Acoustics considered that cumulative noise levels do not include significant contributions from multiple mines and no further assessment is required.

Vacant Land

6.2.58 The NIA also assessed noise impacts to potentially affected vacant land in relation to the amenity criteria. The percentage of private land exceeding the night period amenity noise level plus 5 dB was less than 25 percent in all cases. The Department is satisfied that noise impacts to privately-owned vacant land does not trigger acquisition rights in accordance with the VLAMP.

Recommended Noise Criteria

6.2.59 The Department is satisfied that Glencore has reduced the Project's operational noise impacts where possible, through mine design and planning and through the proposed mitigation measures. However, as identified above, those receivers to the northwest would experience an increase in noise impacts arising from the Project, while those to the south and east would be expected to experience similar levels to the existing Mangoola Mine.

6.2.60 **Table 6** reflects the Department's recommended noise impact assessment criteria limits. These limits reflect the northwesterly shift in noise predictions associated with the Project and consideration of the minimum 40 dB(A) daytime limit that can be applied under the contemporary NPFI.

Table 6 | Recommended Noise Impact Assessment Criteria

Receiver ID	Day		Evening	Night	
	Years 1 and 2 $L_{Aeq\ (15\ min)}$	Year 3 onward $L_{Aeq\ (15\ min)}$	$L_{Aeq\ (15\ min)}$	$L_{Aeq\ (15\ min)}$	$L_{A1\ (1\ min)}$
171,176, 144	40	40	40	40	52
25, 128, 154, 193, 125A, 182B	40	40	38	38	52
261	42	40	38	38	52
54, 79, 114, 141, 151, 192, 206, 321, 125C, 182A, 241A, 241C, 190, 157	40	40	37	37	52
165, 177, 106B, 104, 166, 178, 251, 253, 260, 112B, 183C, 184A, 147, 112A, 112C, 240, 241B	40	40	36	36	52
134A	44	40	39	39	52

109A - F	43	40	39	39	52
263	42	40	39	39	52
Other privately-owned residences	40	40	35	35	52
Wybong Hall and Anglican Church	48	48	48	48	-

6.2.61 The Department has also recommended a condition requiring that Glencore operates under an updated and revised Noise Management Plan. The Noise Management Plan would require Glencore to describe in detail its mitigation measures, monitoring program and system for recording and responding to any community noise complaints.

Topographical influences

6.2.62 **Figure 14** shows the highest noise levels predicted during any operational stage, season or time period of the Project. As previously discussed, the ridgeline to the north and north west of the Northern Extension Area acts as natural noise barrier and modelling predicts that the ridgeline influences the Project's noise emissions.

6.2.63 Consequently, the noise levels at some receivers located closer to the Northern Extension Area and near the base of the ridgeline, are predicted to be slightly lower than the noise impacts predicted to occur at certain residences located on elevation areas further away (see **Appendix C**).

6.2.64 The Department notes that following ongoing consultation during the EIS preparation, and in consideration of the environmental and social assessments for the Project, Glencore identified a number of nearby receivers to the north of the Project that it has separately approached to offer 'property specific measures' to mitigate impacts at these residences.

6.2.65 While the Department acknowledges that these additional measures are a commercial matter and have been voluntary offered in addition to the requirements of NSW Government policies and guidelines, these measures would assist in mitigating the Project's social impacts on properties that may not otherwise be eligible to receive treatment under the VLAMP.

6.2.66 The Department has further considered the Project's social impacts in **Section 6.10**.

Other Noise Impacts

Sleep Disturbance

6.2.67 Global Acoustic also included an assessment of potential sleep disturbance impacts that can arise from the operation of equipment that generate high volume, short term noise levels. The sleep disturbance modelling predicted that no receivers would experience exceedances of the L_{Amax} trigger level of 52 dB(A) for all receivers.

6.2.68 The Department acknowledges that community submissions raised concerns about night-time noise from the existing operations, and notes that many of the recent noise complaints were made late at night and in the early morning. However, the predicted noise levels are below the NPfI sleep disturbance criterion and those receivers most impacted by the

Project would have the option to request mitigation or acquisition due the operational noise exceedances.

6.2.69 The Department is confident that night-time noise levels and potential sleep disturbance impacts could be effectively managed and mitigated through the implementation of appropriate controls and adaptive management in a Noise Management Plan for the Project, for instance by redeploying fleet and equipment to operate behind overburden emplacements and other less sensitive areas of the site during the evening and night.

6.2.70 The Department has recommended an operational noise condition requiring Glencore to take all reasonable steps to minimise the noise impacts of the development in noise sensitive areas during the evening and night.

Low Frequency Noise

6.2.71 The NPfI identifies low frequency noise as an annoying noise characteristic that may be experienced at receivers. Global Acoustic notes that the CHPP is the highest source of low frequency noise at the Project, which is approved for use through the existing approval. The Project would not be expected to materially change the nature of low frequency noise experienced by receivers as there is no increase to the currently approved CHPP capacity or the existing site infrastructure and mining fleet that the Project would continue to use.

6.2.72 Glencore advised that it has previously installed cladding around all fixed plant, including the CHPP, to reduce noise emissions. A fully attenuated mining fleet is also currently used at the existing operations. Under the Project this same fleet would continue to be used at the Mangoola Mine and in the Northern Extension Area. Glencore has advised that any replacement plant would have equivalent or better noise attenuation than the existing fleet.

6.2.73 Nevertheless, Global Acoustic undertook further modelling of the potential low frequency noise impacts that would be generated at the 9 receivers with the highest predicted operational noise and/or those receivers located closest to the CHPP (ie those receivers most likely to experience low frequency noise). The modelling predicts that low frequency noise from the Project would remain below the NPfI thresholds at all receivers.

6.2.74 While the Department is satisfied that low frequency noise is unlikely to impact sensitive receivers, the Department and EPA have recommended noise conditions that include a requirement for Glencore to take all reasonable steps to minimise noise from the development, including low frequency noise, undertake noise monitor in accordance with a detailed Noise Management Plan.

Road Traffic Noise

6.2.75 Previous assessments for the Mangoola Mine have identified that the road traffic noise in the morning peak hour exceeds the RNP criteria. As noted above, mitigation measures for road traffic noise are afforded to receivers 246, 249 and 251 under PA 06_0014. The Project would not change the current operational traffic and Glencore would continue to offer the same noise mitigation measures to receivers 246, 249 and 251.

6.2.76 Global Acoustic considered potential noise impacts from construction road traffic associated with the Project. Traffic volumes used to model road traffic noise were taken from the Project's Traffic and Transport Impact Assessment (see **Appendix A**).

6.2.77 Under the RNP, Denman Road is categorised as an arterial/sub arterial road with a noise criterion of 60 dB(A) during the day period and 55 dB(A) during the night period. Bengalla Link Road and Wybong Road are categorised as local roads and have a daytime noise criterion of 55 dB and night-time noise criteria of 50 dB.

6.2.78 Construction traffic is predicted to access the site along Wybong Road, via either Denman Road (east of the Mine Access Road) or the Golden Highway (west of the Mine Access Road) (see **Section 6.5** for the Department's assessment of traffic impacts).

6.2.79 The RNP identifies that, where existing road traffic noise criteria are already being exceeded, any additional increase in total road traffic noise level should be limited to 2 dB, as the average person is not able to perceive a change in noise impacts at this scale.

6.2.80 With the exception of the receivers with existing road noise mitigation rights, the closest receivers to the proposed construction works would be Receiver 250 to the east and Receiver 176 to the west. Modelling of the road noise impacts at these receivers identified that construction traffic associated with the Project would not increase the road traffic noise by more than 2 dB, except at Receiver 250 during the afternoon peak.

6.2.81 Notwithstanding this slight increase in noise at Receiver 250, the predicted traffic noise levels at Receiver 250 would not be expected to exceed 50 dB at any time, meaning that the traffic noise levels would remain less than the day period noise criterion of 55 dB for a local road.

6.2.82 The Department therefore considers that the Project would not be required to implement further mitigation for road traffic noise and that these impacts can continue to be managed in line with a revised Noise Management Plan for the site.

Rail Noise

6.2.83 Glencore proposes to continue transporting product coal from the site within the same limits as the current Mangoola Mine (ie 10 trains per day). Therefore, rail noise would not change relative to currently approved operations, however it would occur for an additional year of operations.

6.2.84 The Department notes that should the Project be approved all impacts would occur for an additional year. The Department is satisfied that the rail noise impacts would not result in any additional impacts to receivers and could continue to be managed through the existing mitigation measures. The Department has recommended conditions limiting daily train movements and requiring that only locomotives approved to operate on the NSW rail network in accordance with EPL noise limits in are used on the rail spur.

Conclusions

6.2.85 The Department acknowledges that noise impacts were a frequently expressed concern of nearby residents in their submissions on the Project and has carefully assessed the potential noise impacts of the Project. Overall, the Project is predicted to result in similar levels of noise generation as the existing operations, but would be likely to extend the envelope of existing noise impacts to the northwest in line with the advancing mining front.

6.2.86 The Department is satisfied that these predicted increases can be managed, and that appropriate mitigation and acquisition rights could be afforded to those receivers who are

likely to experience elevated and more material impacts, including the 7 residences that would be eligible for acquisition rights and 18 for mitigation rights.

6.2.87 In managing the impacts of the Project on the surrounding community, Glencore has offered to retain the existing acquisition and mitigation rights for all receivers currently identified in the PA 06_0014, even where these receivers would not be subject to those rights as a result of the impacts arising from the Project.

6.2.88 The Department is confident that subject to the recommend conditions, the Project could be operated to minimise the likelihood of impacts to the greatest extent possible, including during adverse meteorological conditions, as evidenced by the reduction in noise complaints and improvements in compliance with the noise criteria at the existing operations.

6.3 Air Quality

6.3.1 The EIS included an Air Quality Impact Assessment (AQIA), prepared by Jacobs Group (Australia) Pty Limited (Jacobs). The AQIA was undertaken in accordance with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods, 2016).

6.3.2 Glencore's AQIA was also accompanied by a peer review undertaken by Dr. Nigel Holmes, which concluded that the assessment "*provides a comprehensive investigation as to the likely air quality effects of the proposed MCCO Project and can be relied upon by approval agencies and regulators to assess the proposal.*"

6.3.3 The Department commissioned ERM Australia Pacific Pty Ltd (ERM) to conduct an independent peer review of the AQIA. ERM noted that while some additional analysis could be carried out to support the conclusions in the AQIA, these additional works were unlikely to result in any material change to the predicted impacts or outcomes of the AQIA.

6.3.4 Overall, ERM concluded that the methodology used in the AQIA is generally sound, included an acceptable level of conservatism and that the AQIA results are consistent with what would be expected for a project of this nature.

6.3.5 In response to the ERM review, Glencore conducted additional analysis of the AQIA predictions. The additional analysis included:

- reviewing annual waste and ROM production volumes to confirm the worst-case years were assessed;
- reviewing blasting records from the last two years to demonstrate rating 3 blasts are rare, and therefore the use of the associated emissions rates is conservative;
- recalculating the maximum 1-hour average NO_2 estimates from blast fumes using an alternative methodology; and
- recalculating the annual average NO_2 contours for diesel exhaust using an alternative methodology.

6.3.6 In each of these cases, the additional assessment conducted did not materially change the AQIA's predictions. Consequently, the Department is satisfied that the AQIA provides a conservative assessment of the Project's potential air quality impacts.

6.3.7 In its advice on the Project, the EPA sought separate clarification regarding inputs to the air quality model, including background dust levels and the effectiveness of mitigation measures.

6.3.8 Glencore clarified that background PM_{10} and $PM_{2.5}$ levels were determined from data collected at monitors around the Project site and avoided incorporating emissions from the existing operations which would elevate background air quality levels. This approach minimises the potential for double-counting of modelled existing mine contributions.

6.3.9 Glencore also provided additional detail on its mitigation and management measures noting that site specific testing demonstrated control efficiency for wheel generated dust on haul roads greater than the 85% adopted in its modelling. Glencore also noted the existing mitigation measures such as the enclosure of conveyors and the CHPP, use of water sprays and meteorological monitoring, visual observation and response protocols. The EPA has since advised that the additional information provided by Glencore in its Submissions Report adequately addressed its concerns.

6.3.10 The Department recognises that the air quality impacts of the Project, along with the broader air quality environment in the Hunter Valley, were frequently raised issues in community submissions (see **Section 5**). The community submissions raised the issue of cumulative air quality impacts associated with the Project (including particulate matter from dust emissions) with a particular focus on the potential associated impacts to human health.

6.3.11 The Department has carefully considered the existing operation of the mine, the design of the Project and the implementation of reasonable and feasible mitigation measures to reduce air quality impacts as part of its assessment of the Project.

Existing Operations

6.3.12 Dominant winds in the locality occur along a northwest to southeast axis. During the drier spring and summer months, when ambient PM_{10} levels are typically at their highest, the dominant winds are from the southeast. Conversely, in winter, when $PM_{2.5}$ levels are typically elevated, dominant winds are from the northwest.

6.3.13 Glencore currently implements an air quality and meteorological monitoring program at the existing Mangoola Mine, which includes a network of monitoring stations around the site including continuous monitoring of PM_{10} and periodic measurements of PM_{10}, $PM_{2.5}$, Total Suspended Particulate matter (TSP) and dust deposition.

6.3.14 The existing air quality criteria specified in PA 06_0014 were developed in accordance with the EPA's (then DEC) former Approved Methods from 2005. However, since this time advisory standards for the management of air particulates has changed.

6.3.15 In February 2016, the *National Environment Protection (Ambient Air Quality) Measure* was amended to adopt the former $PM_{2.5}$ advisory reporting standards of 25 $\mu g/m^3$ 24-hour and 8 $\mu g/m^3$ annual average as assessment standards for $PM_{2.5}$ emissions and include a reduced PM_{10} annual average assessment standard of 25 $\mu g/m^3$. While the NEPM provides guidance on the establishment of air quality standards, each participating jurisdiction is responsible for the application of these standards under its own laws and policies.

6.3.16 Accordingly, in January 2017 the EPA gazetted the current Approved Methods 2016, which incorporated and reflected these contemporary standards for the assessment of PM_{10} and $PM_{2.5}$ particulate matter.

6.3.17 The applicable air quality assessment criteria for the Project, based on the Approved Methods 2016 and VLAMP, are shown in **Table 7** .

Table 7 | Air Quality Assessment Criteria (SSD 8642)

Pollutant	Averaging Period	Criterion
Particulate Matter < 10 µm (PM_{10})	24-hour	50 µg/m^3
	Annual	25 µg/m^3
Particulate Matter < 2.5 µm ($PM_{2.5}$)	24-hour	25 µg/m^3
	Annual	8 µg/m^3
Total Suspended Particulate (TSP) matter	Annual	90 µg/m^3

6.3.18 To inform the assessment of air quality impacts against contemporary standards, the AQIA included a review of current air quality conditions in the vicinity of the Project, based on air quality monitoring data surrounding the Mangoola Mine site and the State Government's Upper Hunter Air Quality Monitoring Network.

6.3.19 This data showed that background PM_{10} concentrations remained below the annual average criterion of 25 µg/m^3 at all monitoring stations in the vicinity of the Project. While some exceedances were identified at the EPA monitoring station at Muswellbrook in 2018, this monitor is located over 17 km from dust generating activities at Mangoola and is located at a parallel to the dominate wind direction at the site. Accordingly, the Department is satisfied that the background air quality environment surrounding the Mangoola Mine can be characterised as remaining below 25 µg/m^3 annual average PM_{10}.

6.3.20 Some exceedances of the 24-hour average PM_{10} concentrations of 50 µg/m^3 have been recorded at Mangoola Mine monitoring locations on several occasions between 2012 and 2018. Notably however, there were also exceedances recorded at the EPA regional monitors at Wybong and Muswellbrook during that period. Such events typically coincided with regional dust events and bushfires, which suggests that mining operations were not the sole contributor to these exceedances, although it is recognised that agricultural activity and open cut mining operations would have been likely to contribute to these overall levels.

6.3.21 Between 2012 and 2018, $PM_{2.5}$ concentrations have exceeded the annual average criterion of 8 µg/m^3 at monitors near the existing Mangoola Mine and the 24-hour average $PM_{2.5}$ criterion has been exceeded on 15 occasions at the EPA monitor at Muswellbrook. Again, while mining would have contributed to these particulate matter levels, these exceedances would have likewise been affected by regional events and/or other sources. In particular, the NSW Government's *Upper Hunter Fine Particle Characterisation Study 2013* identifies that the $PM_{2.5}$ levels measured in Muswellbrook are largely attributable to particles emitted from vehicle exhausts and wood heaters within the Muswellbrook township.

6.3.22 Monitoring data from around the Mangoola Mine site indicates that TSP and deposited dust levels in the vicinity of the Project remained below the relevant criteria between 2012 and 2018.

Management and Monitoring

6.3.23 Glencore proposed that it would continue to implement the management and monitoring measures detailed in the approved Air Quality Management Plan. Key air quality management measures (consistent with best practice dust mitigation measures) include:

- minimising the area of land disturbed at any one time;
- utilising water spray and water carts on haul roads, ROM coal stockpile areas and use of dust curtains when drilling overburden;
- minimising fall distance during loading and unloading of overburden;
- maintaining covered conveyors and belt cleaning;
- implementation of progressive rehabilitation; and
- implementation of proactive and reactive dust control strategies informed by real-time monitoring systems.

6.3.24 Glencore has also committed to conduct a review of the existing air quality monitoring network for the mine to ensure that the monitoring network adequately covers the areas potentially impacted by dust generated from the Project area.

Air Quality Model

6.3.25 The AQIA included dispersion modelling to predict the potential air quality impacts of the Project (including cumulative impacts) under both neutral and adverse weather conditions for four key operational years (Year 1, 3, 5 and 8) as well as an assessment of the impacts associated with blast fumes (see **Figure 4** and **Figure 5**).

6.3.26 The modelling conducted as part of the AQIA incorporates a range of existing best practice dust mitigation measures that are already implemented on site as noted above, and are described in Mangoola's existing Air Quality Management Plan. These measures are informed by real time monitoring of dust generation and weather conditions and incorporate both proactive and reactive approaches including minimising disturbance; progressive rehabilitation; dust suppression on haul roads, ROM stockpiles and overburden emplacements; covered conveyors and regular maintenance of plant and equipment.

6.3.27 Glencore also implements a Blast Fume Management Procedure which identifies specific control measures for fume management, including defining the potential risk zones based upon weather patterns and obtaining permissions to fire based on an assessment of real-time weather conditions.

Air Quality Impacts

6.3.28 Based on the modelling predictions and proposed mitigation and monitoring measures, the AQIA predicts that the emissions from the Project would meet acceptable standards for particulate matter, blast fumes and diesel emissions during all years of the Project. The AQIA demonstrates that the Project's emissions can be adequately managed to minimise

potential air quality and amenity impacts on nearby privately-owned land, including during adverse weather conditions.

Particulate Matter, TSP and Deposited Dust

6.3.29 The maximum predicted PM_{10} and $PM_{2.5}$ levels, which occur in Year 3 and Year 5 of the Project, respectively are shown in **Figure 15** and **Figure 16**. The AQIA predicts that the incremental 24-hour and annual average PM_{10} and $PM_{2.5}$ levels would meet applicable criteria at all private receiver locations for all stages of the mine. The AQIA also predicts that the cumulative annual average PM_{10} and $PM_{2.5}$ levels would meet applicable criteria at all private receiver locations for all stages of the mine.

6.3.30 The AQIA predicts that, with the application of all appropriate measures to minimise off-site air quality impacts, the cumulative annual average TSP, dust deposition and NO_2 levels (associated with blast fumes and diesel emissions) would meet the applicable criteria at all private receiver locations for all stages of the mine, including during adverse weather conditions.

6.3.31 The Department is satisfied that, with the implementation of the above mitigation measures and development of an Air Quality and Greenhouse Gas Management Plan (including requirements for monitoring the site's air quality), the Project would be able to operate in accordance with the air quality criteria outlined in the Approved Methods (EPA 2016). The Department has reflected the requirements for the preparation of an updated AQGGMP in its recommended conditions at **Appendix G.**

6.3.32 Given the Project is predicted to comply with all relevant air quality criteria, it does not trigger the need to apply voluntary mitigation or acquisition criteria under the VLAMP at any private sensitive receptors.

6.3.33 Notwithstanding, R83 is already subject to voluntary acquisition under the existing approval (PA 06_0014) and Glencore has committed to retain these existing acquisition rights for the Project. Consequently, the Department has recommended a condition retaining the acquisition rights that were afforded to Receiver 83 under PA 06_0014 due to historical air quality impacts from the existing Mangoola Mine.

Construction impacts

6.3.34 The AQIA also considered air quality impacts associated with the 16-month construction period. Glencore notes that construction would be temporary in nature, with dust generation predominantly associated with earthworks and activities for the Wybong PO Road realignment, haul road overpass over Big Flat Creek and Wybong Road, and construction of water management infrastructure. The AQIA also notes that the volume of material that would be handled during construction is much lower than typical mining operations.

6.3.35 The Department accepts the AQIA's conclusions that construction phase dust impacts could be adequately managed through the implementation of industry standard operational management and mitigation measures. The Department recommends that these management and mitigation measures are detailed in an Air Quality and Greenhouse Gas Management Plan.

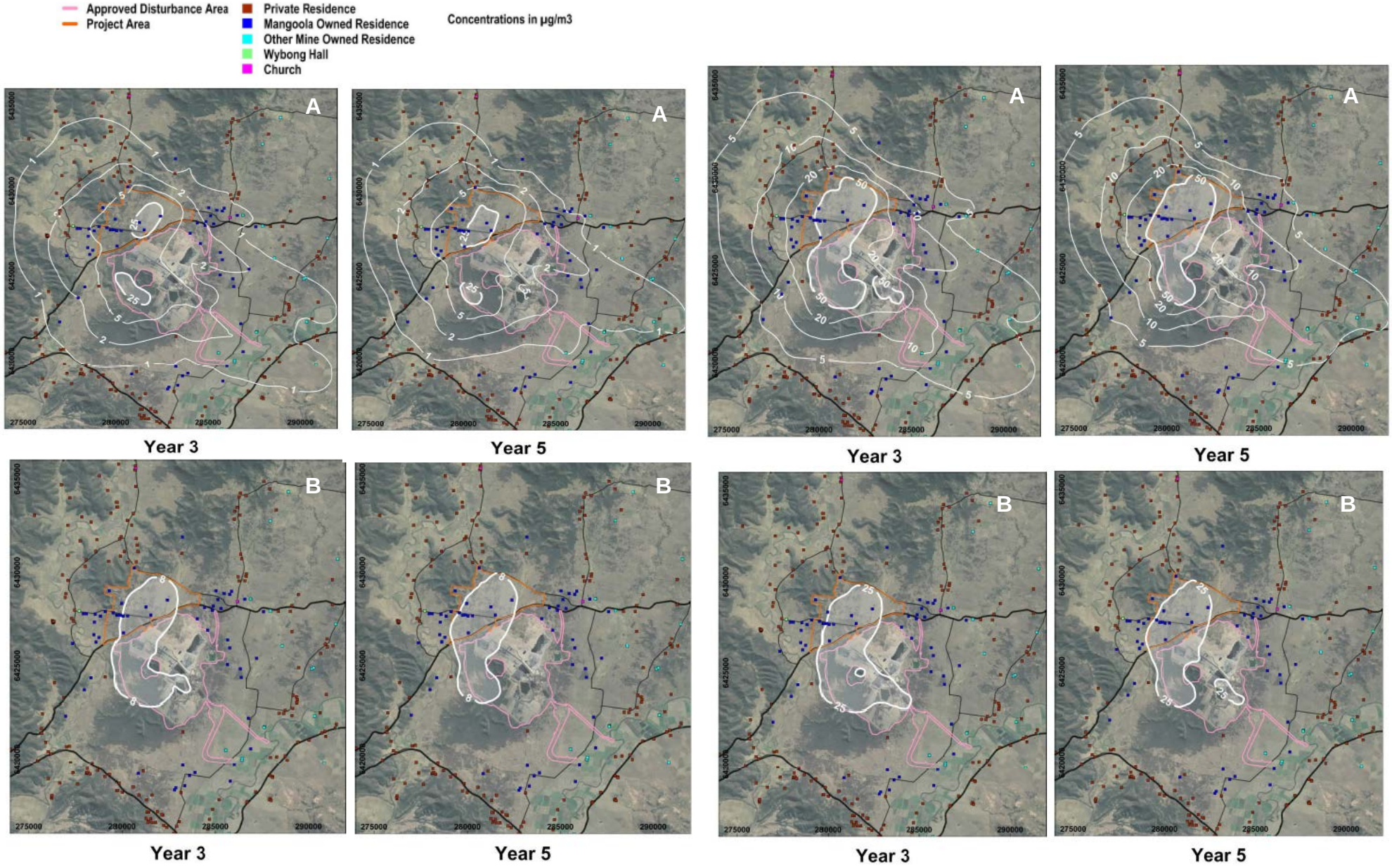

Figure 15 | A: Project only predicted maximum 24-hour average $PM_{2.5}$ concentrations
B: Predicted cumulative annual average $PM_{2.5}$ concentrations

Figure 16 | A: Project only predicted maximum 24-hour average PM_{10} concentrations
B: Predicted cumulative annual average PM_{10} concentrations

Greenhouse Gas Emissions

6.3.36 The EIS included a Greenhouse Gas and Energy Assessment (GHGEA), prepared by Umwelt (Australia) Pty Limited (Umwelt) that provides greenhouse gas emissions (GHGEs) projections for the Project, and evaluates mitigation options proposed by Glencore.

6.3.37 The GHGEA considers the existing Mangoola Energy Action Saving Plan and the methodologies and emissions factors outlined in the *National Greenhouse Accounts (NGA) Factors 2018*, the *National Greenhouse an Energy Report Act 2007* and the principles of *The Greenhouse Gas Protocol 2004.*

6.3.38 The EIS also included *Glencore's Position Paper on Climate Change* and consideration of the NSW Government's *NSW Climate Change Policy Framework* (CCPF) and the Commonwealth Government's commitments to the *United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement 2015* (Paris Agreement).

6.3.39 In considering the greenhouse gas impacts of the Project, the Department recognises that this is a matter of interest to many members of the broader community and was raised in a number of submissions on the Project.

Mitigation and Management of GHGEs

6.3.40 The EIS proposes a range of management and mitigation measures for Scope 1 and Scope 2 GHGEs that seek to minimise emissions as far as possible, particularly by reducing electricity consumption and diesel usage. Glencore's proposed strategies include:

- limiting the length of material haulage routes, thereby minimising transport distances and associated fuel consumption;
- optimising haul road ramp gradients and payload to reduce diesel usage;
- selecting equipment and vehicles that have high energy efficiency;
- scheduling activities so that equipment and vehicle operation is optimised (e.g. minimising idle times and in-pit servicing);
- improving extraction and processing energy use through implementation of through seam blasting;
- energy efficiency initiatives to reduce indirect electricity consumption Scope 2 emissions;
- implementation of the existing emissions cap for the Mangoola Mine in accordance with the Safeguard Mechanism under the Australian national greenhouse gas mitigation policy framework; and
- participation, monitoring and reporting within the Commonwealth Government's *National Greenhouse Energy and Reporting Scheme* (NGERS), which includes ongoing review of technologies and measures to further minimise GHG emissions.

6.3.41 Under the current project approval, Glencore is required to implement an Energy Saving Action Plan which must include a framework to investigate and implement measures to reduce Scope 1 and 2 GHG emissions and energy use at the Mangoola Coal Mine. The Department recommends that an Air Quality and Greenhouse Gas Management Plan is implemented for the Project which includes best practice management measures to minimise Scope 1 and 2 GHGEs and improve energy efficiency.

6.3.42 As noted in its position paper in the EIS, Glencore has recently announced that it will limit coal production to 150 Mtpa across its global operations in order to limit its total GHG emissions. The Project fits within Glencore's coal production cap commitment as it is focused on sustaining current coal production.

6.3.43 **Table 8** provides a combined emission estimate for the construction and operational aspects of the development.

Table 8 | Estimated GHGEs from the Project (Mt CO_2-e)

GHGEs	Sources	Annual Average	Total
Scope 1	Fugitive emissions from exposed coal seams and on-site diesel consumption	0.41	3.25
Scope 2	On-site electricity consumption	0.05	0.40
Scope 3	Purchase of diesel and electricity and the transport and consumption of product coal (predominantly thermal)	13.04	104.29
Total		**13.50**	**107.94**

Note: Mt CO_2-e = million tonnes carbon dioxide equivalent.

6.3.44 Glencore predicts that the Project would generate approximately 407,000 t CO_2-e of Scope 1 emissions and 51,000 t CO_2-e of Scope 2 emissions per annum, equating to approximately 3.5% of all GHGEs over the life of the Project and approximately 0.08% of Australia's current target emissions for 2030 (as discussed below).

6.3.45 The Department considers that Glencore has applied reasonable and feasible measures to reduce its Scope 1 and 2 emissions through the design and operation of the Project. The majority (approximately 70 percent) of residual Scope 1 and 2 GHGEs identified in **Table 8** would be associated with fugitive gas emissions due to exposure of the seams during open cut mining operations and only 30% of the predicted Scope 1 and 2 GHGEs would be due to on site fuel and electricity consumption required to operate the mine.

6.3.46 Further to this, the Department notes that Glencore has reviewed the feasibility of pre-draining coal seam gas to reduce these emissions, however it considers this option is economically unviable due to capital and operational costs.

6.3.47 As identified in **Table 9**, the vast majority (almost 97%) of emissions generated by the Project comprise Scope 3 GHGEs that arise from the consumption of coal by end users, for purposes such as power generation. Under the Paris Agreement accounting rules and Australian legislation, Scope 3 emissions are not included in Project emission reporting to avoid double counting emissions.

6.3.48 The GHGEA predicts that the Project would generate approximately 13 Mt CO_2-e in Scope 3 emissions each year. The GHGEA argues that compared with 2019 global greenhouse emissions (approximately 33,000 Mt), the Scope 3 emissions from the Project represent a very small proportion of overall emissions levels (approximately 0.04%).

Consideration of Climate Change Policy Framework

6.3.49 Under clause 14 of the Mining SEPP, the consent authority must consider the findings of the GHGEA, including its assessment of downstream emissions, in determining the Project. In making its determination, the consent authority must have regard to any applicable State or national policies, programs or guidelines, and where necessary, consider imposing conditions to ensure that GHGEs are minimised to the greatest extent practicable.

6.3.50 The Department has considered the findings of the GHGEA (including predicted Scope 3 emissions), having regard to both national and State-level commitments made under the 2016 Paris Agreement and *NSW Climate Change Policy Framework* (CCPF).

6.3.51 Under the Paris Agreement, each country must identify its own post-2020 climate actions to achieve a balance between anthropogenic emissions and removal by GHGE sinks in the latter half of this century. These actions are referred to as Nationally Determined Contributions (NDCs).

6.3.52 Australia's NDC includes a commitment to reduce national GHGEs by between 26 and 28 percent from 2005 levels by 2030. Australia has committed to achieve this target through initiatives to expand renewable energy sources, support low emissions technologies, improve energy efficiencies and provide corporate incentives to reduce emissions. The CCPF outlines the State's long-term aspirational objectives of achieving net-zero emissions by 2050 and making NSW more resilient to a changing climate.

6.3.53 It is important to note that the established national and State policy frameworks focus on broader structural economic adjustment and abatement measures to achieve GHGEs targets and outcomes, and do not seek to restrict private development in order to meet Australia's commitments under the Paris Agreement. Nor do these frameworks impose any prescriptive emissions criteria or targets which can be applied in development assessment of individual projects.

6.3.54 The EIS includes consideration of GHG emissions, having regard to climate change projections and principles of ecologically sustainable development (ESD), including inter-generational and intra-generational equity. The environmental, social and economic costs of GHG emissions generated by the Project have been considered in the cost benefit analysis in the EIS. Glencore has also proposed a range of mitigation measures to manage the residual costs of the Project. The proposed measures have been reflected, and in some cases strengthened, in the Department's recommended conditions.

6.3.55 The Department also notes that as a major brownfield extension, the Project would be able to recover a significant coal resource with relatively fewer emissions than a similar scale greenfield project. This is largely due to the connection with the existing Mangoola Coal processing and transport infrastructure and rail loadout facilities, which allow for a significantly reduced environmental footprint compared with the construction of new facilities for a greenfield project located elsewhere in NSW, other States or Territories in Australia or internationally.

International Climate Policy and Coal Demand

6.3.56 The majority of key consumer countries identified by Glencore are signatories to the Paris Agreement. The GHGEA includes a review of the current NDC's for each of the signatory countries, noting that these commitments are due to be updated in 2020.

6.3.57 While it is not a signatory to Paris Agreement, Taiwan has committed to reduce GHGEs by 50 percent by 2050. Taiwan has also established a GHGE reporting scheme and a Greenhouse Gas Reduction Accreditation System in preparation for a future cap-and-trade program.

6.3.58 The Department recognises that recent years have seen an increased demand for renewably generated energy sources and that renewable energy sources are playing an increasing role in the overall energy mix.

6.3.59 This view is supported by the NSW Government's *Strategic Statement on Coal Exploration and Mining in NSW* (2020), which identified that in the medium term there will still be a strong global demand for thermal coal for power generation for at least the duration of the Project.

Conclusion

6.3.60 The Department has carefully considered the potential air quality impacts of the Project, paying particular attention to cumulative air quality issues in the locality. While the Department recognises that these issues are of concern to the broader community, the detailed assessment (including peer review, independent expert advice and input from the EPA) demonstrates that the proposed mine extension would have minimal impacts on air quality in the vicinity of the mine or in the broader region.

6.3.61 The Department considers that Glencore's proposed mitigation and management measures would effectively manage and minimise potential air quality and amenity impacts on nearby privately-owned land and meet EPA assessment criteria for particulate matter, blast fumes and diesel emissions from the Project, including during adverse weather conditions.

6.3.62 Overall, the Department believes the air quality impacts of the Project can be effectively managed through the recommended conditions and the implementation of comprehensive monitoring and management measures.

6.3.63 The Department has also considered the likely GHGEs associated with the Project. The Project is projected to generate approximately 108 Mt CO_2-e over its lifespan, comprising 3.6 Mt CO_2-e of Scope 1 and 2 emissions and 104.3 Mt CO_2-e of Scope 3 emissions. The Department notes that these emissions levels are relatively modest for a coal mine of this scale, represent a small proportion of Australia's NDC, should be considered relative to the global impacts that would arise from the recovery of alternative coal resources for power generation, and weighed against the potential economic and social benefits of the Project.

6.3.64 To ensure these impacts are appropriately addressed, the Department has recommended a range of conditions that require Glencore to minimise the Project's Scope 1 and 2 GHGEs to the greatest extent practicable, take all reasonable steps to improve its energy efficiency, manage 'non-road' mobile diesel equipment to comply with any exhaust emission standards specified under an EPL for the site and prepare a detailed Air Quality and Greenhouse Gas Management Plan for the Project. On balance, the Department considers that the residual impacts of the Project are acceptable.

6.4 Blasting

6.4.1 The EIS included a Blasting Impact Assessment (BIA), prepared by Enviro Strata Consulting Pty Ltd (ESC), that assessed the potential ground vibration, airblast overpressure and flyrock impacts of blasting events in the proposed extension area on nearby sensitive receivers. Sensitive receivers considered in the BIA included privately-owned residences, Aboriginal cultural heritage sites, historic items and linear infrastructure. Potential blast fume impacts have also been addressed in **Section 6.3**.

Existing Operations

6.4.2 Glencore is seeking to undertake blasting activities in a similar manner to the existing Mangoola Mine operations over the duration of the extended project life. Glencore's existing blasts are managed in accordance with an approved Blast Management Plan and are currently limited to 2 blasts per day or 6 blasts per week (averaged over a calendar year) between 9 am to 3 pm Monday to Saturday.

6.4.3 Existing blasting criteria under PA 06_0014 and EPL 12894 are described in **Table 9** below. These criteria must not be exceeded unless Glencore has a written agreement with the relevant landowner or infrastructure owner to exceed them. In addition, a qualified blast specialist is engaged each year to review the blast vibration limit for rock formation.

6.4.4 The Department considers that the blast management criteria imposed at the existing Mangoola Mine site reflect leading practice standards for the management of open cut mining operations and the relevant ANZEC human amenity criteria outlined in *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZECC) and clauses 12AB(5) and 12AB(6) of the Mining SEPP. The Department considers that these criteria remain relevant for the proposed Project.

6.4.5 The existing Blast Management Plan describes the control measures used by Glencore to ensure compliance with the criteria listed in **Table 9.** These measures include varying blast hole spacing, angles and depth, stemming height, explosive product selection, charge mass, loading and sequencing depending on rock thickness and distance to nearby sensitive receivers. Meteorological conditions are also monitored in real time by the on-site meteorological station.

6.4.6 Glencore also operates a blast monitoring system which includes video records of each blast, vibration and overpressure monitors which are located at residential receivers, heritage and infrastructure sites.

6.4.7 A review of the mine's blast monitoring results between 2014 and 2019 indicates that there have been no exceedances of the blast criteria over this period. Glencore proposes to continue to implement this system for all Project-related blasts that would continue to occur at the existing Mangoola Mine and the new Northern Pit.

Table 9 | Existing Blasting Criteria from PA 06_0014

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Residence on privately owned land	120	10	0%
	115	**5**	5% of the total number of blasts over a period of 12 months
500kV transmission line pylons – tension towers*	-	50	0%
500kV transmission line pylons – suspension towers*	-	100	0%

**As agreed with Transgrid*

6.4.8 The blast overpressure model prepared as part of the BIA accompanying the EIS assessed a range of maximum instantaneous charges and bench heights and has demonstrated that blasting is able to be designed and managed to ensure that blast overpressure impacts can be managed effectively to comply with applicable criteria as discussed in more detail below.

Predicted Blasting Impacts

Privately-owned Residences

6.4.9 The BIA included predictions of the maximum airblast overpressure and ground vibration levels that would be expected to arise from a worst-case blast event at all private residences within 5 km of the Northern Extension Area. This modelling considered 10 scenarios with a range of bench sizes and blast charge masses. No exceedances of the ground vibration criterion are predicted under any scenario, with the worst-case maximum ground vibration predicted to reach a level of 3.9 mm/s at the closest receiver (R157).

6.4.10 Nevertheless, the airblast overpressure modelling predicted that an increase in overpressure impacts would be experienced at private residences to the north of the proposed extension area, in line with the progressing mine front. In recognition of this increase in impacts, the BIA included an initial assessment of the worst-case impacts that would be expected to arise from the largest maximum instantaneous charge proposed for the Project to provide a 'worst-case' baseline for considering likely blast impacts at nearby receiver locations (see **Figure 17**).

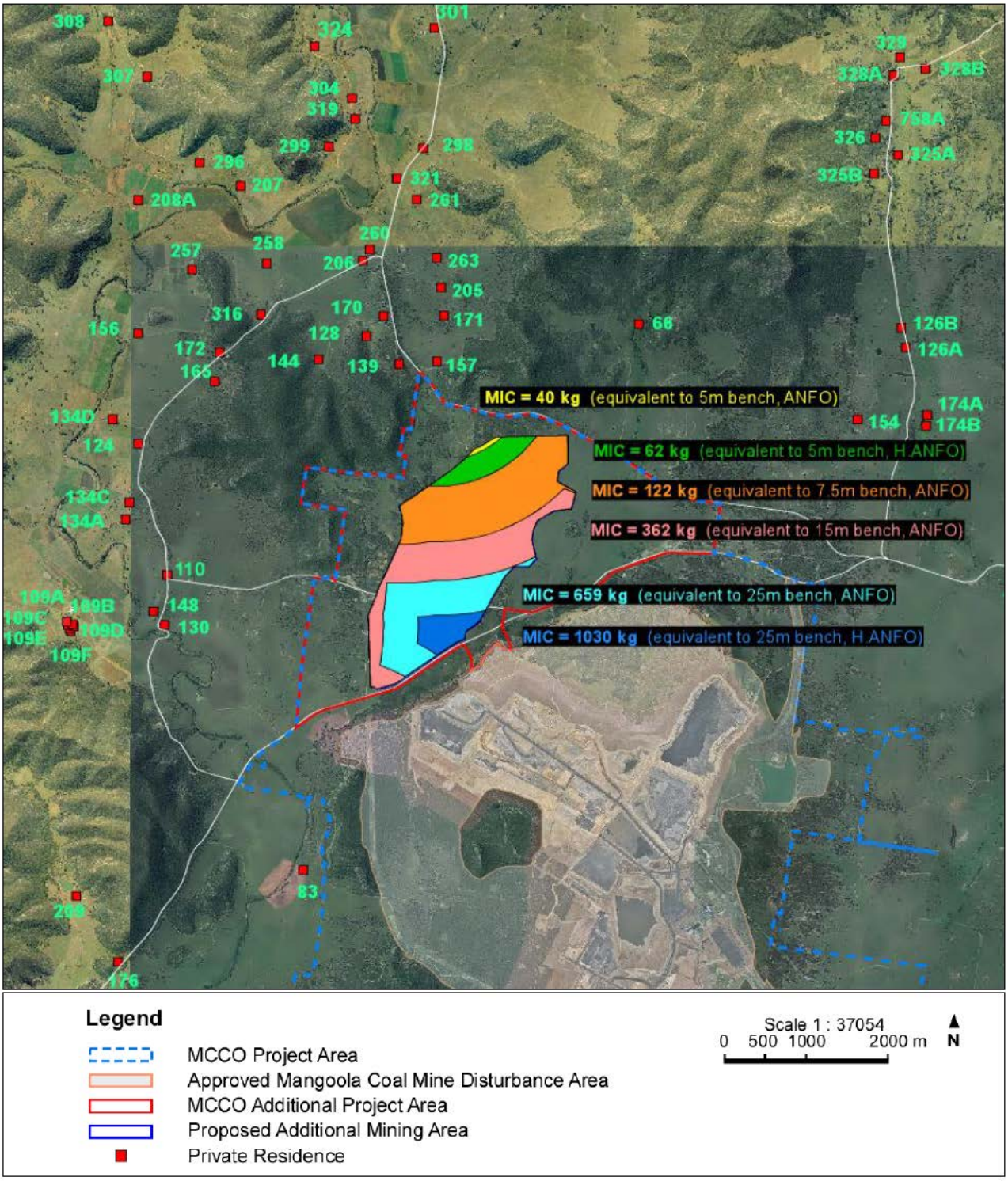

Figure 17 | Charge Mass Distribution to limit Airblast Overpressure to 114dBL at any private residence

6.4.11 This assessment indicated that in the absence of mitigation measures (ie adjustment of blast design parameters and MICs) the Project would exceed the airblast criteria at up to 17 private residences in Year 8 of operations. **Table 10** summarises the maximum (unmitigated) airblast overpressures predicted at the 4 closest private residences.

Table 10 | Predicted airblast overpressures at 4 closest private residences

Closest Receivers	Distance (m)	Airblast Overpressure Criteria (dB(Lin Peak))	Maximum Predicted Airblast Overpressure (dB(Lin Peak))	Operational Year
R66^	1,600	115/120	109 - 123	Year 1
R128	1,890	115/120	107 - 121	Year 8
R139	1,370	115/120	111 - 125	Year 8
R157	1,150	115/120	113 - 127	Year 5

6.4.12 ESC further analysed airblast overpressures to determine the maximum bench size and charge mass that could be used without exceeding the airblast overpressure criteria. **Figure 17** demonstrates that blasts can be designed (ie by selecting the appropriate bench size and charge mass), to ensure the airblast overpressure criteria is not exceeded at any privately-owned residence.

Heritage Items, Rock Formations and Infrastructure

6.4.13 Several Aboriginal and European heritage sites are located around the Northern Extension Area (see **Figure 18**).

6.4.14 Sites of Aboriginal significance include several rock shelters to the west of the Northern Extension Area, the closest located approximately 500 m from the new mining area. Further rock shelter sites are located within the south western corner of the existing operations.

6.4.15 The Northern Extension Area is also surrounded by sites of potential European heritage significance. To the north and west of the Northern Extension Area are former house sites, sheds, yards and other structures (of variable condition) a church and a cemetery, generally related to the agricultural history of the area which comprise:

- Wybong Cemetery, (late 19th century graves with stone and marble headstones / grave markers);
- Wybong Hall;
- 'Brogheda', 'Yarraman', 'Yarlett', 'Minnie Vale' and 'Collareen' (former houses and associated sheds);
- a Catholic Church; and
- Castle Hill, and other historic dwellings.

6.4.16 To the south are two significant rock formations, Anvil Rock and The Book, located within the existing Mangoola Mine footprint.

6.4.17 The Department has considered the Project's impacts on heritage in **Section 6.11**.

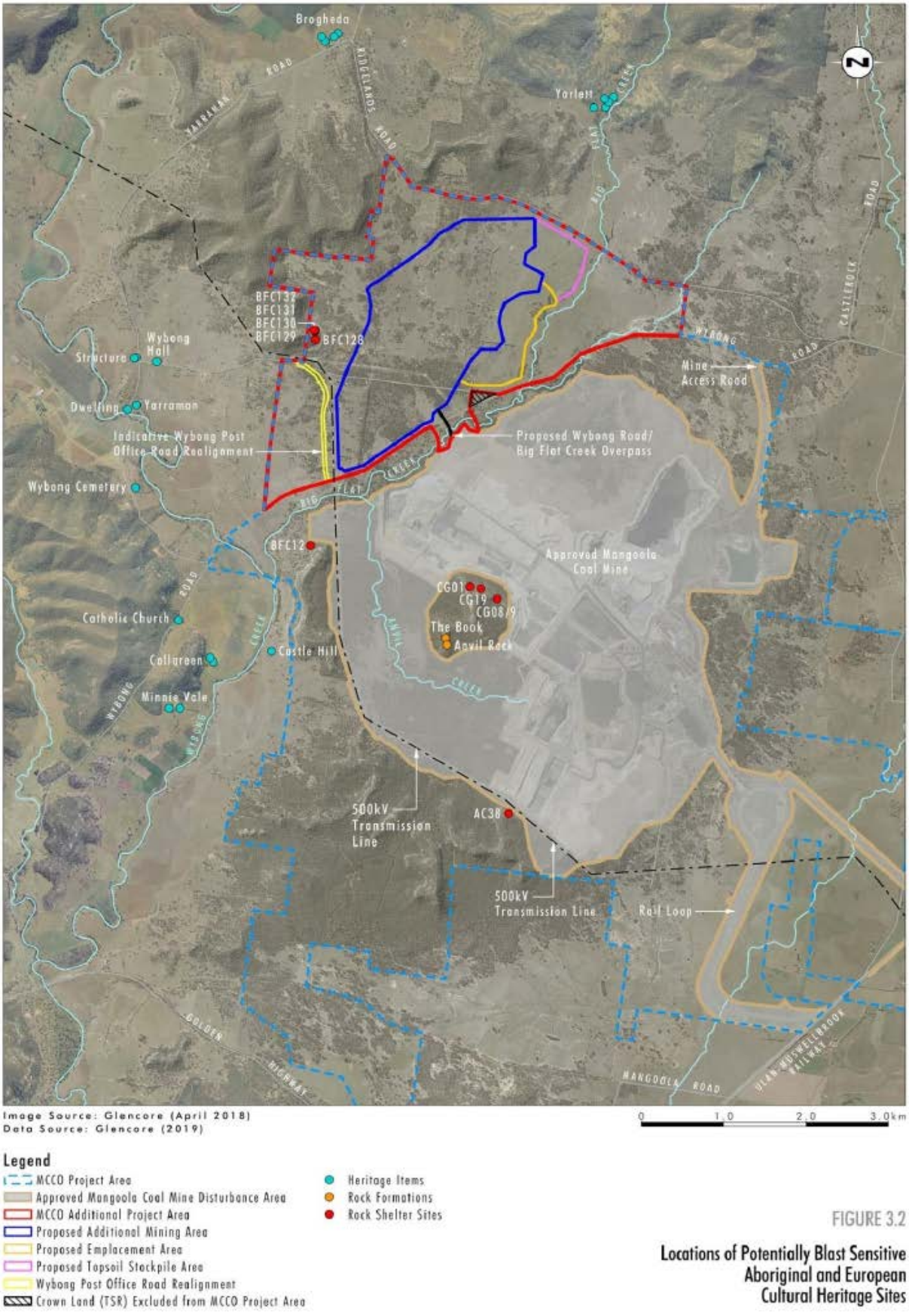

Figure 18 | Aboriginal and European heritage sites within the vicinity of the Project

6.4.18 The Department notes that the airblast overpressure criteria (see **Table 11**) applied to privately-owned residences is to ensure human comfort levels. As the heritage structures are not occupied, ESC notes that a vibration limit of 5 mm/s and an airblast overpressure criteria of 133 dB would limit structural damage. Modelling predicts that there would be no exceedance of the ground vibration criteria or airblast overpressure at any of the heritage structures (see **Table 11**).

Table 11 | Predicted Ground Vibration and Airblast Overpressures at closest heritage items

Location	Distance (m)	Ground Vibration Criteria (mm/s)	Predicted* Vibration (mm/s)	Airblast Overpressure Criteria (dB(Lin Peak))	Maximum* Predicted Airblast Overpressure (dB(Lin Peak))
Heritage Items					
Yarlett	1,680	5	0.2 – 2.1	133	108 - 122
Wybong Cemetery	2,460	5	0.1 – 1.2	133	104 - 117
Wybong Hall	2,220	5	0.1 – 1.4	133	105 - 119
Yarraman	2,430	5	0.1 – 1.2	133	104 - 117
Rock Formations					
Anvil Rock	2,450	50	0.1 – 1.2	N/A	N/A
The Book	2,300	50	0.1 – 1.3	N/A	N/A
Aboriginal Rock Shelter Sites					
Site CF128	500	50	1.1 - 15	N/A	N/A
Site CF129	550	50	0.9 - 13	N/A	N/A
Site CF132	570	50	0.9 - 12	N/A	N/A

6.4.19 As outlined above, the existing Mangoola Mine is located in close proximity to a number of Aboriginal rock shelters and two rock formations of European heritage significance (Anvil Rock and The Book). In accordance with PA 06_0014, Glencore currently undertakes monitoring of Anvil Hill and representative rock structures to inform the proactive and adaptive management of ground vibration impacts from blasting as the mine front progresses around Anvil Hill (eg scaling mass charges to maintain safe vibration limits). To date these measures have been successful in protecting rock structures from the impacts of the existing operation.

6.4.20 In addition to this, Glencore engages a suitably qualified specialist to review the safe blast vibration limits for these rock formations on an annual basis. The ESC notes that while there is no set vibration limit for rock shelter sites or rock formations, these existing reports have identified a safe ground vibration limit of 50 mm/s.

6.4.21 The predicted ground vibration at the rock formations or rock shelters near the Project would be well below this limit (see **Table 11**). Accordingly, the Department considers that the potential vibration impacts of the Project would continue to be managed in accordance with the measures contained in the existing Blast Management Plan, provided that the vibration limits for rock shelters continue to be subject to ongoing vibration monitoring and an annual assessment by a qualified blast specialist.

6.4.22 The Department has recommended conditions to reflect ground vibration and airblast overpressure criteria for the heritage structures.

Infrastructure

6.4.23 The Department notes that no exceedances of Dam Safety Committee's (DSC) vibration limit of 50 mm/s for on-site prescribed dams, or the Resources Regulator's limit of 100 mm/s for prescribed tailings dams are predicted to occur under the Project (see **Table 12**).

6.4.24 In considering the predicted impacts of the Project, the DSC also noted that the closest relevant notification areas surround the Raw Water, Pit Water and start-up tailings dams.

6.4.25 With respect to impacts on transmission lines, ESC noted that Glencore has an existing agreement with Transgrid to modify the original ground vibration limits in **Table 9** to 125 mm/s for suspension pylons and 60 mm/s for tension pylons. Accordingly, ESC modelled the predicted blast impacts for 500kV transmission lines against these criteria.

6.4.26 TransGrid has confirmed that the existing ground vibration agreement can be extended to include the Northern Extension Area providing Glencore does not blast up to the edge of the transmission tower easement and maintains a setback of 15 m from the edge of the easement in the vicinity of suspension towers and a 45 m setback for the tension towers. Glencore has committed to operate within these limits.

6.4.27 ESC has predicted blasting impacts for public roads and 11kV power lines against ground vibration criteria determined by a blasting specialist based on an Australian Coal Industry Research Program study into blast management (ACARP Report Reference No. C14057).

6.4.28 The Blast modelling indicates that when using higher charge masses, the blasting impacts of the Project would be likely to exceed the relevant ground vibration criteria. To ensure compliance with relevant criteria, blasts would be designed using lower charge masses and bench size.

6.4.29 As shown in **Table 12**, the modelling predicts that with the use of reduced charge masses and bench sizes, blasts can be designed to ensure the mining operations do not exceed the relevant criteria. The Department has recommended conditions that requiring Glencore to implement measures to ensure it complies with relevant ground vibration criteria for infrastructure and the terms of Glencore's existing agreement with TransGrid for management of its transmission assets.

Table 12 | Predicted blasting impacts at closest infrastructure

Item	Minimum Distance (m)	Ground Vibration Criteria (mm/s)	Predicted Vibration (mm/s)	
			Maximum Charge	Reduced Charge
Prescribed Dams				
Pit Water Dam	3,570	50	0.6	-
Raw Water Dam	3,470	50	0.7	-
Tailings Dam 1	3,000	100	0.8	-
Tailings Dam 2	2,910	100	0.9	-
Telecommunications				
Buried cables	48	100	629	66
*500kV transmission line pylons**				
Tension towers	130	60	128	55
Suspension towers	53	125	537	97
11 kV Power lines				
Timber Poles	35	100	1,043	78
Public Roads				
Wybong Road	50	100	589	62
Ridgelands Road	90	100	230	90
Yarraman Road	2,000	100	1.6	-

Flyrock

6.4.30 The closest receivers are located more than 1 km from the proposed extension area, and as a result flyrock is unlikely to impact any sensitive receivers or livestock. The Department notes that this far exceeds the normal buffer used for flyrock management of up to 500 metres and considers that these distances are large enough to significantly reduce the risk posed by flyrock.

6.4.31 However, as with the existing operations, blasting would occur within 500 m of Wybong Road, Wybong PO Road and Ridgelands Road, powerlines and Crown land. Glencore proposes to operate an exclusion zone to manage the effects of flyrock when blasting within 500 m radius of these locations.

6.4.32 Glencore has also committed to develop a Road Closure Protocol to manage road closures associated with blasting within the proposed exclusion zone. Road closures already occur near the Mangoola Mine and would be limited to no more than one per day to minimise disruption to local road users, although this closure may extend to more than one road per road closure event.

6.4.33 The Department accepts that the risk from blasting flyrock would be sufficiently mitigated by the distance from residential receivers and grazing land and the proposed standard management and monitoring measures. The Department has recommended that these measures are documented in a detailed Blast Management Plan for the site.

Blast Fumes

6.4.34 The assessment of potential air quality impacts associated with blasting concluded that, with the implementation of the existing measures described in Glencore's Blast Fume Management Strategy, the Project would comply with the relevant criteria at all private receivers. The Department has considered the impacts of NO_x in **Section 6.3**.

6.4.35 As discussed in **Section 6.3,** the Department has recommended a condition requiring that Glencore implement a Blast Fume Management Strategy for the Project as part of the Air Quality and Greenhouse Gas Management Plan.

Conclusions

6.4.36 The Department considers that the BIA has satisfactorily assessed the Project's potential ground vibration, airblast overpressure and flyrock impacts and is unlikely to result in material impacts to nearby privately-owned residences, heritage items or infrastructure.

6.4.37 The Department also considers that Glencore's current operational experience at Mangoola Mine demonstrates it can comply with contemporary airblast overpressure and ground vibration criteria, and minimising the release of flyrock, dust and noxious fumes.

6.4.38 The Department notes that Glencore has committed to offer, prior to blasting, a property inspection to all private landholders located within 2 kilometres of the proposed extension area to establish the baseline condition of private structures. The Department has recommended that this commitment be formalised as a condition of consent.

6.4.39 The Department has recommended a series of ground vibration and airblast overpressure criteria to protect sensitive receivers and their property, heritage sites and infrastructure. Glencore has predicted that through careful blast design there would be no exceedances of these criteria.

6.4.40 The Department has also recommended a condition to minimise blasting road closure impacts on the community. This would require the development of a Road Closure Plan for any blasts that occur within 500 m of a public road, limited to one closure per day which avoids peak traffic. The Department has also recommended conditions requiring Glencore to notify the community of blasting events and road closures, and co-ordinate the timing of closures with nearby mines to minimise the cumulative effect on road users.

6.4.41 To ensure that blasting impacts continue to be managed by Glencore, the Department has recommended that the existing blast management and monitoring practices are applied to the proposed operations through the preparation and implementation of a contemporary Blast Management Plan. This plan must describe the controls to be applied to ensure the safety of site personnel and the public, to protect public and private infrastructure and heritage items and to manage and minimise the release of dust and noxious fumes.

6.5 Traffic and Transport

Background

6.5.1 The existing Mangoola Mine project approval restricts the transport of product coal from the site to the existing rail loop only, with no road transport of coal permitted. The current approval permits up to 20 train movements per day (i.e. 10 trains in and 10 trains out) which would remain unchanged under the proposed Project.

6.5.2 Road access to the existing project occurs by way of a dedicated Mine Site Access Road off Wybong Road, a local road under the control of Council, which links to the State road network via Bengalla Road, Denman Road and Thomas Mitchell Drive (see **Figure 19**).

6.5.3 The Mangoola Mine approval also restricts the use of certain local roads by the mine's employees, including Reedy Creek Road, Roxburgh Road, Castlerock Road and Mangoola Road. This restriction was introduced to protect the amenity and safety of residents and commuters on those local roads. In addition, mine related heavy vehicles are not permitted to use Wybong Road west of the Mine Site Access Road (to the intersection with the Golden Highway). The Project would operate within the approved maximum workforce for Mangoola Mine (540 people), with a proposed maximum workforce of 480 people.

6.5.4 Under PA 06_0014, Glencore has upgraded the Wybong Road intersections with the Golden Highway, Wybong PO Road and Yarraman Road and has upgraded and continues to maintain Wybong Road between the intersections with the mine access road and Bengalla Link Road. In addition, Glencore is required to contribute to the upgrade and maintenance of Thomas Mitchell Drive, including its intersection with Denman Road, in accordance with the *Thomas Mitchell Drive Contributions Study* which was developed in consultation with Council and the mining industry in 2014.

6.5.5 On top of these existing road upgrade and maintenance obligations, part of Glencore's existing VPA with Council includes an annual development contribution towards the costs for maintenance of Council roads affected by the Mangoola Mine.

6.5.6 In 1997, Council adopted the *Muswellbrook Western Roads Strategic Traffic Study* which guided decisions and consents for the Bengalla, Mt Pleasant and Mangoola Mines. This was superseded by Council's 2015 *Mine Affected Road Network Plan* (MARNP), which developed a range of mitigation strategies to address the impacts of mine related traffic on the local road network.

6.5.7 Council has recently completed a review and update of the 2015 MARNP and has prepared the *Mine Affected Road Network Plan Review* (MARNP Review) (Bitzios Consulting & Northrop 2020). The MARNP Review was publicly exhibited from 18 April to 15 May 2020 before it was finalised and adopted by Council on 26 May 2020.

6.5.8 The key recommendations of MARNP and MARNP Review as they relate to the Project include Council's proposal to potentially close Wybong PO Road and upgrade Yarraman Road, along with broader opportunities to improve network connectivity in the LGA through the establishment of link roads.

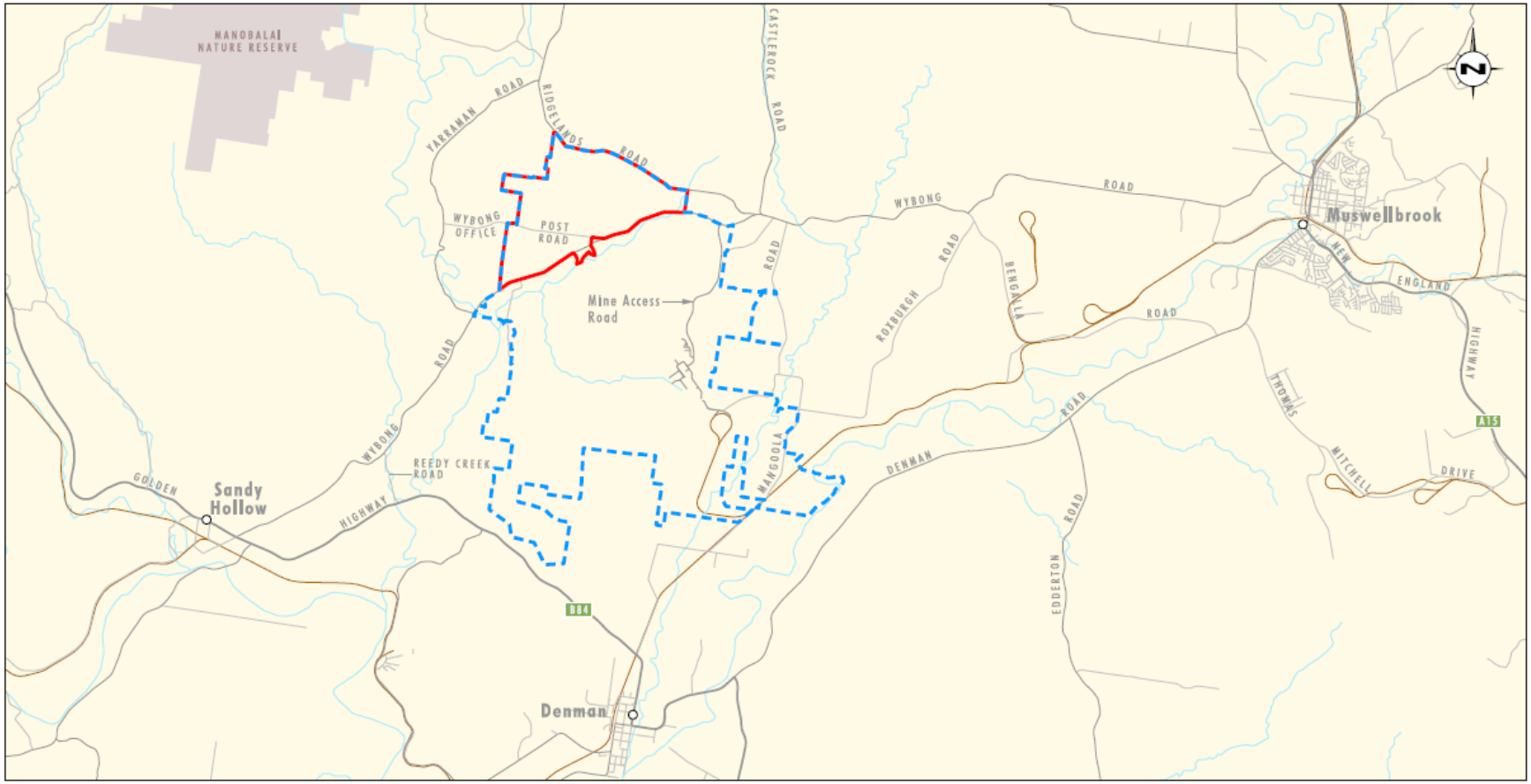

Figure 19 | Existing Road Network

6.5.9 Importantly, the Department notes that these recommendations have not been endorsed by the State Government and represent MSC's view on its desired operation of the local road network. Consequently, while these studies may be considered as informative of MSC's views, they cannot be considered to represent the State Government's policies or positions on the management of road impacts for State significant developments.

Impact Assessment

6.5.10 The EIS includes a Traffic and Transport Impact Assessment (TTIA) by GHD which investigated the potential impacts of the Project. The TTIA was prepared in accordance with the RMS *Guide to Traffic Generating Developments,* Austroad's *Guide to Road Design* and *Guide to Traffic Management.*

6.5.11 The key elements of the Project with potential traffic and transport impacts include the proposed closure/realignment of Wybong PO Road, construction traffic on the road network and the haul road overpass of Wybong Road. Employees and heavy vehicle deliveries would also continue to use of the existing road network to access to the site.

6.5.12 The TTIA assessed the potential impacts of the Project using previous traffic assessments, intersection surveys, tube traffic counts, traffic modelling and intersection analysis (using SIDRA 7 modelling software). The TTIA also included an assessment of potential impacts to the Hunter Valley Rail Network which may result from the Project.

6.5.13 The key intersections of interest relevant to the existing operations are:

- Golden Highway / Wybong Road;
- Wybong Road / the Mine Site Access Road;
- Denman Road / Bengalla Road; and
- Denman Road / Thomas Mitchell Drive.

6.5.14 TfNSW also requested that further analysis be undertaken for the intersection performance at the Sydney Road and New England Highway intersection (in Muswellbrook) in its advice on the EIS (see **Section 5**). This information was provided in Glencore's Submissions Report, however the Department notes that traffic travelling from the Mangoola Mine to the New England Highway would not be expected to use this intersection given the presence of a more direct route via Thomas Mitchell Drive.

6.5.15 Traffic surveys for the TTIA and Submissions Report indicate that all intersections currently operate with a level of service (LoS) C or better during peak periods, and that existing traffic volumes along the road network are within acceptable operating capacity.

6.5.16 Nevertheless, concerns relating to potential traffic and transport impacts were raised by Council and by 11 members of the community in public submissions. The issues raised focused primarily on the potential impacts of increased traffic movements and associated impacts to travel time due to the realignment of Wybong PO Road.

6.5.17 Glencore provided detailed responses in its Submissions Report to all issues raised, including responses to the advice received by TfNSW and Council. The Department notes that TfNSW considered that the information provided by Glencore in its EIS was adequate and stated that it had no further comments on the Project (see **Section 5**).

Wybong PO Road

6.5.18 As depicted in **Figure 19**, the footprint of the Project would require the closure of a 2.7 km section of Wybong PO Road, from its intersection with Wybong Road. As noted in **Section 2.4**, Glencore proposes to realign Wybong PO Road to traverse the western boundary of the Northern Extension Area adjacent to the realigned 500 kV transmission line easement.

6.5.19 The proposed realignment is predicted to marginally increase the travel distance to Muswellbrook by 1.6 km or an additional travel duration of 55 seconds. However, the Department notes that the realignment would significantly improve the current condition of the road, alternative routes are available to access residences to the west of the Project, and no concerns were raised in public submissions about the proposed realignment.

6.5.20 Furthermore, as Glencore owns all land along the section of Wybong PO Road proposed to be closed, the realignment would not impair road access to private properties.

6.5.21 Notwithstanding, Council's 2020 MARNP review indicates that Council's preference for the road network in this area would be to close the affected section of Wybong PO Road and instead upgrade the southern end of Yarraman Road to provide access to this community. While Council's preferred approach would increase travel time for residences in the area, Glencore has submitted additional to inform the consideration of Council's proposal (see **Appendix D**).

6.5.22 As noted in its additional information, Glencore acknowledges Council's desire to implement the MARNP Review recommendations and has offered to contribute towards the upgrade of Yarraman Road on a proportionate basis to the costs that would otherwise be incurred to realign Wybong PO Road, as proposed in the EIS. This contribution would however be contingent on Council agreeing to the permanent closure of the affected section of Wybong PO Road.

6.5.23 The Department notes that should Council's preferred option be pursued, and the eastern end of Wybong PO Road closed, those residences located near the western end of Wybong PO Road would still be able to access Wybong Road via Yarraman Road to the south and Ridgelands Road to the north. The greatest impacts to these properties under this option would arise when travelling to the Golden Highway via Yarraman Road during periods of flooding. Under current flood conditions the existing causeway over Yarraman Road becomes submerged and traffic is diverted via Wybong PO Road.

6.5.24 Should Council pursue the closure of the affected stretch of road prior to upgrading the current causeway, these residences would have to travel north to Ridgelands Road in order to access Wybong Road in flood conditions. While this would be an infrequent occurrence and would not materially affect the operation of the long term road network in the area, the Department considers that it provides further justification for the option proposed in the EIS to realign the east extent of Wybong PO Road.

6.5.25 Additionally, the Department notes that any upgrade to the causeway on Yarraman Road is a matter for Council as the roads authority, as the responsible party for that section of the road network. As residents would still be able to access Wybong Road to the north and south, and alternative options have been proposed to realign Wybong PO Road to address the long term functionality of the road network in the area, the Department considers that

the closure of Wybong PO Road to facilitate mining operations should not be contingent on any subsequent plans by Council to upgrade the southern section of Yarraman Road.

6.5.26 Having assessed the environmental and social impacts associated with the proposed impacts to Wybong PO Road, the Department considers that either the realignment or closure of this section of road would is approvable, subject to conditions.

6.5.27 While the Department considers that the realignment of Wybong PO Road would deliver a preferred social and road network outcome, it would necessitate the clearing of approximately 20 ha of land, including the only area within the Project disturbance footprint that contains large-eared pied bat habitat. Glencore has identified that should the realignment of Wybong PO Road not be required, these impacts would be avoided and there would no longer be a requirement to offset impacts for the large-eared pied bat.

6.5.28 Overall, the Department notes that Wybong PO Road is not heavily trafficked, that alternate routes to Wybong Road are available for nearby residents and that the potential future upgrade of Yarraman Road by Council is yet to be endorsed or approved.

6.5.29 Consequently, the Department has recommended conditions that require Glencore to close the affected section of Wybong PO Road prior to undertaking mining operations within 200 m of the affected section of road and either:

- realign the affected section of road as described in the EIS, to the satisfaction of Council; or
- provide a financial contribution to Council equivalent to the cost of realigning the road, which may be directed towards the implementation of Council's preferred approach to addressing road network issues in the locality.

Construction traffic

6.5.30 Construction traffic would require access to the Northern Extension Area via Wybong Road, Wybong PO Road and Ridgelands Road, for a 16 month period prior to commencing mining operations in the Northern Extension Area in 2022. These construction access points would then be maintained over the duration of the operational Project life for emergency services, ongoing environmental monitoring, land management and property maintenance activities.

6.5.31 The TTIA assumes the construction activities would be expected to generate additional inbound and outbound traffic movements comprising:

- 145 light vehicles (conservatively assuming 1 car per construction worker);
- an average of approximately 31 heavy vehicles per day; and
- a peak of approximately 70 heavy vehicles per day.

6.5.32 Nevertheless, the Department notes that the existing Mangoola Mine currently employs around 400 operational staff from a maximum limit of 540 full time employees. As such, a large proportion of the increase in construction traffic could be accommodated within the existing operational limits of the Mangoola Mine. Additionally, the predicted increase in heavy vehicle activity includes the short haul transport of gravel from the Mangoola Mine to the Northern Extension Area. As these trucks would only be travelling along the existing Mangoola site access road and a short section of Wybong Road, the Department considers that these truck movements would have limited implications for the broader road network.

6.5.33 The intersection analysis undertaken by GHD indicated that based off a predicted increase in current background traffic levels and construction commencing in 2022, all intersections would continue to operate a satisfactorily and maintain a LoS C or better. The TTIA and additional information provided by Glencore predicts that the regional road network would adequately accommodate the additional construction traffic.

6.5.34 In commenting on the predicted LOS, Council's submission raised concerns that the traffic modelling in the TTIA has not incorporated operational traffic. However, the Department can confirm that the existing operational traffic from the approved mine is included in traffic counts and the modelling adequately considers the incremental impacts of the Project.

6.5.35 In response to comments from RMS (now TfNSW), Glencore has confirmed that adequate car parking would be available for the additional construction workforce within the Northern Extension Area and that no car parking would occur within existing public road easements. Glencore has also committed to design and install its access gates for construction points and car parking areas to incorporate sufficient set-back distances to allow B-double vehicles to access the site without encroaching or queuing on the public road easement.

6.5.36 Glencore has proposed to provide further detail of the establishment and management of the required construction access and parking arrangements as part of a Traffic Management Plan, to be developed in consultation with Council prior to commencing construction. The Department supports this commitment and has reflected this in the recommended conditions at **Appendix G**.

6.5.37 As the Project is not seeking to change the currently approved maximum production rate (i.e. 13.5 Mtpa) or existing approved operational workforce numbers, the Department is satisfied there would be no increase in the currently approved operational traffic volumes. However, the Project would extend the duration of mining operations by up to 13 months.

6.5.38 Glencore states that this small extension to the Project life is unlikely to significantly impact the road network or road users. The Department agrees with this conclusion and notes that this is supported by the results of the traffic surveys conducted for the Project which confirmed that the road network has adequate capacity and is operating at an acceptable LoS given the existing operational traffic movements.

6.5.39 The Department notes that Council requested a condition be imposed preventing Project traffic utilising Wybong East Road and Kayuga Road, as has been imposed under the approval conditions for the Bengalla and Mount Pleasant mining operations to the northeast of the site. In considering this recommendation, the Department notes that the existing Mangoola Mine is already subject to five road restrictions under PA 06_0014, which have greater nexus with the traffic generation associated with this Project.

6.5.40 Given the Project would not increase the currently approved operational traffic movements and all relevant intersections would be able to accommodate the additional construction traffic, the Department is of the view that these further restrictions are unwarranted.

6.5.41 Overall, the Department is satisfied that subject to its recommended conditions, which include upgrades to the road network undertaken in consultation with Council as well as ongoing road maintenance contributions, the Department is satisfied any Project related

vehicle movements generated during the construction and operation phases would be able to be satisfactorily accommodated within the surrounding road network.

Overpass Construction

6.5.42 As outlined in **Section 2**, the Project would require the construction of a private haul road overpass of Big Flat Creek and Wybong Road in order to provide access between the extended Northern Pit area and the existing operations.

6.5.43 As illustrated in **Figure 20**, the overpass has been located and designed in an effort to minimise the span and extent of impacts on Big Flat Creek and provide for optimal integration with the existing haul road network at the Mangoola Mine, thereby reducing the need to rehandle overburden material and re-disturb areas of established rehabilitation.

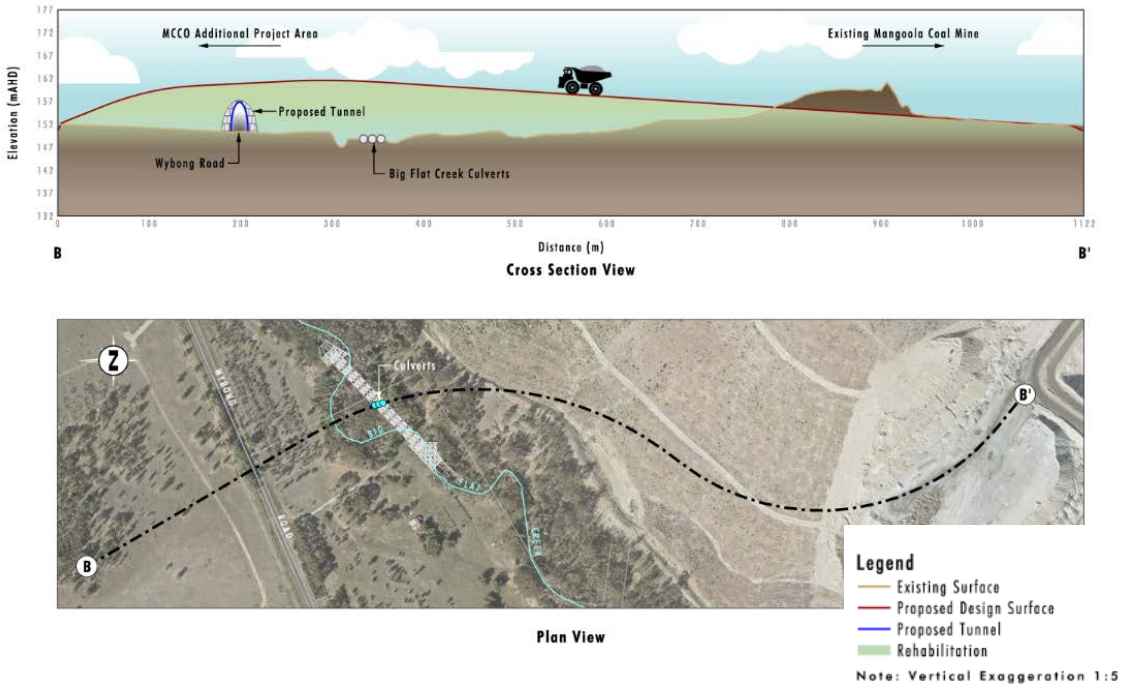

Figure 20 | Cross Section view of Wybong Road Overpass

6.5.44 The overpass would be constructed in consultation with Council and addresses all relevant Austroads and RMS design standards. The overpass would have an overall length of approximately 150 m and a clearance of 6.2 m above Wybong Road. The Department notes that Glencore increased the originally proposed clearance height of the tunnel in its Submissions Report (from 5.4 m to 6.2 m) in order to address comments from Council and to ensure the proposed overpass could continue to accommodate the same specifications of oversized vehicles that can currently use the road (see Section 5).

6.5.45 During construction of the haul road overpass, a bypass would be constructed to temporarily divert Wybong Road traffic around the construction site (see **Figure 6**) and maintain traffic flow. The bypass would be designed and constructed in accordance with relevant design guidelines and in consultation with Council. At a minimum, the bypass would be built to the same standard as the existing Wybong Road, including being sealed for use by over-size over-mass (OSOM) vehicles. Once constructed, the bypass road would be retained for the life of the development for use during overpass decommissioning.

6.5.46 The bypass road would be constructed in a manner that would not require the closure of Wybong Road, with the exception of temporary impacts associated with the construction the connections with Wybong Road. Management of road safety interactions during construction of the overpass and bypass road would be described in more detail in a Traffic Management Plan to be developed in consultation with Council.

6.5.47 The Department is satisfied that the revised design of the haul road overpass would maintain the ability of Wybong Road to accommodate the passage of heavy vehicles (including OSOM vehicles) and not cause any significant impacts to traffic flows, subject to the implementation of traffic controls to be described in the Traffic Management Plan.

Road Safety

6.5.48 The TTIA included an assessment of impacts to road safety near the intersections relevant to the Project, based on a review of crash data provided by TfNSW over the 5 year period from 2013 to 2017. This assessment concluded that there are no significant safety deficiencies in the road network near the Project-related intersections.

6.5.49 Following advice from the Council on the EIS, Glencore conducted a review of additional crash data, not available at the time of preparing the TTIA, which identified two recent fatal crashes along Wybong Road, one in August 2018 and one in September 2019. As a result of the August 2018 crash, the State Coroner recommended that improved escort arrangements should be provided for oversize vehicles on narrow rural roads.

6.5.50 In order to address these recommendations, Glencore has committed to ensure that the movement of oversize vehicles associated with the Project are undertaken in accordance with the *National Heavy Vehicle Regulator Guidelines* and relevant TfNSW requirements.

Management and Monitoring

6.5.51 In order to manage traffic impacts during the construction phase, Glencore has committed to preparing a Traffic Management Plan, in consultation with Council and prior to the commencement of construction activities. The Traffic Management Plan would include a description of appropriate traffic control plans, including:

- traffic control measures in work areas;
- restrictions on the delivery of heavy plant and materials to site;
- identification of appropriate entry/exit points for the proposed construction areas; and
- a protocol for publicly advertising the changes in traffic conditions associated with Project activities.

6.5.52 Further to this, Glencore has committed to adopt the requirements of the RMS's Technical Manual – *Traffic Control at Work Sites*, for all Project related road works.

6.5.53 Glencore would continue to abide by existing conditions of approval which restrict the use of Reedy Creek Road, Roxburgh Road, Castlerock Road and Mangoola Road, except in an emergency to avoid the loss of life, property and/or prevent environmental harm, and would continue to provide contributions to road upgrades and maintenance.

6.5.54 The Department is satisfied that with the implementation of the above mitigation measures, including the development of a detailed Traffic Management Plan, the Project would be able to operate with acceptable levels of impact to the local road network or road users.

Conclusion

6.5.55 The Department considers that Glencore's proposed mitigation and management measures would effectively manage and minimise potential traffic and transport impacts on the local road network, and that the proposed options for the closure and potential realignment of the affected section of Wybong PO Road could be implemented in a manner that would not materially impair the operation of the local road network.

6.5.56 Overall, the Department believes the traffic and transport aspects of the Project can be managed through the implementation of the comprehensive monitoring and management measures detailed in the recommended conditions.

6.6 Final Landform and Rehabilitation

6.6.1 In developing a proposed final landform plan for the Project, Glencore has sought to adopt rehabilitation principles consistent with the Mangoola Mine, including the use of topographic relief (macro and micro relief), hydro-geomorphologically stable drainage lines and flow paths that integrate with the surrounding landscape. These principles have been successfully implemented across the existing Mangoola Mine site and have been subject to industry led case studies into leading practice rehabilitation outcomes.

6.6.2 The proposed Northern Pit extension area would be rehabilitated in a similar manner, with approximately 484 ha of the 623 ha of additional disturbance being revegetated with native woodland communities. Around 456 ha of this rehabilitated woodland would be established for biodiversity offset purposes (see **Section 6.7**) and would provide long term biodiversity conservation outcomes for the Northern Extension Area and broader region (see **Figure 21**). Of the remaining 139 ha of additional disturbance, around 82 ha would be retained as part of the final Northern Pit void and the remainder would be rehabilitated to grassland or retained for potential future use (e.g. infrastructure).

6.6.3 This preferred final landform plan was informed by a detailed Mine Plan Options Report which accompanied the EIS and provides Glencore's evaluation of a range of alternative final landform and final void configurations. A summary of the Glencore's considerations of the final landform options and proposed option (Case 3) is provided in **Table 13**.

6.6.4 In assessing the mine plan options, the Department recognises that the existing Mangoola Mine is already approved to retain a 52 ha final void in the landscape to the southwest of Anvil Hill and must rehabilitate the remainder of the site with a combination of around 1,450 ha of woodland and forest habitat and around 700 ha of native grassland.

6.6.5 The proposed final landform seeks to optimise the use of overburden recovered from the Northern Pit area by transferring around 50 Mbcm of overburden to the Mangoola Mine. In this way, while the Project would involve the retention of an additional final void in the landscape, the overburden recovered from the Project can be transferred to the Mangoola Mine site to assist in reducing the size of the final void that is already approved to be retained under PA 06_0014 and improve final landform drainage features (see **Figure 22**).

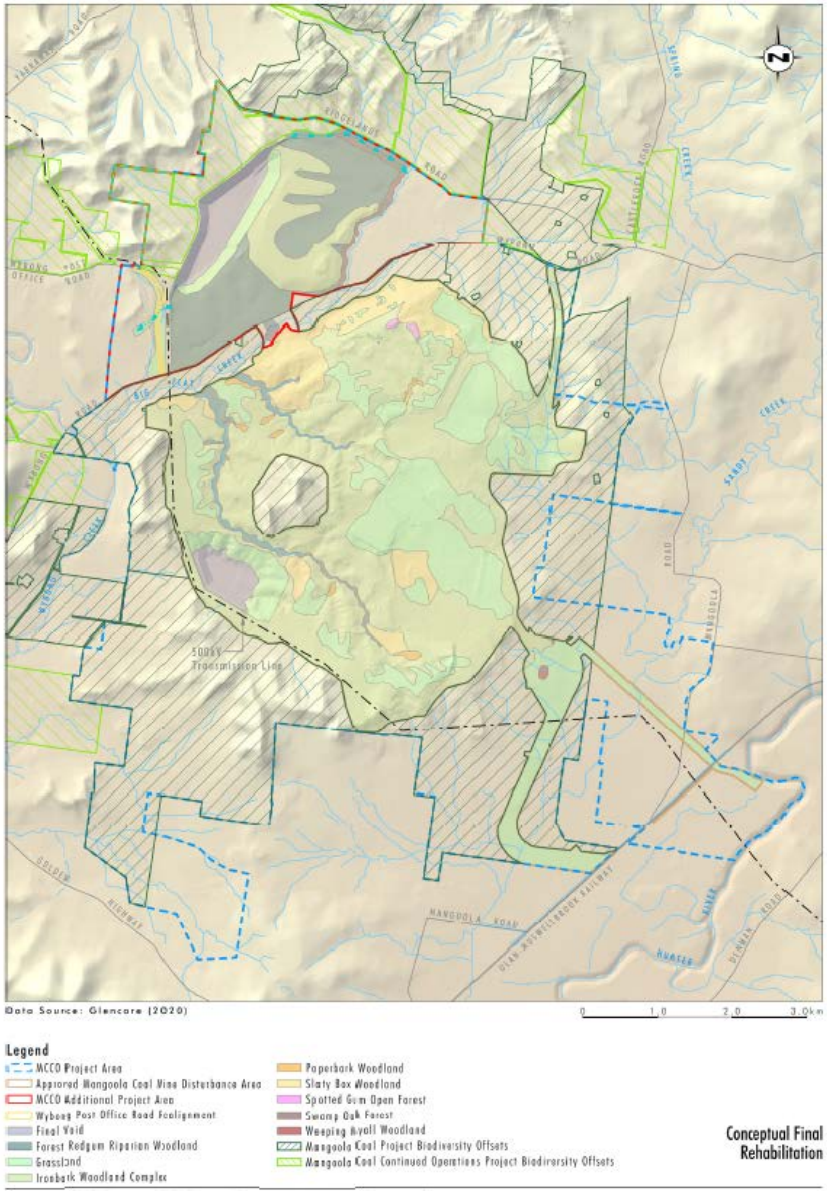

Figure 21 | Conceptual Final Rehabilitation for Extension Area and Mangoola Mine

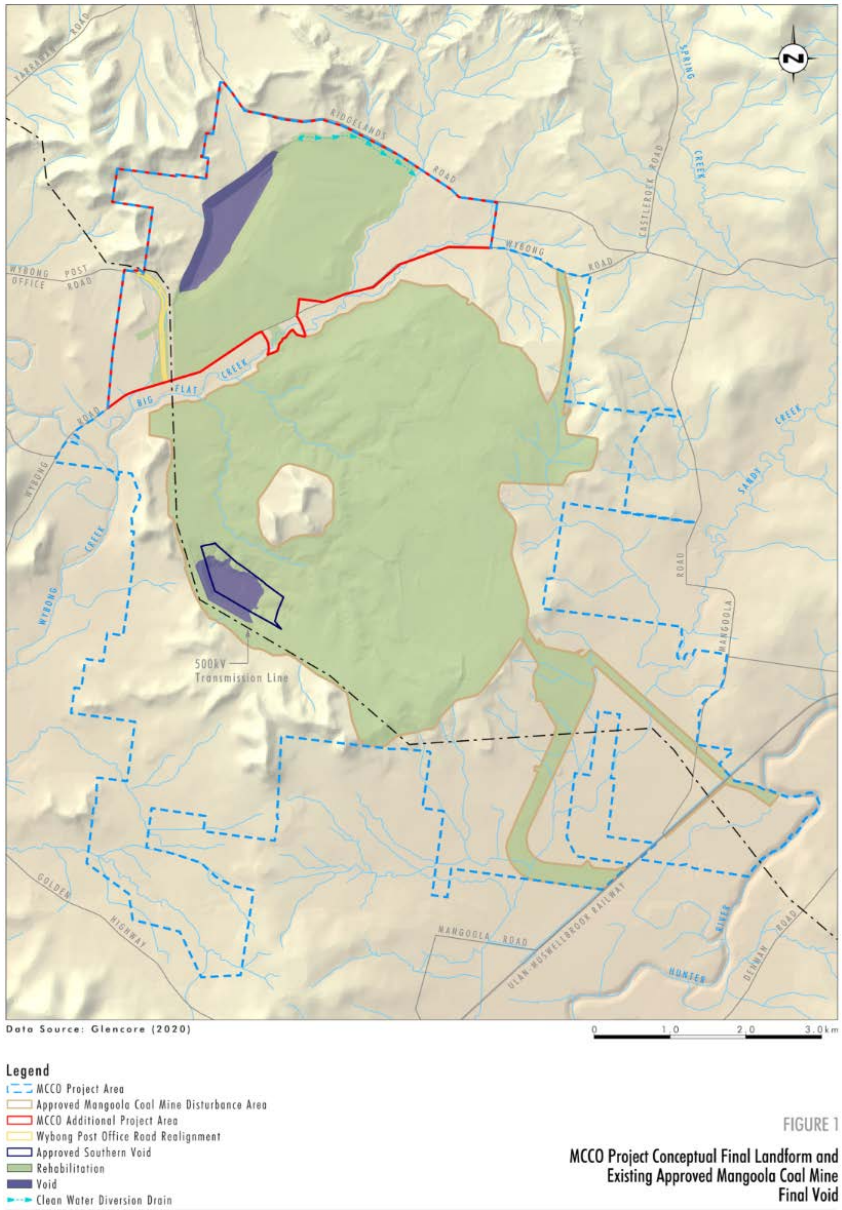

Figure 22 | Proposed Project Final Landform Plan, including overlay of the currently approved Mangoola Coal Mine Final Void

6.6.6 In response to advice provided by MEG and the Resources Regulator on the EIS, along with public submissions which questioned the need to retain two voids in the final landform, Glencore commissioned Xenith Consulting to conduct an expert analysis of the final landform options from a mining engineering perspective and also commissioned IEMA to peer review the full scope of the Mine Plan Options Report (see **Section 5**).

6.6.7 Further comparative analysis of the preferred option (Case 3) against two alternative final void options (Case 4 and 6) is provided in Glencore's response to the RR's review of the Submissions Report (see **Table 13**). Following review of Glencore's Submissions Report, the Resource Regulator sought further detailed information regarding the treatment of the final landform and voids. Glencore subsequently provided additional information in response to this request.

6.6.8 The Department also recognises that Council's submission indicated a preference for Case 4, which involves the retention of a much larger, single void in the final landform. While the Department acknowledges Council's position, it is noted that this option does not necessarily deliver a better landform or future land use outcome for the site.

Table 13 | Consideration of alternative final landform scenarios

Scenario	Description	Consideration
Case 1 Baseline	• the Project with no transfer of overburden between project areas; • two final voids to become waterbodies; • most cost-effective option	• all overburden emplaced within the Northern Pit extension area, north of Wybong Road • no rehandling of overburden to improve final void • 40 m higher overburden emplacement in final Northern Pit landform (compared with Case 3) • additional out of pit overburden emplacement
Case 2 Initial Project	• 50 Mbcm of overburden transferred from the Northern Pit area to Mangoola Mine • two final voids to become waterbodies	• improved final void profile for Mangoola Mine compared with Case 1 • additional cost of $53 million (above Case 1)
Case 3 Proposed Project	• 55 Mbcm of overburden transferred from the Northern Pit area to Mangoola Mine • rehandling 5 Mbcm of overburden within Northern Pit area to improve final void profile • two final voids – 81 ha (Northern Pit) and 46 ha (Mangoola Mine) voids to become waterbodies	• improved final void profile compared with Case 2 • additional cost of $75 million (above Case 1) • mine closure delayed by 6 months compared with baseline
Case 4 Single void	• 83 Mbcm of overburden transferred from the Northern Pit area to Mangoola Mine • retain a 132 ha Northern Pit final void as a waterbody and backfill open cut areas of the Mangoola Mine to RL150 - RL160 m to enable free drainage	• improved final landform at the Mangoola Mine • retention of a much larger final void and steeper highwalls in the Northern Pit area compared with preferred option (Case 3) • additional cost of $114 million (above Case 1) • similar project duration to baseline

Case 5 No voids	• Both pits backfilled – no final voids • 83 Mbcm of overburden transferred from the Northern Pit area to Mangoola Mine to backfill void • 100 Mbcm of overburden rehandled and transferred from Mangoola Mine to Northern Pit following completion of mining once void is available to fill	• 394 ha of rehabilitated land to be disturbed • additional overburden used to fill pits would reduce the material available to provide topographic relief • additional $526 million compared with Case 1 • mine closure delayed by 4.5 years
Case 6 Partially backfilled voids	• 56 Mbcm of overburden transferred from the Northern Pit area to Mangoola Mine • rehandling of 8 Mbcm of overburden to partially fill Northern Pit void • two final voids– 144 ha (Northern Pit) and 62 ha (Mangoola Mine) voids to become waterbodies	• final void profiles would be shallower and from depressions in the final landscape compared with preferred option, but would still hold water • larger area of final voids compared with preferred option (Case 3) • reduced ability to provide topographic relief • mine closure delayed by 9 months • additional $95 million compared with Case 1
Case 7 'Do Nothing'	• not proceeding with the Project and continued operation of the approved Mangoola Mine	• both the impacts and benefits of the Project would not be realised, and the existing approved void would remain in the landscape.

6.6.9 Following the completion of its mine planning options analysis, Glencore concluded that that the retention of two final voids would result in an overall benefit by improving landform topography, relief and drainage. The alternative of creating a final landform with either no or one final void in the landscape would require the use of overburden that would otherwise have been used to create an undulating free draining landform. Importantly, should this occur, the resulting landform would have a reduced capacity for drainage and increased potential for ponding, and would result in a flatter and less visually variable landscape.

6.6.10 Further to this Glencore has argued that the location of the final voids and highwalls would be in areas with minimal visibility from the public domain including Wybong Road. These outcomes are supported by the Xenith review commissioned by Glencore, which considered the engineering feasibility and material balance of the alternatives and supported the selection of the preferred option as superior on the basis of volumetric balance, practicality of implementation, engineering viability and the provision of a stable and free draining final landform.

6.6.11 The IEMA review noted the preferred option is an improvement on the approved Mangoola Mine final void and the principles adopted by Glencore are consistent with those for the Mangoola Mine. IEMA noted Glencore has successfully implemented progressive rehabilitation at the Mangoola Mine to date and indicated its confidence that Glencore could deliver appropriate outcomes in rehabilitating the Northern Extension Area. The IEMA review also concluded that further refinement of the final landform and post mining land use could occur during the development of the proposed Mine Closure Plan.

6.6.12 In addition to the above, the Department requested further consideration of the final void designs by Glencore to reduce the extent of the highwall and modify the acute edges between the highwall and overburden emplacements. Glencore provided further analysis in the Submissions Report to refine the final shape of the voids, particularly to remove the sharp corners at the ends of the highwalls (see **Figure 23** and **Figure 24**).

6.6.13 Glencore has also committed to further refine the highwall design during its detailed final landform and mine closure planning process, to achieve an optimum final void profile. The refinement of the final landform designs would be informed by ongoing geotechnical investigation and consultation with the relevant stakeholders.

6.6.14 To ensure Glencore continues to refine the final landform design, the Department has recommended conditions which include rehabilitation objectives requiring Glencore to optimise the final voids, minimise highwall instability risk and maximise the angle between the highwalls and contours of the shaped final landform. The Department has also recommended conditions requiring the development of a Rehabilitation Strategy and Rehabilitation Management Plan in consultation with Resource Regulator and Council to detail how these rehabilitation outcomes would be achieved.

6.6.15 The Resource Regulator's submission on Glencore's Submissions Report also raised concerns about the long term safety and maintenance of the highwall and requested further information from Glencore to demonstrate that sustainable rehabilitation outcomes could be achieved. Glencore provided supplementary information to indicate the proposed highwall profile at the Northern Pit would be consistent with Mangoola Mine, with maximum slopes of 27 degrees in the unweathered strata and a commitment to review the use of berms in consultation with Resource Regulator.

6.6.16 The Department notes that this matter can be adequately addressed as part of the mine closure process and has incorporated the Resource Regulator's comments relating to these matters in its recommended conditions.

6.6.17 The Department has carefully considered Glencore's evaluation and peer reviews of the final landform of the Project and is satisfied that Glencore has adequately considered the final void options. The Department considers that the preferred option finds an appropriate balance between efficient mining operations and providing a safe and stable landform with suitable relief over the majority of the site.

Figure 23 | Proposed layout changes to the Project void

Figure 24 | Proposed layout changes to the Mangoola Mine void

Rehabilitation

6.6.18 Glencore proposes to rehabilitate the final landform in the Northern Extension Area with woodland species to contribute towards its required biodiversity offset (see **Section 6.7**) and establish open woodland and native grassland areas suitable for grazing over the remaining land, consistent with the approved rehabilitation strategy for the Mangoola Mine.

6.6.19 The EIS notes that to date, around 490 ha of disturbed mining land at the Mangoola Mine has been successfully rehabilitated to woodland. Glencore reiterated this in its Submissions Report and noted that ecological monitoring demonstrates rehabilitation is progressing towards achieving the completion criteria, including continued growth through the 2018 drought period.

6.6.20 The Department is aware of the Glencore's success in progressively rehabilitating the Mangoola Mine and other mines in the Hunter Valley and considers that the application of its recommended conditions pertaining to rehabilitation performance criteria and management plan requirements would adequately address the ongoing rehabilitation of areas disturbed by mining operations.

6.6.21 In addition to these typical rehabilitation activities, NRAR sought further information regarding Glencore's approach to the rehabilitation of Big Flat Creek, given Glencore's commitment to restore those sections of Big Flat Creek that are impacted by the Project, particularly the overpass infrastructure. In response to these matters, Glencore committed to update its existing Rehabilitation Management Plan to specifically address works within the riparian zones.

6.6.22 In recognition of Glencore's commitment to remediate and rehabilitate the parts of Big Flat Creek impacted by the construction and operation of the haul road overpass, the Department has recommended conditions requiring the Surface Water Management Plan to include detailed plans and objectives for rehabilitation of the section of Big Flat Creek that would be impacted by the Project. The Department has also recommended rehabilitation objectives for creek restoration works which must be addressed in the Rehabilitation Management Plan.

6.6.23 The ongoing management and monitoring of potential pollution from the site during and following rehabilitation, including long term flows to Big Flat Creek was also raised in Council's submission. In response to these matters Glencore identified that the EIS included reference to geochemical analysis of the existing overburden emplacements at the Mangoola Mine, which indicate that the emplacements are likely to be non-acid forming (NAF) and non-saline.

6.6.24 While the management of potential acid forming (PAF) material has been successfully at the existing Mangoola Mine, Glencore has committed to further inspections of coarse rejects and excavations during mining to identify any PAF material and where identified co-dispose the PAF material with NAF material and in locations where potential seepage of acid is minimised. In doing this, Glencore intends to minimise the potential exposure of waste rock and coal rejects and reduce the overall concentration of any potential acid forming material., and emplace this material along with any potentially sulphurous and saline material deeper within the emplacement to further reduce the risk of exposure.

6.6.25 The Department is satisfied that this approach would adequately dilute and manage any potential pollution risks or risks to long term stability of the rehabilitated landform and notes that these measures would be described in more detail as part of the recommended Rehabilitation Strategy for the Project, to be developed in consultation with Council and the Resource Regulator.

6.6.26 As has successfully been implemented at the existing operations, , the drainage lines within the Northern Extension Area have been designed to convey flows to the sediment basins constructed during mining operations to manage the potential for any erosion and offsite sedimentation risk. Rehabilitation of the final landform to replicate native woodland communities, with trees, shrubs and grasses would further stabilise the surface of the landform and enable effective controls of surface water flows without the need to use reinforced rock-lined drop structures. The progressive rehabilitation of the drainage lines and emplacements during mining operations would be monitored to determine the success of these features and ensure the final landform is stable and non-polluting.

6.6.27 Relevant sediment basins around the site would be retained to perform a sediment detention function until it can be verified that the surface of the emplacements is vegetated and stabilised and water quality in sediment basins is comparable with the receiving environment. Additionally, these sediment basins may be retained beyond the project life for water storage if agreed with the final landowner and relevant agencies.

6.6.28 To ensure the objective of maintaining a non-polluting landform over the long term is achieved, and in accordance with the existing approval conditions, the Department has recommended a condition requiring the Water Management Plan to establish performance criteria for post-mining water pollution from rehabilitated areas of the site and a monitoring program to verify the ongoing success of these measures.

Proposed final land uses

6.6.29 Glencore is proposing to establish final land use outcomes for the project that are consistent with the existing Mangoola Mine. This includes an intention to return the majority of the site to rehabilitated woodland and open forest, with areas of native grassland that are capable of sustaining low intensity agricultural land uses such as grazing (see **Figure 21**).

6.6.30 The EIS included consideration of potential opportunities for the future use of areas of the site not proposed to be rehabilitated to woodland, including infrastructure that may be retained for future use. These areas were selected based on the infrastructure and landforms established for the Mangoola Mine and Northern Pit Extension Area, which Glencore has identified as having the potential to be utilised for future agricultural, industrial and employment land activities.

6.6.31 Community submissions also raised concerns with the proposed final landform outcomes, particularly with the loss of agricultural land and the need to adopt a landform that supports beneficial future uses. Many of these comments were also reflected in Council's submission which included detailed comments on beneficial final land uses and mine closure planning processes (see **Sections 5** and **6.10**).

6.6.32 In response to these matters, Glencore indicated that it intended to address these matters in line with the existing requirements of PA 06_0014, which requires detailed consideration of final land use options to be undertaken during the mine closure planning phase, which would commence approximately 5 years prior to completion of mining operations.

6.6.33 The Department has sought to strengthen the consideration of these mine closure planning and future land uses assessments, by recommending contemporary conditions that reflect leading practice standards for landform relief features in the Rehabilitation Objectives for the site and earlier consideration of mine plan closure requirements in the Rehabilitation Management Plan. Importantly, the revised Rehabilitation Management Plan would be required to include measures to investigate and facilitate post-mining beneficial land uses for the entire site (including any retained final voids), that:

- details how the rehabilitation objectives, performance indicators and completion criteria and for each rehabilitation domain would be addressed; and
- describes any further studies, work, research or consultation that will be undertaken to expand the site-specific rehabilitation knowledge base, reduce uncertainty and improve rehabilitation outcomes.

6.6.34 The Department has also recommended contemporising the existing conditions to include a Rehabilitation Strategy to guide the progressive development, final landform and land use outcomes for the site. This strategy would need to be approved by the Planning Secretary prior to the commencement of mining operations in the Northern Extension Area and progressively reviewed at least every three years, to build on the Rehabilitation Objectives for the mine, provide details of the scheduling, diversity and mix of vegetation communities to be established on site and plans and programs to periodically review the rehabilitation, final landform and land use outcomes to:

- align with regional and local strategic land use planning objectives and outcomes;
- support opportunities for sustainable post mining land uses;
- utilise existing mining infrastructure, where practicable;
- avoid disturbing self-sustaining native ecosystems, where practicable; and
- describes how rehabilitation measures would be integrated with the Biodiversity Management Plan; and
- engage with stakeholders on mine closure and investigate ways to minimise adverse socio-economic effects of mine closure.

6.6.35 The Department considers that together, the above conditions would be sufficient to ensure that mine closure planning is considered and progressively reviewed at appropriate stages throughout the consent life and that appropriate parties, including Council, are consulted as part of any final land use planning decisions.

6.6.36 Having carefully considered the proposed mine plan and final landform design, the Department accepts that Glencore has sought to develop a landform that is broadly consistent with the existing approved final landform features at the Mangoola Mine. The Department notes that the proposed final landform design incorporates both micro and macro-relief features, considers relevant safety and stability requirements, contributes to the rehabilitation of woodland communities and provides for appropriate future uses.

6.6.37 Glencore has also committed to further refine and improve its final void management and final landform designs throughout the mine life, to reasonably minimise the extent of the final void and deliver a more natural appearance to the final landscape.

6.6.38 The Department notes that Glencore has successfully implemented a range of landform and rehabilitation outcomes at other mine sites in the Hunter Valley and is confident that the proposed mine plans can be achieved. The Department therefore considers that the conceptual final landform plan provides a reasonable basis to inform its assessment of the Project's likely mine closure and rehabilitation outcomes. The Department considers that any further refinements to the final landform design can be strengthened and effectively managed in accordance with the recommended conditions of consent and in consultation with relevant stakeholders.

Conclusion

6.6.39 The Department has assessed the proposed final landform and rehabilitation outcomes for the Project, having regard to the requirements imposed under the existing Mangoola Mine consent and contemporary standards for mine rehabilitation.

6.6.40 The Department recognises that the proposed final landform plan would result in the retention of an additional mining void than currently approved and would rehabilitate a greater proportion of the Northern Pit area to native woodland and forest communities, as opposed to land with grazing capability, than is currently the case of the Mangoola Mine.

6.6.41 The Department believes that the proposed final landform and rehabilitation strategy provides an appropriate basis for rehabilitation of the site and would achieve a final land use that supports and enhances the conservation land uses in the area.

6.6.42 To ensure the rehabilitation of the Project is appropriately managed and monitored, the Department has recommended a broad suite of conditions, developed in consultation with the Resource Regulator, which require Glencore to:

- achieve certain rehabilitation objectives including ensuring that any final voids are safe, stable and non-polluting;
- optimise the size and depth of the final voids, to inform mine planning and the progressive development of the final landform;
- minimise the drainage catchment of the voids as far as is reasonable and feasible (whilst having regard to their role as long term groundwater sinks); and
- prepare and implement a comprehensive Rehabilitation Strategy and Rehabilitation Management Plan in consultation with the Resources Regulator, the Department and Council that addresses these and other best practice rehabilitation objectives.

6.7 Biodiversity

Background

6.7.1 The EIS included a Biodiversity Development Assessment Report (BDAR), prepared by Umwelt, that assessed the potential biodiversity impacts of the Project. The BDAR was prepared in accordance with the *Framework for Biodiversity Assessment* (FBA) (OEH, 2014a) and the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014b).

6.7.2 The Department notes that transitional arrangements apply to the Project following the commencement of the *NSW Biodiversity Conservation Act 2016* in August of 2017. The Project is classified as a 'pending planning application' under the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* which allows the assessment of the Project to continue under the FBA.

6.7.3 The BDAR built on the extensive biodiversity work that was undertaken in 2014 as part of the *Upper Hunter Strategic Assessment* (UHSA) process, which is documented in the *UHSA – Mangoola Coal Biodiversity Certification Assessment Report* (Umwelt, 2015).

6.7.4 The BDAR also identified key terrestrial and aquatic flora and fauna species in the Northern Extension Area, which were generated from literature reviews, database searches and extensive additional field surveys undertaken over numerous seasons from 2010 to 2018.

6.7.5 The BDAR also included a biodiversity offset strategy (BOS) to compensate for the loss of ecological values as a result of the Project. The offset strategy was supplemented by an expert report prepared by Dr Stephen Bell, in consultation with the BCS, on the availability of habitat within the proposed offsets for two threatened orchid species, the Tarengo leek orchid *(Prasophyllum petilum)* and the pine donkey orchid *(Diuris tricolor)*.

6.7.6 As indicated in **Section 5**, in its advice on the EIS, BCS made several comments regarding the BDAR and expert report on orchids, and requested a significant amount of additional information in relation to both documents. Glencore provided a response to BCS's requests in the Submissions Report and additional information (see **Appendices C** and **D**). BCS subsequently confirmed that its comments on biodiversity issues have been satisfactorily addressed.

6.7.7 The Department and BCS are both satisfied that the BDAR is based on extensive surveys and that the BDAR and associated BOS have been prepared in accordance with relevant guidelines and policy.

Existing Environment

6.7.8 Much of the land in the vicinity of the Mangoola Mine has been historically cleared of native vegetation, primarily for agricultural enterprises, with areas further afield having also been cleared for coal mining operations. Areas of extensive vegetation are present along the ridgelines surrounding the north and west of the Project and in the Manobalai Nature Reserve around 5.5 km northwest. This remnant vegetation represents a link between remnant patches of vegetation along the Great Eastern Ranges to the west of the Hunter Valley and on the valley floor, with the Wollemi National Park to the south.

6.7.9 Umwelt's surveys of remnant vegetation identified six Biometric Vegetation Types (BVTs) within the proposed disturbance area, as shown in **Figure 25**. These vegetation communities were identified as conforming to a range of listed Threatened Ecological Communities (TECs), including the four TECs listed under the BC Act and one TEC listed under the EPBC Act, being:

- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions Endangered Ecological Community (EEC) (BC Act);
- Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions EEC (BC Act);
- Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC (BC Act);
- White Box Yellow Box Blakely's Red Gum Woodland EEC (BC Act); and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC) (EPBC Act).

6.7.10 During targeted fauna surveys, Umwelt identified eight ecosystem-credit species within the Extension Area, comprising glossy black-cockatoo (*Calyptorhynchus lathami*), grey-crowned babbler (*Pomatostomus temporalis temporalis*), little lorikeet (Glossopsitta pusilla), speckled warbler (*Chthonicola sagittata*), varied sittella (*Daphoenositta chrysoptera*), squirrel glider (*Petaurus norfolcensis*), yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*) and foraging habitat for the southern myotis (*Myotis macropus*) (see **Figure 26**).

6.7.11 During targeted flora surveys, Umwelt identified four species credit species within the Northern Extension Area, including 1,326 individuals of the pine donkey orchid (*Diuris tricolor*), 691 individuals of the Tarengo leek orchid (*Prasophyllum petilum*), 0.9 ha of breeding habitat of the southern myotis (*Myotis macropus*) and 2.1 ha of breeding habitat of the large-eared pied bat (*Chalinolobus dwyeri*) (see **Figure 26**).

6.7.12 Of the species listed above, the Tarengo leek orchid and large-eared pied bat are also listed under the EPBC Act, with the Tarengo Leek Orchid (*Prasophyllum sp. Wybong*)[4] being listed as Critically Endangered and large-eared pied bat being listed as vulnerable.

6.7.13 Aquatic habitat within the Northern Extension Area is largely restricted to the area surrounding Big Flat Creek, which is an ephemeral creek that only flows following rainfall and is generally characterised as having poor water quality. Targeted aquatic habitat assessments and qualitative sampling undertaken within Big Flat Creek did not identify any threatened aquatic flora or fauna species listed under either the *Fisheries Management Act 1994* or the EPBC Act.

[4] *Under the FBA, Prasophyllum petilum includes Prasophyllum 'sp. Wybong', the latter is a synonym as determined by the National Herbarium of NSW. Prasophyllum petilum is listed as 'Endangered' under the BC Act 2016 whereas Prasophyllum 'sp. Wybong' is listed as 'Critically Endangered' under the EPBC Act.*

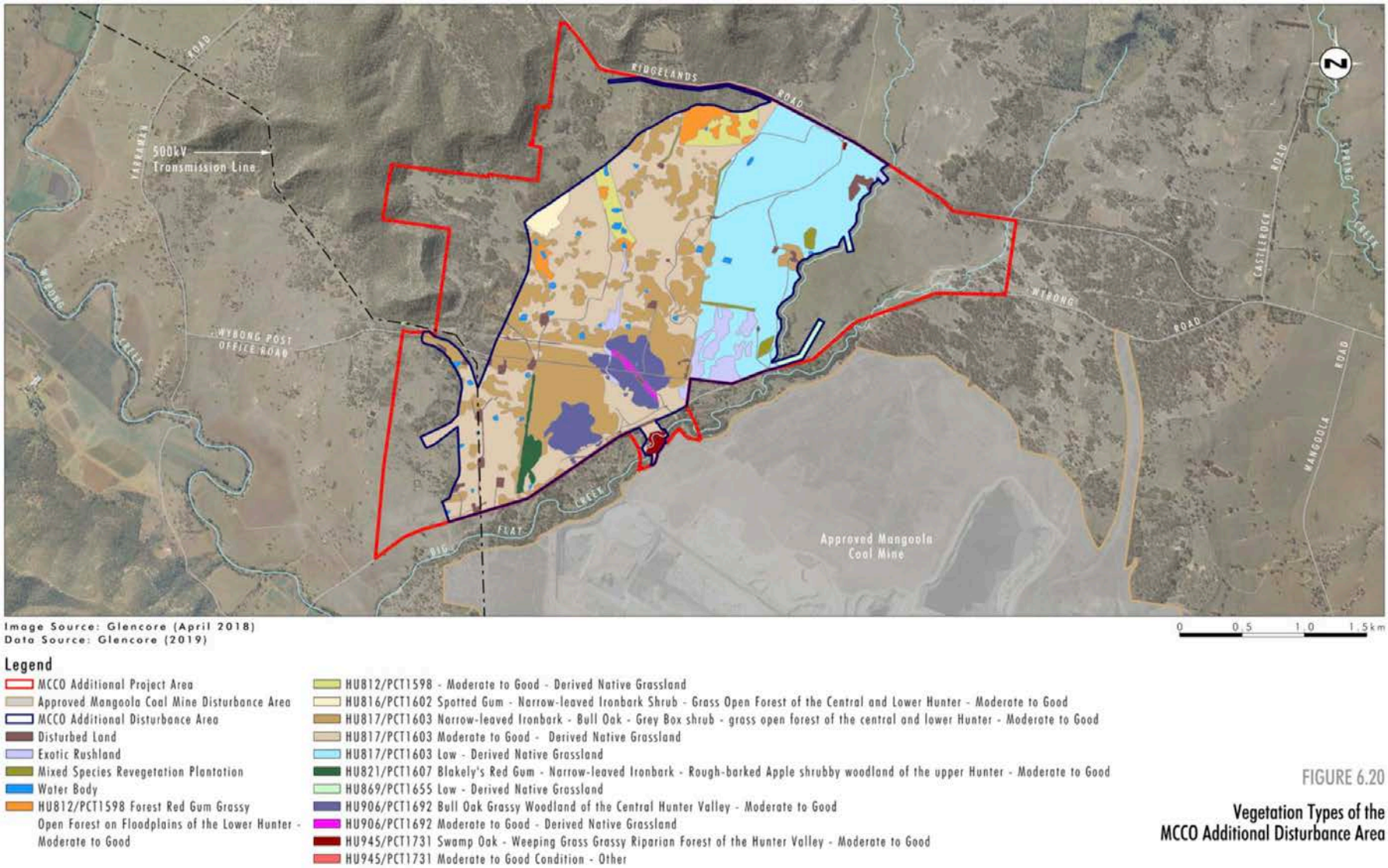

Figure 25 | Vegetation types within the disturbance area

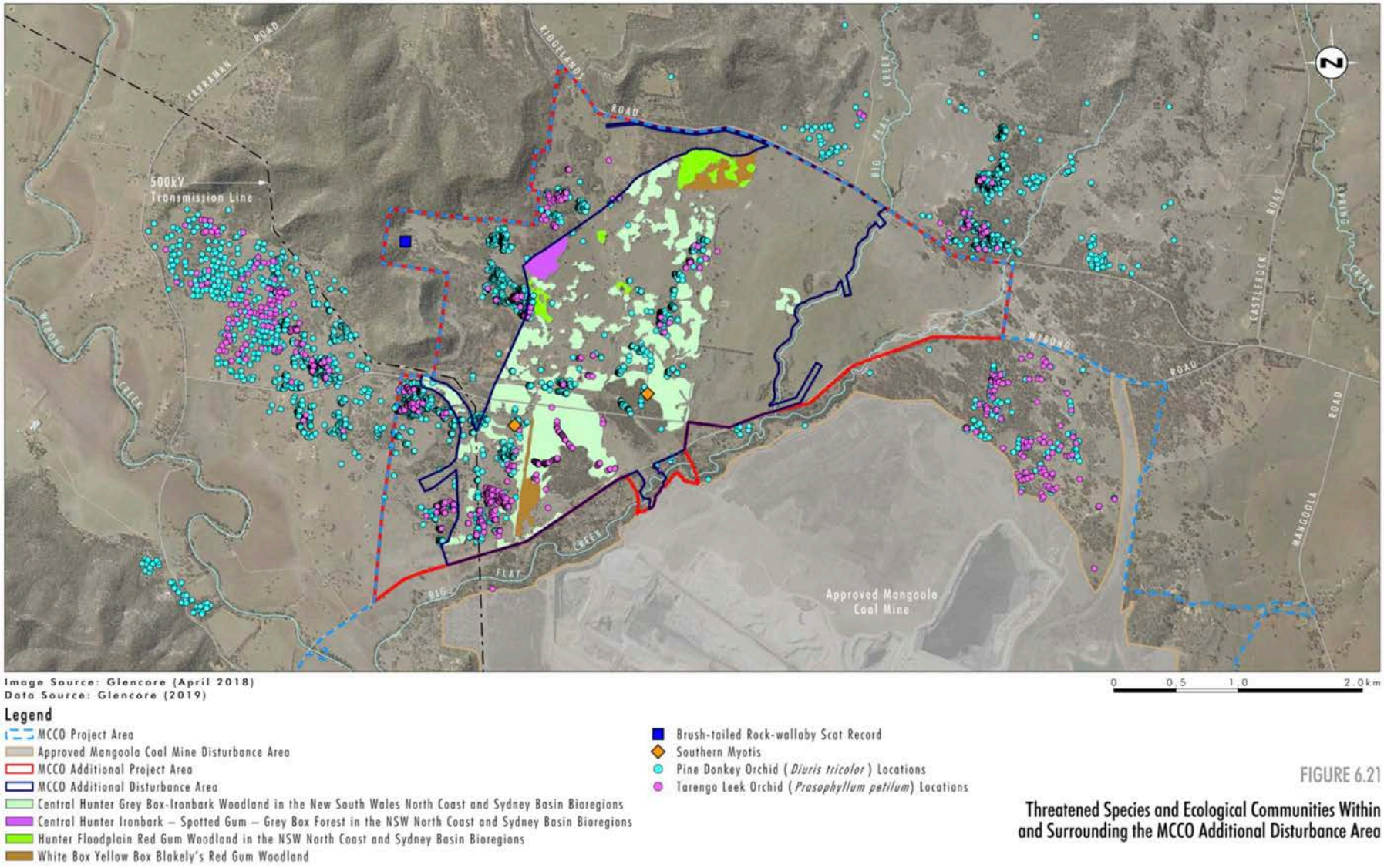

Figure 26 | Threatened species and ecological communities within the disturbance area

Avoidance and Mitigation Measures

6.7.14 In considering the application of the avoid, mitigate, offset hierarchy the Department recognises that Glencore undertook a biodiversity constraints study during the pre-feasibility stage to design the Northern Extension Area to avoid and minimise impacts on sensitive biodiversity areas, where practicable. Glencore has indicated that this process has led to avoiding mining in areas further to the west and east, as well as refinements to the Wybong PO Road realignment and the Wybong Road/Big Flat Creek overpass to accommodate key biodiversity constraints. These refinements have resulted in:

- a reduction in the maximum considered disturbance area of around 400 ha;
- avoidance of over 4,000 individual threatened orchid specimens;
- avoidance of mine plan options that would have required further realignment of the 500 kV transmission line, realignment of Ridgelands Road and a second crossing of Big Flat Creek; and
- avoidance of impacts on 3 strands of Weeping Myall (*Acacia pendula*) Woodland which is listed as a TEC.

6.7.15 The Department notes that the Project largely avoids the highest quality remnant forest and woodland communities present on the slopes to the north and northwest of the Northern Extension Area, and considers that Glencore has taken reasonable and feasible measures to avoid impacts to biodiversity, where practical, given the location of the coal resource.

6.7.16 Glencore has also committed to implementing a wide range of mitigation and control measures to minimise the residual biodiversity impacts of the Project, many of which have already been successfully employed at the Mangoola Mine. Key measures include:

- comprehensive vegetation and habitat clearing protocols;
- dust, noise, lighting, and erosion and sediment controls;
- fencing and access restrictions;
- feral animal and weed management strategies;
- habitat enhancement measures such as the installation of nest boxes, salvaged hollows, fallen timber, hollow logs and rocks to supplement mine rehabilitation; and
- progressive rehabilitation and stabilisation of disturbed land.

6.7.17 Many of these mitigation measures are already described in the existing approved Biodiversity Management Plan and Glencore has committed to revising and updating this plan to include further specific requirements for the Project, such as those necessary to address works within the riparian zones.

6.7.18 The Department accepts that the biodiversity impact mitigation measures proposed are based on best available practices and have been successfully used to mitigate the impact of coal mining developments elsewhere in the Hunter Valley and NSW.

Predicted Biodiversity Impacts

6.7.19 The BDAR indicates that the Project would result in clearing of 570 ha of native vegetation, consisting of 356 ha of woodland or open forest and 214 ha of derived native grassland in the Northern Extension Area.

6.7.20 **Table 14** summarises the direct biodiversity impacts of the Project on vegetation communities and the biodiversity credits required to be offset to compensate for this loss.

Table 14 | Direct biodiversity impacts and associated biodiversity credit requirements

Ecological Feature	Area of Impact (ha)	Number of Impact Credits Generated
Biometric Vegetation Type / Plant Community Type		
HU812 / 1598 Forest Red Gum grassy open forest on floodplains of the lower Hunter (EEC/CEEC)*	14.67	1,874
HU812 / 1598 Forest Red Gum grassy open forest on floodplains of the lower Hunter – Moderate to Good – Derived Native Grassland (EEC/CEEC)*	15.24	
HU816 / 1602 Spotted Gum – Narrow-leaved Ironbark shrub – grass open forest of the central and lower Hunter	6.30	369
HU817 / 1603 Narrow-leaved Ironbark – Bull Oak – Grey Box shrub – grass open forest of the central and lower Hunter	295.25	13,457
HU817 / 1603Narrow-leaved Ironbark – Bull Oak – Grey Box shrub – grass open forest of the central and lower Hunter – Moderate to Good – Derived Native Grassland	197.49	
HU821 / 1607 Blakely's Red Gum – Narrow-leaved Ironbark – Rough-barked apply shrubby woodland of the Hunter (EEC/CEEC)*	6.46	253
HU906 Bull Oak grassy woodland of the central Hunter Valley	30.76	1,597
HU906 Bull Oak grassy woodland of the central Hunter Valley – Moderate to Good – Derived Native Grassland	1.64	
HU945 Swamp Oak – Weeping Grass grassy riparian forest of the Hunter Valley	2.95	168
TOTAL	570	17,718
Species-credit Species		
Large-eared pied bat (*Chalinolobus dwyeri*)	2.10	27
Southern myotis (*Myotis macropus*)	0.9	20
Tarengo leek orchid (*Prasophyllum petilum*)	691 (individuals)	8,983
Pine donkey orchid (*Diuris tricolor*)	1,326 (individuals)	17,238

* *Includes a combined total of 24 ha of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the EPBC Act*

6.7.21 In addition to these direct biodiversity impacts, Umwelt has identified that the construction and operation of the Project is also likely to result in minor indirect impacts associated with habitat connectivity, fugitive light emissions, dust, noise, groundwater changes, weeds and

feral animals. These indirect impacts would be expected to be similar to those currently experienced at the Mangoola Mine and could be appropriately managed and minimised through the continued imposition of existing mitigation measures described in the management plans for the site.

Aquatic Ecology

6.7.22 Umwelt's assessment of the Northern Extension Area indicates that given the ephemeral nature of Big Flat Creek, the Project is unlikely to result in any material impacts to fish habitat. While the draining and/or filling of semi-permanent pools that may exist along the creek could result in short term impacts during construction, Umwelt has indicated that these impacts would be localised, temporary in nature and unlikely to significantly impact local fish populations.

6.7.23 To address these potential impacts, Glencore has committed to ensure that the design of works within or near the creek would provide for the retention of natural functions and maintenance of fish passage in accordance with relevant NSW Department of Primary Industries guidelines for fish passage and waterway crossings[5]. Glencore has also committed to implement a range of standard water quality, erosion and sedimentation control measures within riparian zones to minimise impacts to aquatic ecology.

6.7.24 In addition to these matters the Department notes that the IESC recommended that the final landform be designed to manage potential changes in surface water flow paths that could impact the presence of ground orchids surrounding the site.

6.7.25 Glencore's Submissions Report identified that the final landform design has been developed to appropriately manage surface water flows and could be reviewed in the management plans and mine closure phases to consider the presence of any additional endangered orchids that are identified during the operations.

6.7.26 Overall, the Department considers that the final landform design would minimise impacts on any nearby populations of orchids and has recommended that the management of impacts to ground orchids is considered in the Biodiversity Management Plan and the rehabilitation of the site.

Groundwater Dependant Ecosystems

6.7.27 GDEs are ecosystems which require access to groundwater (beyond soil-based groundwater from rainfall) to meet all or some of their water requirements. The EIS includes a GDE Assessment prepared by Umwelt in consideration of the IESC's *Information Guidelines Explanatory Note: Assessing Groundwater-Dependent Ecosystems* (2019).

6.7.28 The GDE Assessment identified potential GDEs through consideration of modelled groundwater levels within 10 m of the surface (ie groundwater layers 1 and 2), desktop assessments of known GDEs and detailed vegetation mapping. Areas of potential GDEs were further refined by field surveys and site inspections.

6.7.29 The IESC advice requested additional information in relation to GDEs, including a more detailed assessment of the local occurrence of GDEs based on shallower groundwater

[5] *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003)

drawdown contours and wider predictive criteria. The IESC also recommended consideration of the impact of direct clearing on groundwater-dependent vegetation.

6.7.30 In its response to the IESC advice, Umwelt provided more detailed information on its GDE identification methodology and assessment process, and confirmed that the impact assessment was based on a wide range of criteria including modelled groundwater drawdown, vegetation communities, local terrain, soil characteristics, proximity to a watercourse, the floristics of the community and the presence of species that are known to be dependent on groundwater (such as *Eucalyptus camaldulensis*).

6.7.31 Consequently, Umwelt considered the GDE Assessment and additional information to be appropriate and conservative in scoping all potential GDEs and impacts associated with the Project.

6.7.32 The Department accepts that the GDE Assessment is based on comprehensive technical assessments, including the Groundwater Impact Assessment and the BDAR, and has considered a wide range of factors to assess the presence of GDEs and potential impacts associated with the Project.

6.7.33 The GDE Assessment identified ten plant community types (PCTs) within the Northern Extension Area that have the potential to be at least partially dependent on groundwater. These PCTs have been mapped in **Figure 27**, which illustrates where they coincide with areas of 1 m or greater drawdown in the alluvium, colluvium and regolith as a result of the proposed mining operations. Six of these PCTs were considered to have a low likelihood of groundwater dependence, while three are considered to be moderately dependent and one is considered highly dependent on groundwater.

6.7.34 Umwelt indicated that the Northern Extension Area would directly impact 84.1 ha of potential GDEs through clearing for mining operations, although only a small proportion of this vegetation (around 8.2 ha) is considered to have a moderate likelihood of groundwater dependence. This 8.2 ha of vegetation comprises 0.003 ha of *Forest Red Gum grassy open forest on floodplains of the lower Hunter*, 5.3 ha *of Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked apple shrubby woodland of the Hunter* and 2.9 ha *Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley.*

6.7.35 Umwelt has confirmed that the clearance of these GDE vegetation types has been appropriately captured in the predicted clearing shown in **Table 14** and factored into the proposed biodiversity offset package for the project, in accordance with the NSW FBA.

6.7.36 In addition to direct clearance, around 12.4 ha of low groundwater dependent GDEs and 9.6 ha of moderate groundwater dependent GDEs are located outside of the disturbance area and within predicted drawdown in Layer 1 of the groundwater model. While these areas have the potential to be indirectly impacted by groundwater drawdown (see **Figure 27**), no potential GDEs that have a high dependence on groundwater are predicted to be impacted by the groundwater drawdown outside of the proposed disturbance area.

6.7.37 Groundwater modelling indicates that drawdown in the upper strata primarily occurs as a result of the existing approved mining at Mangoola and that there are unlikely to be any incremental drawdown impacts due to the Project.

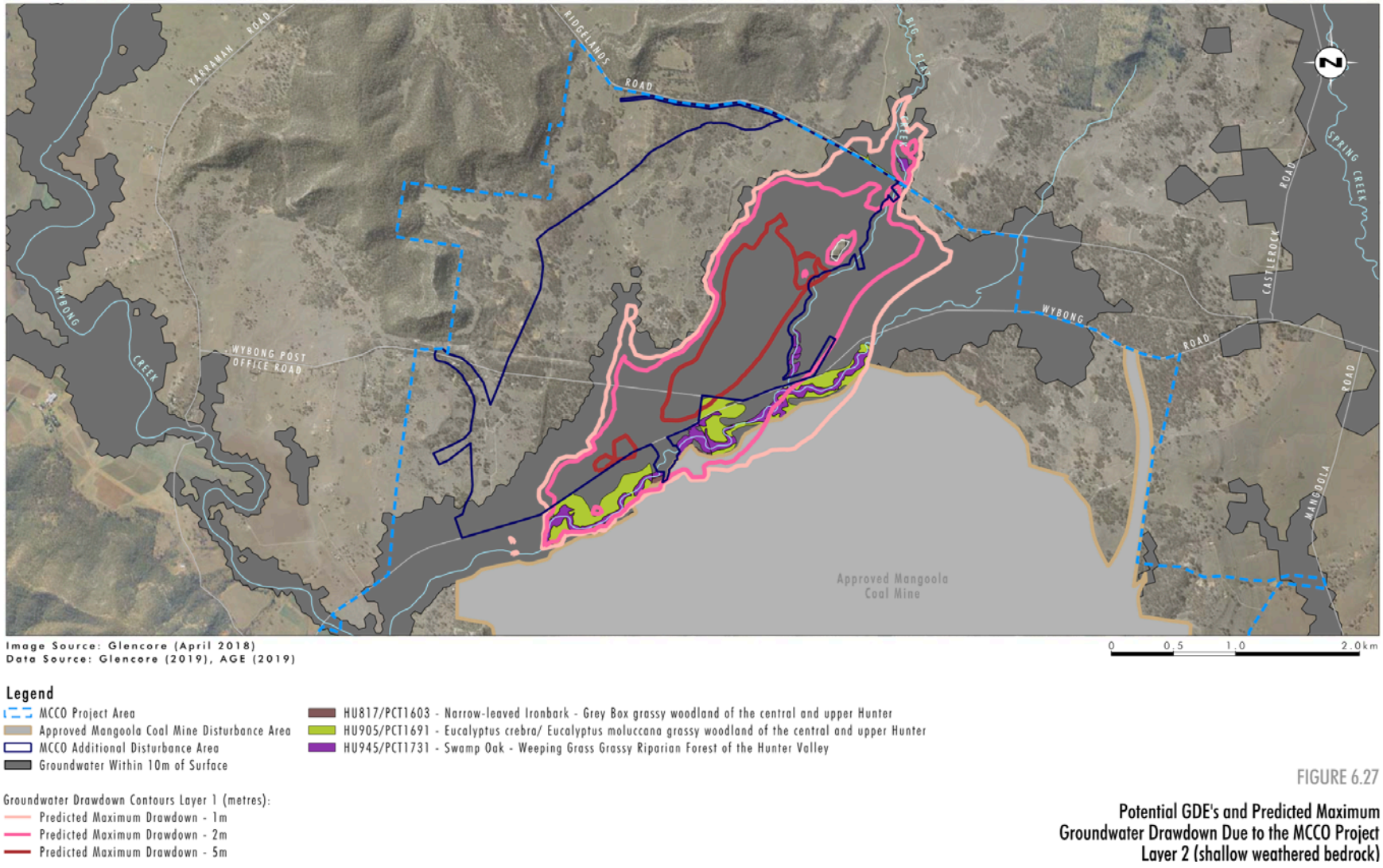

Figure 27 | Potential GDEs predicted to be impacts by the Project

6.7.38 In its advice on GDEs, the IESC commented that the Project "will cause some increase in the total area of impact" and considered that those "GDEs that are still present are likely to have been stressed by the existing drawdown".

6.7.39 Glencore's response to the IESC disagreed with this point and noted that annual ecosystem monitoring undertaken at a potential GDE location along Big Flat Creek does not indicate any observable adverse impacts on the flora, despite the water table being drawn down below the root zone as a result of existing mining operations. Further, Glencore noted that the groundwater modelling undertaken for the Project indicates that the existing groundwater drawdown in the upper strata that has occurred as a result of the current Mangoola Mine is unlikely to be materially exacerbated by the Project.

6.7.40 The Department recognises that the combined groundwater take of the Project and the existing Mangoola Mine are likely to result in sustained lower groundwater levels in the locality for a long period of time.

6.7.41 Overall, while the Department considers that the Project would be unlikely to result in significant incremental impacts on GDEs in the short term, it believes that the Project would benefit from the adoption of detailed monitoring and response plans to track and manage potential impacts to GDEs over time. The Department considers that predicted indirect impacts on GDEs could be appropriately managed through a comprehensive monitoring regime and adaptive management measures, including specific trigger levels for remedial action and/or offsetting. These monitoring and adaptive management measures would be similar to those for other sites in the Hunter Valley and should be reflected in both a Groundwater Management Plan and Biodiversity Management Plan.

6.7.42 In addition, the Department considers that performance measures requiring negligible environmental consequences on GDEs is appropriate to ensure that approved impacts are appropriately recognises and any adverse impacts are appropriately offset in accordance with the *NSW Biodiversity Offsets Scheme*.

Stygofauna

6.7.43 Stygofauna are any fauna that live in groundwater systems or aquifers. The EIS included a Stygofauna Assessment, prepared by Eco Logical Australia Pty Ltd (Eco Logical), that assessed the potential presence and risk of impact to stygofauna in the vicinity of the Northern Extension Area (see **Appendix A**).

6.7.44 The Stygofauna Assessment included a review of groundwater drilling logs, water quality and hydrogeological information, as well as groundwater sampling from eleven bores in the Wybong Creek alluvial aquifer and the fractured/porous rock aquifers in the vicinity of the Northern Extension Area.

6.7.45 No stygofauna were identified during these surveys and the assessment found that the bedrock aquifers are unlikely to be suitable habitat given they lack a significant network of interconnected fractures for stygofauna movement. The colluvium was also found to be generally unsuitable as it is likely to dry out periodically (see **Section 6.8**).

6.7.46 The Department considers that the Stygofauna Assessment has been adequately undertaken and accepts that the Project is unlikely to adversely impact stygofauna

communities. The IESC advice in relation to the Project confirms that "*the assessment of the presence of stygofauna is sufficiently comprehensive*".

Matters of National Environmental Significance (MNES)

6.7.47 As indicated in **Section 4.6**, a delegate of the Commonwealth Minister for the Environment separately determined the Project to be a controlled action under the EPBC Act due to potentially significant impacts on MNES for listed threatened species and communities, including:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC;
- Tarengo leek orchid (*Prasophyllum* sp. Wybong); and
- Regent honeyeater (*Anthochaera phrygia*).

6.7.48 In addition, DAWE considered the Project may result in significant impacts on:

- Swift parrot (*Lathamus discolor*); and
- Grey-headed flying fox (*Pteropus poliocephalus*).

6.7.49 The EIS included an Assessment of Commonwealth Matters (ACM), prepared by Umwelt, that assesses the Project's potential impacts on the above MNES (see **Appendix A**). The ACM confirms that the information contained in the BDAR in relation to biodiversity surveys, quantification and mapping of habitat, impact descriptions and avoidance and mitigation measures, have been undertaken in accordance with the DAWE's assessment requirements relating to biodiversity.

6.7.50 **Table 15** summarises the direct impacts on MNES as a result of the Project.

Table 15 | Direct biodiversity impacts on MNES

EPBC Act Species / Community	Direct Impact Area (ha)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	24
Tarengo leek orchid (*Prasophyllum* sp. Wybong)	691 individuals
Regent honeyeater (*Anthochaera phrygia*).	147.97
Swift parrot (*Lathamus discolor*);	27.4
Grey-headed flying fox (*Pteropus poliocephalus*)	162.6

6.7.51 The Project would result in the clearing of 24 ha of *White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland* CEEC habitat, although the ACM notes that this represents a very small proportion (0.0009%) of remaining habitat for this CEEC, when considered in the context of the broader range of the community in NSW (approximately 250,729 ha).

6.7.52 Umwelt acknowledged in the AMC, that the loss of 691 individual Tarengo leek orchids may lead to a long-term decrease in the size of the population of the leek orchid in the Hunter Valley. However, impacts to this species could be mitigated through the application of a translocation program in place under the existing conditions of the Mangoola Mine and have been fully considered in Glencore's proposed offset package.

6.7.53 The ACM indicated that while the disturbance area contains approximately 148 ha of potential foraging habitat for the Regent honeyeater, it is considered unlikely that the clearance of this vegetation would result in significant impact on the population or long term survival of this species.

6.7.54 The ACM also included a revised assessment of significance for the Swift parrot which determined that the Project is unlikely to significantly impact Swift parrot populations, as this species has not been recorded within the Northern Extension Area or the immediate locality and would be unlikely to have a strong affiliation with the habitats that exist within the proposed disturbance area.

6.7.55 Similarly, a revised assessment of significance for the Grey-headed flying fox determined that the Project is unlikely to cause substantial adverse effects on foraging habitat critical to the survival of this species, particularly given that this species has not been recorded in the Northern Extension Area and that the disturbance footprint represents a relatively small area of suitable fragmented habitat when compared to foraging habitat in the broader local region.

6.7.56 The ACM confirmed that the residual impacts of habitat loss associated with the *White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland* CEEC and Regent honeyeater, and the direct clearing of Tarengo leek orchids would be compensated for under the proposed BOS and rehabilitation program (see below). As the Grey-headed flying fox and Swift parrot are not expected to be significantly impacted by the project, neither species has been identified as requiring further specific offsets.

Biodiversity Offset Strategy

6.7.57 The BDAR included a BOS to compensate for the residual biodiversity impacts associated with the Project and satisfy the credit requirements generated by the Project in accordance with the FBA. While these credits have been accurately developed in accordance with applicable policies, they will need to be converted to BAM credits prior to retirement under the BC Act, consistent with BCS's approach to other projects around the State.

6.7.58 In response to comments provided by BCS on the suitability of the vegetation communities identified as orchid habitat within the offset areas as described in the EIS, Umwelt revised and updated the originally proposed orchid offset. The updated BOS for orchids was included in the Submissions Report and updates the proposed BOS to include:

- in-perpetuity conservation using the retirement of biodiversity credits generated through the establishment of additional land-based offset sites, being the:
  - Mangoola Offset Sites; and
  - Wybong Heights Offset Site;
- use of available surplus credits from nearby offset sites being finalised by Glencore in relation to other development proposals, including the:
  - Highfields Offset Site – 790 credits for *Narrow-leaved Ironbark – Bull Oak – Grey Box shrub – grass open forest of the central and lower Hunter*; and
  - Mangrove Offset Sites – 29,269 credits for the Tarengo leek orchid and Pine donkey orchid;

- establishment of 456 ha of ecological mine rehabilitation to a standard that would generate credits to be used towards biodiversity offsetting purposes; and
- payment into the Biodiversity Conservation Fund to account for species credits required for the Southern myotis.

6.7.59 The BDAR indicates that the proposed additional Mangoola offset sites are strategically located such that the properties adjoin existing Mangoola Mine biodiversity offset areas and facilitate the expansion of a movement corridor linking offset and rehabilitation areas to the north and west. Regionally, the proposed Wybong Heights Offset is strategically located in proximity to the Manobalai Nature Reserve and provides an extension of existing offsets established for other Glencore mining operations.

6.7.60 The Department endorses the location of the proposed additional offset areas and notes their proximity to existing local offsets, nature reserves and remnant vegetated ridgelines, as well as their location within a strategic biodiversity corridor identified by the NSW Government as a focus for the establishment of future connected conservation areas.

6.7.61 The location of the biodiversity offset sites and potential connectivity pathways is provided in **Figure 28**.

6.7.62 The Department also notes that the existing Mangoola Mine offset strategy includes requirements to conserve and manage land based offset sites as well as re-establish rehabilitated woodland communities. Importantly, while the land based offset areas identified under PA 06_0014 must be retired before the existing consent can be surrender, the final rehabilitation of the Mangoola Mine site would need to be incorporated into any development consent for the Project. Accordingly, the Department has recommended conditions that reflect Glencore's ongoing obligations to implemented the biodiversity offset and rehabilitation requirements identified under the PA 06_0014, with a particular focus on the re-establishment of targeted vegetation communities and species.

Adequacy of BOS

6.7.63 The BDAR identified that Glencore would need to retire 17,718 ecosystem credits to account for clearing of native vegetation and associated fauna habitats and foraging resources. Glencore would also need to retire 26,268 species credits, including 26,221 for flora species and 47 for fauna species.

6.7.64 **Table 16** summarises Glencore's proposed method to satisfy the ecosystem and species credit requirements associated with the Project. The majority of credits would be generated from the establishment of the Mangoola and Wybong Heights Offset Areas, along with the retirement of surplus credits that Glencore has available from the establishment of the separate Highfields and Mangrove Offset Sites.

6.7.65 In considering the proposed approach to the BOS, the Department recognises that Glencore has exceeded the minimum offsetting requirements of the FBA by committing to retire all available credits for the Tarengo leek and Pine donkey orchids that would be generated from the offset properties. This approach would result in a significantly larger offset for these species than is required under the FBA and would provide a substantial and beneficial conservation outcome (see **Table 16**).

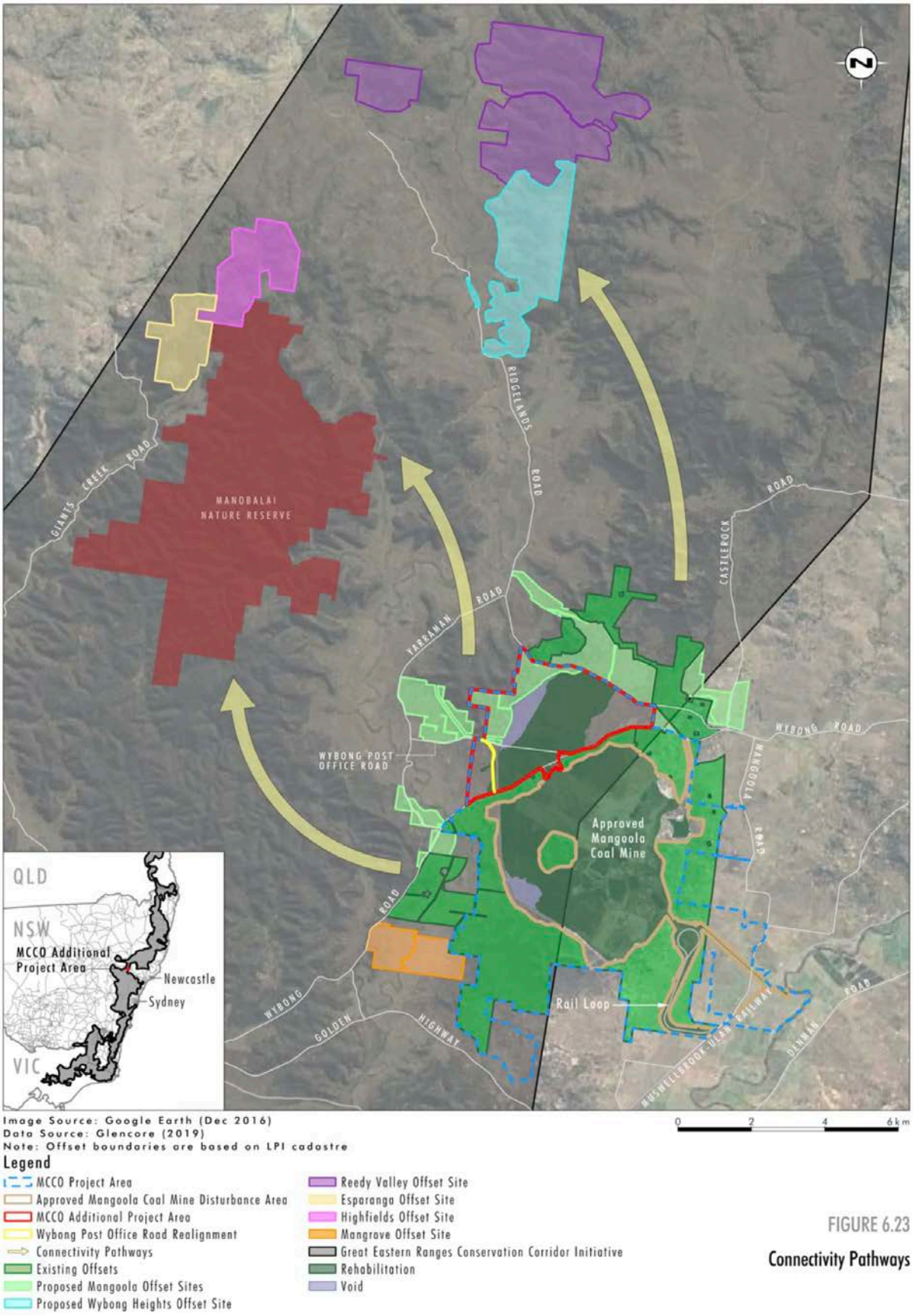

Figure 28 | Location of biodiversity offset sites and connectivity pathways

Table 16 | Direct biodiversity impacts and associated biodiversity credit requirements

Ecological Feature	Credits Required	Credits from New Offset Sites		Credits from Existing Offset Sites		Credits from Ecological Rehabilitation	Biodiversity Conservation Fund	Total Offset Credits to be Used
		Mangoola Offset	Wybong Heights Offset	Highfields Site	Mangrove Site			
HU812 Forest Red Gum grassy open forest on floodplains of the lower Hunter	**1,874**	510	0	0	0	1,364	0	**1,874**
HU816 Spotted Gum – Narrow-leaved Ironbark shrub – grass open forest of the central and lower Hunter	**369**	742	2,042	0	0	0	0	**369**
HU817 Narrow-leaved Ironbark – Bull Oak – Grey Box shrub – grass open forest of the central and lower Hunter	**13,457**	8,991	3,015	790	0	681	0	**13,457**
HU821 Blakely's red Gum – Narrow-leaved Ironbark – Rough-barked apply shrubby woodland of the Hunter	**253**	860	2,549	0	0	0	0	**253**
HU906 Bull Oak grassy woodland of the central Hunter Valley	**1,597**	0	1,597	0	0	0	0	**1,597**
HU945 Swamp Oak – Weeping Grass grassy riparian forest of the Hunter Valley	**168**	17	0	0	0	151	0	**168**
Large-eared pied bat (*Chalinolobus dwyeri*)	**27**	667	0	0	0	0	0	**27**
Southern myotis (*Myotis macropus*)	**20**	0	11	0	0	0	9	**20**
Tarengo leek orchid (*Prasophyllum petilum*)[1]	**8,983**	12,325	0	0	3,067	0	0	**15,392**[2]
Pine donkey orchid (*Diuris tricolor*)	**17,238**	121,740	0	0	26,202	0	0	**147,942**[2]

Notes:
[1] DAWE have determined that the credit liability for *Prasophyllum* sp. Wybong may be satisfied through the offsetting of *Prasophyllum petilum*.
[2] Glencore has agreed to retire all credits for these species generated on the proposed offset properties

6.7.66 The *NSW Biodiversity Offset Policy for Major Projects* enables the use of ecological mine rehabilitation to contribute towards meeting the offset requirements of a mining project. Glencore's BOS proposes to generate 2,187 ecosystem credits (12% of the total ecosystem credit requirements) through the establishment of 456 ha of ecological mine rehabilitation. This land would be rehabilitated progressively over the life of the mine and would be established to meet relevant listing and completion criteria for specified TECs.

6.7.67 As part of existing operations, Glencore has successfully rehabilitated approximately 490 ha of land, which is considered to represent a high standard of rehabilitation in the mining industry. It is noted that 37% of the public submissions supporting the Project commented on the high standard of existing rehabilitation established at the Mangoola Mine (see **Section 6.9**). Glencore has confirmed that the same rehabilitation techniques currently being employed at the site would be used in the rehabilitation of the Northern Pit area.

6.7.68 The Department is satisfied that Glencore has a demonstrated successful track record in establishing native vegetation rehabilitation and has confidence that the company would be able to achieve the required rehabilitation standards necessary to contribute towards meeting the offset requirements for the Project.

6.7.69 Finally, Glencore proposes to account for a small number of residual species credits (9 credits) required to compensate for impacts on the southern myotis through payment into the Biodiversity Conservation Fund (BCF). Payment into the BCF is an available option for the retirement of any credits under current NSW policy frameworks. The BCF is managed by the NSW Biodiversity Conservation Trust which uses these contributions to fund, purchase and manage strategic biodiversity offsetting outcomes.

6.7.70 Further to the above, the Department notes that the credit liability for ecosystems and relevant species-credits required to be offset at the State level are also sufficient to account for all impacts to Commonwealth MNES associated with the Project. In particular, the Department recognises that the proposed BOS meets the requirements of the FBA and would be considered to deliver 'like for like' outcomes in accordance with the *NSW Biodiversity Offset Policy for Major Projects* and the EPBC Act *Environmental Offset Policy*.

Conclusion

6.7.71 Overall, the Department is satisfied that the Project has been designed to avoid, mitigate and manage biodiversity impacts where practicable, and that where impacts to biodiversity would occur, sufficient ecosystem and species credits could be obtained and appropriately retired to sufficiently compensate for residual biodiversity impacts.

6.7.72 The Department is confident that subject to conditions, the Project could be undertaken in a manner that would result in acceptable short-term impacts on biodiversity and result in a net improvement in the biodiversity values of the locality in the medium to long term.

6.7.73 Accordingly, the Department has recommended a range of biodiversity management conditions, including a requirement that Glencore prepare a Biodiversity Management Plan and a Biodiversity Offset Strategy for the Project, in consultation with the BCS.

6.7.74 To address any residual uncertainty relating to the potential for indirect drawdown impacts on GDEs, the Department has recommended groundwater performance measures be

established that require negligible environmental consequences on GDEs. It is also recommended that a GDE monitoring program be prepared as part of the Groundwater Monitoring Plan, involving monitoring of groundwater levels and the condition of vegetation before, during and after mining operations. The Plan would be required to include specific trigger levels for identifying impacts on GDEs and commitments to implement remedial action and/or offsetting in the event that any unforeseen impacts arise.

6.8 Water

6.8.1 The EIS includes Surface Water and Groundwater Assessments investigating the potential impacts of the Project on water resources, the environment and downstream water users.

6.8.2 Glencore provided additional information responding to the IESC's advice on the groundwater modelling and systems and the need for greater certainty around the predicted impacts, and to address submissions from the public, EPA, BCS and DPIE Water that raised issues with water licensing, flood modelling, water quality, groundwater drawdown, changes in catchment areas and impacts on tributaries.

Water Balance and Use

6.8.3 The existing Mangoola mining operations utilises water supplies comprising water collected in accordance with harvestable rights, groundwater inflows into mining areas, dirty water and mine water captured within the mining footprint as part of existing surface water management system and supplementary water supplies pumped directly from the Hunter River in accordance with relevant water licence provisions.

6.8.4 Glencore currently holds a number of water licences for the Mangoola Mine under the *Water Management Act 2000* and *Water Act 1912* as shown in (see **Table 17**).

Table 17 | Existing Surface Water Allocation Licences Held by Glencore

Water Source	Share Component Held (Mega Litres, ML)
Wybong Creek Unregulated WAL	861
Hunter River Regulated General Security WAL	2,758
Hunter River Regulated High Security WAL	17

6.8.5 In accordance with the conditions of the existing Project Approval, Glencore does not use any licensable water from the Wybong Creek Water Source for mining purposes other than that incidentally collected by approved mining operations.

6.8.6 To inform the consideration of the changed water requirements of the Project, the EIS included a detailed Site Water Balance which integrated the existing operational demands with the additional water demands associated with development of the Northern Extension Area. The Site Water Balance predicted annual average inflows and outflows (as shown in

Figure 29) would be similar to that of the existing operations, with the key change being the capture of additional rainfall runoff from the Project catchment area.

6.8.7 The Site Water Balance indicated that, on average, rainfall runoff provides the highest system inflow, with less than 25% of inflows being sourced from the Hunter River, in accordance with existing Water Access Licences (WALs). The majority of outflows would comprise CHPP demand, consistent with the existing operations.

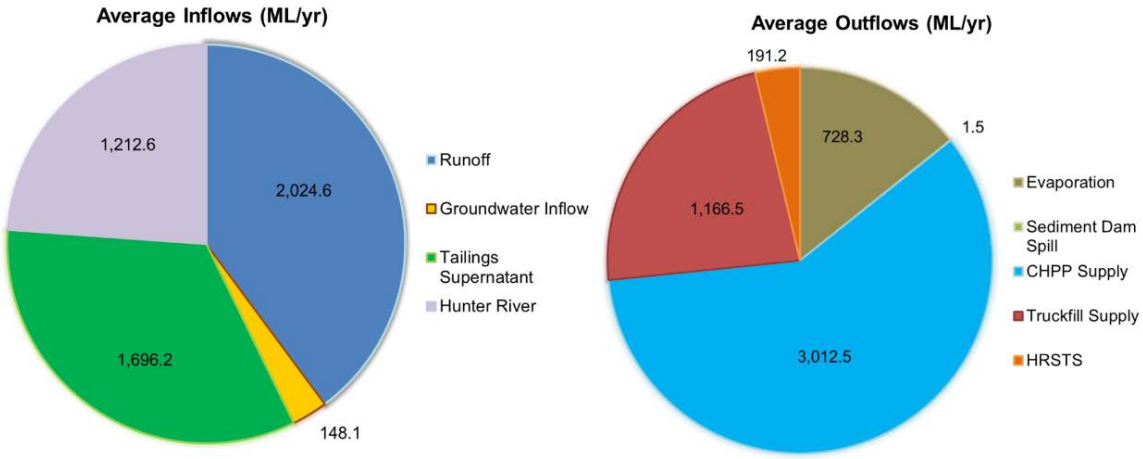

Figure 29 | Site Water Balance

6.8.8 The Department notes, even under the simulated worst-case scenario, there is a low risk of the Project being subjected to a shortfall in water supply given Glencore's existing water licence entitlements. However, should a shortfall occur, Glencore has committed to:

- purchase additional WALs (if available);
- reduce CHPP demand by increasing bypass coal;
- reduce site water demand by scaling back production; and/or
- investigate sourcing alternative water supplies.

6.8.9 The Department is satisfied that Glencore has sufficient water to meet the operational water requirements of the proposal and recommends that Glencore be required to update the existing Site Water Management Plan and Site Water Balance to reflect the Project.

Surface Water

6.8.10 The EIS included a Surface Water Assessment (SWA), prepared by Hydro Engineering and Consulting Pty Ltd (HEC) which assessed:

- the likely impacts of the Project on surface water resources within, and downstream of the Northern Extension Area;
- potential impacts on water quality, streamflow and the local flood regime;
- water management for the Project, including requirements for upslope diversions and management of mine-affected water;
- water supply and discharge requirements for the Project during the operational phase; and
- predictions of the long term water level and quality within the final void.

Existing Hydrological Setting

6.8.11 The Northern Extension Area is located within the Wybong Creek Catchment. Wybong Creek has an estimated catchment area of approximately 792 square kilometres (km^2) and is an unregulated tributary of the Goulburn River, which subsequently flows into the Hunter River to the south of the site and downstream of Glencore's Hunter River pump station and Hunter River Salinity Trading Scheme (HRSTS) discharge point for the Mangoola Mine.

6.8.12 The Hunter River is one of the largest coastal catchments in NSW, draining a total area of approximately 22,000 km^2. Flow in the Hunter River to the east of the Northern Extension Area is highly regulated and controlled by releases from Glenbawn Dam.

6.8.13 On a local scale, the existing approved operations are located within the catchments of Sandy Creek to the southeast, Anvil Creek and Clarke's Gully to the west and Big Flat Creek to the north. Anvil Creek was mined through in 2018 and much of its catchment now reports to the existing mine water management system.

6.8.14 The additional disturbance proposed as part of the development of the Northern Pit is located within the Big Flat Creek catchment, which has an area of approximately 36.5 km^2. A number of unnamed drainage lines traverse the proposed disturbance area from north to south before draining into Big Flat Creek, which runs parallel to Wybong Road separating the Northern Pit area from the existing Mangoola Mine (see **Figure 30**).

Existing Operations

6.8.15 The existing water management system in place at the Mangoola Mine has been designed to manage sediment laden runoff, divert clean water, provide flood protection and provide reticulation and reuse of mine water in accordance the conditions of the existing Project Approval. Operational water management includes the implementation of an approved Site Water Management Plan and its subcomponents, including a:

- Site Water Balance;
- Erosion and Sediment Control Plan;
- Surface Water Monitoring Program;
- Groundwater Monitoring Program; and
- Surface and Ground Water Response Plan.

6.8.16 As part of the water management system, clean water (runoff from undisturbed areas) is largely diverted away from the site or captured in clean water dams which overflow into the off-site environment. Sediment-laden water (runoff from overburden emplacement areas) is captured in sediment dams, is allowed to settle or is treated as necessary, and is subsequently released to the environment when water quality objectives have been met. Mine-affected water (saline runoff from disturbed areas, groundwater seepage/inflow and any coal contact water) is captured in dirty water dams for treatment and re-use on site.

6.8.17 The existing clean water and sediment dams have been designed in accordance with *Managing Urban Stormwater Soils and Construction including Volume 2E Mines and Quarries* (i.e. 'the Blue Book') and act as passive management systems, overflowing via spillways when runoff volumes exceed available storage capacities, and may be subject to supplementary dewatering by Glencore following large runoff events.

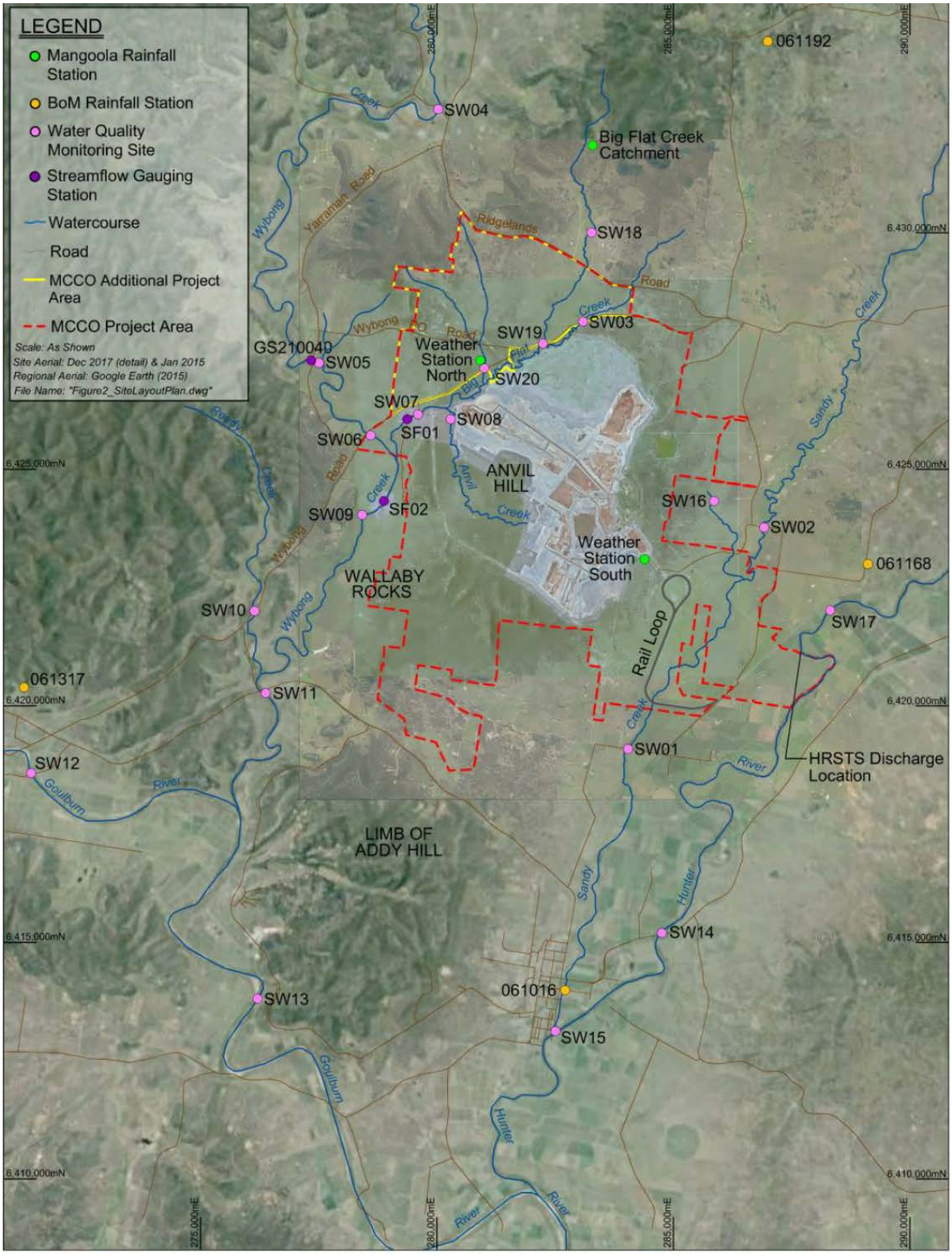

Figure 30 | Existing Water Monitoring Network

6.8.18 The surface water management system also includes a series of tailings dams for emplacement of fine tailings material. Water from the tailings facilities is captured within decant dams or sumps for re-use around the site.

6.8.19 Water contained in the mine site water management system is predominantly used for coal processing (at the CHPP) and dust suppression, with small amounts of water also used for fire suppression (as required) and equipment washing and maintenance.

6.8.20 To date, the mine water management system has been maintained as a closed system with no controlled releases being required. However, under PA 06_0014 Glencore is permitted to discharge water from the site to help mitigate periods of excess water which may constrain mining operations. These permitted water discharges are regulated under EPL 12894 (issued in 2008) and in accordance with the provisions of the HRSTS.

6.8.21 To facilitate these discharges, the Mangoola Mine is approved to operate a water pipeline and discharge facility located on the Hunter River, as shown in **Figure 4**. The timing of constructing this facility, and its associated infrastructure, is determined by a TARP to help mitigate periods of excess water which may constrain future mining operations. The criteria outlined in the TARP have not yet been triggered. Glencore is seeking to continue to have the option to utilise this discharge point for the life of the Project, in accordance with all existing discharge limits and licence provisions.

6.8.22 There is no proposed change to the existing water management discharge arrangements as a result of the Project. Water management structures (ie dams) have been constructed to allow sufficient capacity to ensure that all water would continue to be managed within the limits of the existing system, without the need for offsite discharges (except as already approved for operational reasons or from sediment dams during extreme weather events).

6.8.23 Surface water monitoring at the existing operations is undertaken in accordance with the approved Surface Water Monitoring Program and includes monitoring of streamflow and water quality in both upstream and downstream watercourses. The monitoring network is comprised of 3 streamflow gauges (2 on Wybong Creek and 1 on Big Flat Creek) and 20 water quality sites (dispersed throughout Sandy Creek, Big Flat Creek, Wybong Creek, Anvil Creek, Reedy Creek, Goulburn River and Hunter River) (see **Figure 30**).

Predicted Impacts

Catchment Excision and Flow Volumes

6.8.24 The development of the Northern Pit would result in a number of changes to the existing catchment areas, with reduced catchment yields in Big Flat Creek and Wybong Creek. The SWA predicts that these changes to catchment yields would result in small reductions in surface flows within these creeks and the loss of a minor amount of surface flows in Wybong Creek (of which Big Flat Creek is a tributary) (see **Table 18**).

6.8.25 The SWA predicts that the worst-case scenario of a 1.2 % reduction in catchment area (during year 8 of the Project) would equate to a reduction in annual average flow of approximately 317 ML. With an annual average flow of 26,455 ML in Wybong Creek, this represents an equivalent 1.2 % reduction in annual average flow.

6.8.26 The Project is also predicted to result in a marginal increase in the frequency of 'no flow' days within Big Flat Creek from 26.5% to 28.3% of days. Given the ephemeral nature of

Big Flat Creek and the fact that Glencore is the only licensed surface water user on Big Flat Creek, the Department does not consider this small change to be significant.

Table 18 | Wybong Creek Catchment Area Captured by the Northern Extension area

Project Year	Area Captured (km^2)	Percentage of Wybong Creek Catchment	
		Area Upstream of (and including) Big Flat Creek (%)	Total Area (%)
1	4.2	0.63	0.53
3	4.3	0.64	0.54
5	7.8	1.17	0.98
8	8.0	1.20	1.01
Post mining	7.32	1.1	0.9

6.8.27 Following the completion of mining an area of approximately 7.32 km^2 would be permanently removed from the catchment of Big Flat Creek and Wybong Creek, equating to a loss of approximately 1.1% of the Wybong Creek catchment area upstream of and including Big Flat Creek (see **Table 18**). This equates to a reduction of 291 ML in annual average flows (ie 1.1%) and is unlikely to materially affect flows in Wybong Creek.

6.8.28 In addition to changes in surface water flows, the SWA also predicted the potential impacts associated with a reduction in baseflow to Big Flat Creek and Wybong Creek due to mining related changes in groundwater. Although baseflow changes to Big Flat Creek were predicted to be negligible, the SWA concluded that the Project would result in additional baseflow loss along the full length of Wybong Creek of approximately 13 ML per year. This amounts to less than 0.05 % of the mean annual total flow within Wybong Creek.

6.8.29 To account for and mitigate its long-term impacts on surrounding watercourses, Glencore would permanently retire an appropriate volume of its existing WALs from the Wybong Creek Water Source within the Hunter Unregulated and Alluvial Water Source WSP.

6.8.30 A number of community submissions received on the Project expressed concerns with the potential surface water losses from the surrounding catchments, noting that this water is an important commodity for the existing community and agricultural industries in the region.

6.8.31 Glencore confirmed in its Submissions Report that the predicted reductions in surface water flows associated with the Project could be entirely catered for within the limits of Glencore's existing WALs, meaning that the project would not materially affect existing water availability for downstream users or environmental flows.

6.8.32 In this regard, the Department considers that the predicted surface water losses would be negligible in the context of the broader catchment areas. Given Glencore currently holds sufficient WALs for all water take associated with the Project and the water licensing system in NSW has been designed to provide for sustainable environmental flows, the

Department is satisfied that there would be minimal cumulative impacts to downstream water users as a result of the Project.

6.8.33 The Department also notes that DPIE Water considered that the additional information provided by Glencore in its Submissions Report adequately addressed its advice on the EIS and has recommended that the sections of Big Flat Creek impacted by mining operations be remediated and rehabilitated in accordance with *A Rehabilitation Manual for Australian Streams*. The Department has incorporated this advice in its recommended conditions. Further information regarding rehabilitation is provided in **Section 6.6**.

6.8.34 Overall, the Department considers that subject to the implementation of the mitigation and monitoring measures described in the Surface Water Management Plan, the development of the Northern Pit area would not be expected to significantly increase the existing scale and extent of impacts to surface water catchments or watercourses.

6.8.35 The Department has recommended that Glencore be required to update its existing Site Water Management Plan, including the Surface Water Monitoring Program to incorporate the Project, including the expanded surface water monitoring network.

Water Quality

6.8.36 If left unmanaged, land disturbance associated with the Project has the potential to adversely affect the quality of surface runoff in downstream receiving waters through increased sediment loads, salinity and other pollutants. In order to mitigate this potential impact, Glencore has identified that it would seek to manage surface water quality consistent with the existing practices in place at the Mangoola Mine.

6.8.37 Sediment and clean water dams would continue to be designed in accordance with the Blue Book, overflowing via spillways when runoff volumes exceed the available storage and in accordance with ANZECC Guidelines.

6.8.38 The SWA concluded that, with the exception of controlled releases, discharges are only predicted from sediment dams, which are intended to spill periodically in accordance with the Blue Book during rainfall events that exceed sediment dam design capacity. No spills are predicted from any other dams during the life of the Project (see **Figure 31**).

6.8.39 Furthermore, the sub-catchment areas that would report to sediment dams primarily comprise active overburden or rehabilitated areas, with geochemical tests of the existing Mangoola Mine indicating that runoff from these areas is likely to be of low salinity.

6.8.40 The Department notes that erosion and sediment control measures have been successfully implemented to manage potential water quality impacts at the existing Mangoola Mine and supports Glencore's commitment to prepare an updated Erosion and Sediment Control Plan for the project, with a particular focus on mitigation measures required to manage construction works in and adjacent to Big Flat Creek.

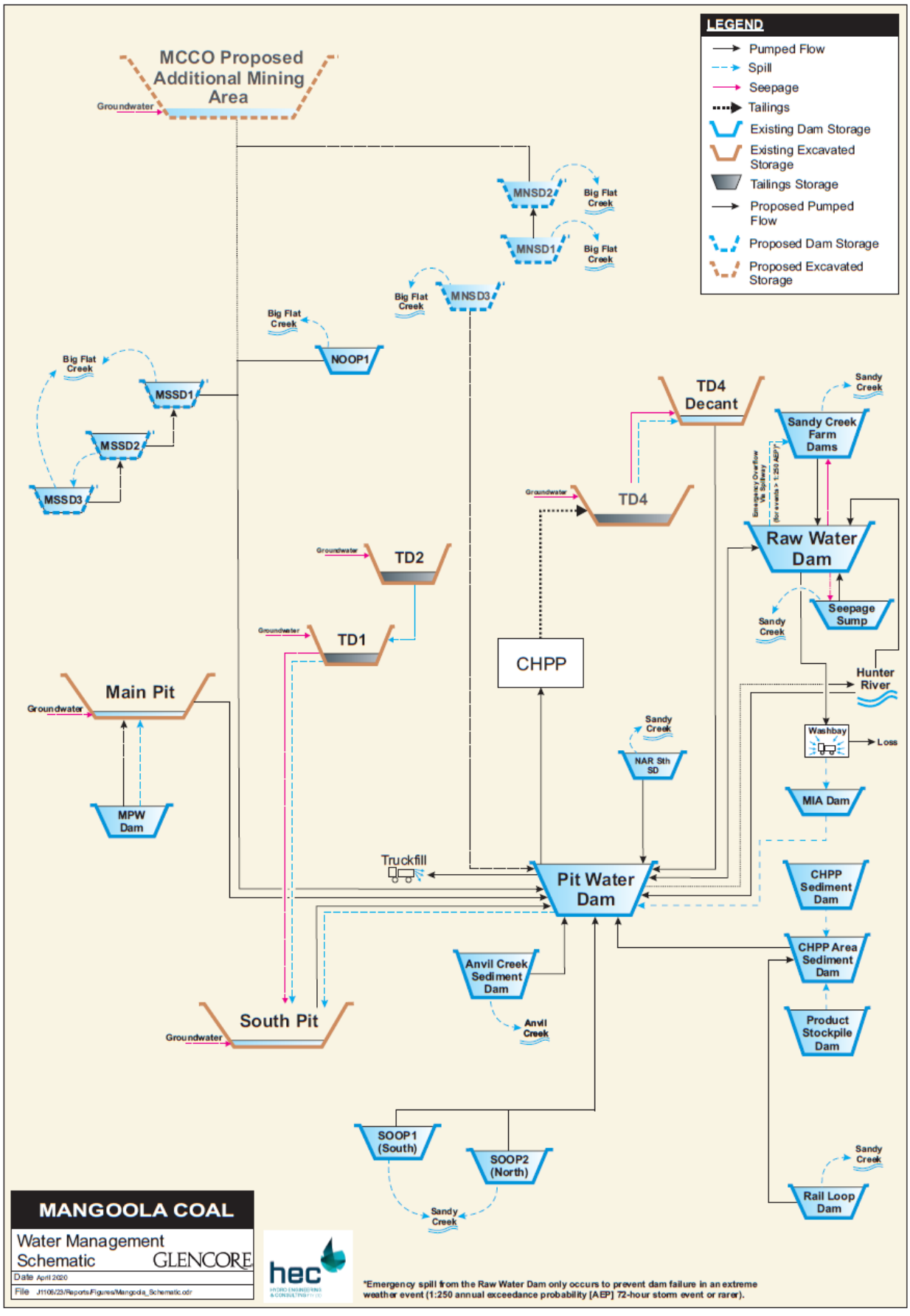

Figure 31 | Water Management System - Schematic

6.8.41 Some community and interest groups submissions raised concerns that the Project would result in additional salt levels in Wybong Creek and the Hunter River. Glencore's Submissions Report confirmed that any such impacts to downstream water quality are not expected to eventuate, given the application of the previously discussed site mitigation measures and considering that any controlled discharges of water from the site would occur via Glencore's licensed discharge point on the Hunter River and in accordance with Glencore's existing EPL and the requirements of the HRSTS.

6.8.42 Further to this, the Department notes that HRSTS has been designed to restrict the controlled release of saline water to periods when the Hunter River is in high flow, in order to provide for adequate dilution. Any water discharges would also need to be monitored prior to release to ensure compliance with relevant water quality criteria.

6.8.43 In relation to discharges from water storages, the EPA raised initial concerns over the potential for mine water to be pumped from the Pit Water Dam to the Raw Water Dam, and subsequently released into Sandy Creek. In both its Submissions Report and additional information (see **Appendices C** and **D**) Glencore clarified that it has no intention to discharge from the Raw Water Dam to Sandy Creek and that the only potential for any release of water from the Raw Water Dam would be in the event that the emergency spillway for the dam is triggered to prevent dam failure during an extreme weather event.

6.8.44 The Department recognises that from an operational and safety perspective, Glencore needs to maintain the currently approved flexibility to permit the transfer of water from the Pit Water Dam to the Raw Water Dam. The Department also notes that the Raw Water Dam has been designed to exceed the required water storage needs and would be able to contain a 72 hour storm event (i.e. 1:250 AEP), even if it is partially full at the beginning of such an event. As such, the likelihood that Glencore would need to spill water from the Raw Dam is exceptionally low. The Department notes that Glencore has also committed to consult with the EPA about this matter and any proposed revisions to the existing EPL.

6.8.45 Following consideration of Glencore's Submissions Report and additional information, the EPA recommended the Department impose two specific conditions related to the management of surface water for the Project. These conditions stipulate that Glencore:

- must not discharge saline water, except under the provisions of the Hunter River Salinity Trading Scheme; and
- must manage water levels in the Raw Water Dam so that it does not discharge water from the premises except in a 1 in 250 Annual Exceedance Probability 72-hour rainfall event or greater.

6.8.46 Consistent with the recommendations of the EPA, the Department has recommended conditions ensuring that all water storages must be designed in accordance with the requirements of the Blue Book, that water levels in the Raw Water Dam must be maintained to meet the EPA's identified design requirements and that all controlled water discharges from site must occur via the approved licensed discharge point (once constructed) in accordance with an applicable EPL and the requirements of the HRSTS.

6.8.47 Overall, the Department is satisfied that the Project is unlikely to cause a detrimental impact to downstream water quality within the Hunter River catchment. Nevertheless, the Department has recommended conditions requiring Glencore to prepare an updated Surface Water Management Plan, including a Salt Balance which must include details of

how saline water would be managed on site, measures to minimise the discharge of saline water and the preparation of an annual salt balance.

Flooding

6.8.48 The EIS included a flood modelling assessment, completed by Hydro Engineering and Consulting, to determine the Project's impacts on the existing flood regime and flood levels.

6.8.49 The flood modelling indicated that the Project would result in some increase in areas of inundation upstream of the Big Flat Creek overpass, there would be no inundation on any land (other than land owned by Glencore) up to and including the 1:100 AEP event.

6.8.50 While some small areas near the overpass are predicted to experience increases in flow velocities of between approximately 0.5 m/s to 1.5 m/s, these impacts are primarily located near the outlets of the proposed culverts. To mitigate these impacts, Glencore has committed to include erosion protection measures in the design of the culvert, which would be detailed in an Erosion and Sediment Control Plan.

6.8.51 As detailed in **Section 2**, Glencore is proposing to construct a flood levee between the Northern Extension Area and Big Flat Creek. The levee would comprise part of a proposed visual bund (see **Section 6.9**) and would be constructed to a level equal to the 1:1,000 AEP flood level plus 0.5 m freeboard. While the predicted flood velocities and depths of the channelised flood waters in this area are very low, Glencore has committed to topsoiling and seeding the flood levee to mitigate erosion and scouring impacts (and provide a consequential benefit of improving visual aesthetics).

6.8.52 With these measures in place, the Department is satisfied that the Project would not result in any significant increases in flow velocities in Big Flat Creek, and consequently the risk of increased erosion associated with the Project is negligible.

6.8.53 The flood modelling also assessed the impact of the Project on flood levels over Wybong Road. The assessment determined that the Project would not result in a material increase in the rate or level of flooding over Wybong Road, which would remain unaffected by flood events up to the 1:100 AEP event.

6.8.54 The Department notes that areas of Wybong Road are currently subject to flooding during larger events (including the 1:1,000 AEP and Probable Maximum Flood). While the Project would result in some additional areas of Wybong Road being affected in such events, these impacts would be relatively minor in nature and are expected to occur in situations where the road would already be forced to close due to flooding impacts along other sections of the road.

6.8.55 To assist in reducing the frequency and severity of these impacts and manage the safety of road users during flood events, Glencore has proposed to install appropriate flood warning signage, including flood depth indicators, in the vicinity of the haul road overpass.

6.8.56 Additionally, the Department recognises that one community submission raised concerns that the Project would also increase flood levels along Ridgelands Road. These concerns were addressed in the Submissions Report which identified that the Project would not alter the existing flooding regime along Ridgelands Road.

6.8.57 Finally, in response to comments raised by BCS, Glencore commissioned Umwelt to undertake a peer review of the flooding assessment, which included a review of the hydraulic model, key hydrologic model inputs, flood assessment reporting and associated flood mapping. After consideration of the additional assessment undertaken by Hydro Engineering and Consulting, the peer review found that while some future work could be undertaken to improve the accuracy of the modelling, the current modelling sufficiently characterises the flooding impact of the Project. The Department notes that having considered the findings of Umwelt's review, BCS has advised that the additional information provided has adequately addressed its concerns regarding flood impacts.

6.8.58 Overall, the Department notes that potential flooding impacts would be localised to Big Flat Creek and land owned by Glencore, and is satisfied that the Project would not materially impact the existing flood immunity of Wybong Road or any other public road in the area.

IESC Advice

6.8.59 The IESC considered that the key potential surface water impacts of the Project are:

- potential ongoing water quality issues associated with sedimentation from both the proposed infrastructure and the unquantified impacts from uncontrolled discharges from sediment dams; and
- potential impacts from water discharges on erosion and water quality in Big Flat Creek.

6.8.60 While the IESC considered that the assessment of surface water resources in the EIS was generally appropriate, it recommended that additional information be considered regarding:

- surface water quality monitoring data in the Hunter River, upstream and downstream of the proposed discharge location;
- future controlled and uncontrolled discharges from the mine water storages, particularly the Pit Water Dam; and
- the specific mitigation measures to address the Project's potential impacts that would be included in the revised Surface and Ground Water Management Plan.

6.8.61 In order to address these matters, Glencore provided a range of additional detailed information in its Response to IESC Advice (see **Appendix D**).

6.8.62 In response to the IESC's concerns raised regarding the clarity and presentation of discharge locations, volumes and qualities in the EIS, Glencore confirmed that all discharge from the Pit Water Dam to the Hunter River under the provisions of the HRSTS is already permitted as part of the existing approved operations and EPL 12894 and that no changes are proposed to the approved (but yet to be constructed) discharge facility.

6.8.63 Glencore confirmed that the only other discharge locations associated with the Project are periodic overflows (spillway flows) from sediment dams in accordance with the Blue Book and ANZECC Guidelines. Additional analysis undertaken by Glencore indicates that overflow from the sediment dams would occur infrequently, if at all. Modelling also indicates that the volume of overflow, should it occur, would be small in comparison to the overall flow in Big Flat Creek, with considerable dilution occurring as a result.

6.8.64 The Department notes that since operations commenced at Mangoola there has been no overflow from the existing NOOP1 sediment dam and that the existing SOOP South and SOOP North sediment dams exceed their design sizing criteria and have overflown via the installed spillway on only one occasion in March 2019. This event was reported to the EPA, and monitoring did not detect a deterioration in water quality in the receiving watercourses.

6.8.65 The IESC also queried the proposed use of chemical dust suppressants in place of water during dry periods and the associated impacts to water quality downstream. Glencore confirmed that dust suppressants (i.e. Kickstart Dynamic and RT9 Dynamic) are already used at the existing Mangoola Mine operations, in a highly diluted form. The Department notes that the use of dust suppressants is common practice at many mine sites across NSW and in the Hunter Valley, and that their use to has been supported by both the Department and EPA as an effective means to control dust emissions.

6.8.66 Glencore is seeking to continue to use these suppressants over a small portion of the site, predominantly along haul road areas which report to the mine water system (not sediment dams). Consequently, Glencore has asserted that the risk of any runoff from haul roads that may contain a diluted dust suppressant component would be very unlikely to enter nearby creeks and the associated risk to downstream water quality is considered negligible.

6.8.67 The IESC advised that assessment of impacts on flood regime were made using simulation models of hydrologic and hydraulic behaviour that are widely adopted and well proven, and the adopted approaches to characterise flood risk were consistent with current guidelines.

6.8.68 Finally, the IESC questioned the increased peak velocity readings in the areas downstream of the proposed haul road crossing and requested that Glencore clarify the cause of these high velocities and whether any mitigation measures can be provided to avoid erosion impacts. Glencore subsequently provided details of its proposed infrastructure design (ie culverts and haul road overpass) and key constraints for the proposed infrastructure and confirmed that these localised areas of high velocity would be monitored, through an Erosion and Sediment Control Plan, during the life of the Project in order to assess whether additional mitigation measures such as armouring are warranted.

6.8.69 The Department considers that the proposed infrastructure design, provision of armouring (if and as required) and monthly monitoring during periods of flow would be appropriate to mitigate the risk of erosion in these areas as a result of the Project.

Management and Monitoring

6.8.70 Glencore has proposed a range of mitigation and management measures to minimise surface water impacts. Water management structures would continue to be designed in accordance with the Blue Book and Glencore would continue to manage sediment-laden water to minimise risks to the receiving environment and downstream water users.

6.8.71 Glencore would also update the existing Site Water Management Plan (including the Site Water Balance, Erosion and Sediment Control Plan, Surface Water Monitoring Program and Surface and Ground Water Response Plan) to incorporate the proposed Project.

6.8.72 In addition, Glencore has committed to preparing an Erosion and Sediment Control Plan specifically for the construction phase of the Project, to detail measures required to manage works in and adjacent to Big Flat Creek. In response to comments from DPIE Water, Glencore has also confirmed that this Erosion and Sediment Control Plan would include consideration of the *Guidelines for Controlled Activities on Waterfront Land*.

6.8.73 In updating the existing Mangoola Mine Surface Water Monitoring Program to include the Project, Glencore has committed to implement the following additional measures:

- monthly water quality monitoring within the Northern Pit area;
- monitoring of water transferred from the Northern Pit area to the Mangoola Mine; and
- monitoring of areas of increased erosion risk, including upstream catchment diversions and areas downstream of the proposed Wybong Road and Big Flat Creek overpass.

6.8.74 Glencore would also continue to monitor streamflow and water quality (including potential erosion) for at least two years following the cessation of mining, with monitoring data being reviewed annually over this period.

6.8.75 The Department considers that the proposed mitigation measures provide a sound basis for the management of surface water impacts for the project and has included a suite of performance measures within the recommended conditions which Glencore would be required to comply with in order to minimise surface water impacts of the Project.

6.8.76 The Department has also recommended that Glencore be required to continue to ensure that all surface discharges comply with discharge limits (both volume and quality) outlined in any EPL for the site and the provisions of the HRSTS, and include a report on the annual water balance for the Project in its Annual Review, including water taken under each WAL.

Groundwater

6.8.77 The EIS included a Groundwater Impact Assessment (GIA) completed by Australasian Groundwater and Environmental Consultants (AGE), to predict the Project's impacts on the groundwater resource and water users. The GIA considered two different scenarios, the first predicted the maximum cumulative impact of the existing Mangoola Mine and the Northern Pit extension, while the second scenario predicted the incremental Project alone impact of the Northern Pit extension on groundwater resources.

6.8.78 The groundwater model was peer reviewed on behalf of Glencore by Dr Noel Merrick of HydroSimulations who concluded that the model was fit for purpose. Additionally, the IESC noted that the delineation and characterisation of physical groundwater resources was appropriate and based on an existing monitoring network, knowledge from the existing Mangoola mine and targeted investigations.

Existing Environment

6.8.79 The groundwater environment surrounding the Project is characterised by three main aquifer systems comprising shallow colluvium and alluvial deposits adjacent to major creeks and drainage lines, and a deeper highly saline system associated with the Triassic bedrock sediments and Permian coal measures.

6.8.80 AGE identified that the Northern Extension Area was characterised by Quaternary colluvium associated with Big Flat Creek and its tributaries, which overlies the Triassic sandstone and conglomerates and Permian coal measures. AGE noted that the unsaturated colluvium in this area was likely drained as a result of the Mangoola Mine and considered that if this aquifer were to be saturated it would contain saline water.

6.8.81 Typically, the Permian strata in the Northern Extension Area are recharged by the infiltration of rainfall from the surface, while the alluvial and colluvial sediments are generally recharged through creek beds when the watercourses are flowing.

6.8.82 Despite containing substantial aquifers, the Triassic bedrock sediments and Permian coal measures contain highly saline water and are considered less productive groundwater systems. There are also no highly productive alluvial groundwater units in the Northern Extension Area.

6.8.83 The closest highly productive alluvium is located around 1 km west of Project, associated with the Wybong Creek and Sandy Creek floodplain. AGE notes that while the Wybong Creek alluvium has been used as a water source for domestic and stock use, many of the private bores within the alluvium close to Mangoola Mine were installed in the 1970's and have either been abandoned, converted from their original use, or become inactive.

6.8.84 Measurements from these bores show that permeability and salinity is variable across the highly productive alluvium. AGE notes that the alluvium near Wybong Creek appears to be highly permeable and directly connected to the creek, and has the potential to contribute baseflow to the creek.

6.8.85 Two registered private groundwater bores are located within a 2 km radius of the Northern Extension Area, with an additional six private bores within a 3 km radius. Of these bores, three are registered for stock and domestic use, three are not registered, one has been converted to a government monitoring bore and one has been backfilled.

6.8.86 Glencore currently holds sufficient licences to account for groundwater extraction at the Mangoola Mine, which together permit Glencore to take up to:

- 700 ML per year under the North Coast WSP (which includes the Permian Newcastle Coal Measures and Triassic Narrabeen Group Sandstones); and
- 254 ML per year from the Wybong Creek alluvial aquifer under the Hunter Unregulated WSP.

6.8.87 As part of the existing Mangoola Mine operations, Glencore operates an extensive groundwater monitoring network which includes over 100 active monitoring bores and vibrating wire piezometres (VWP). This network, combined with data from past and current mining operations, provides a sound understanding of the local groundwater environment.

6.8.88 Monitoring data demonstrates that drawdown associated with the existing operations has caused depressurisation of the Permian strata below Big Flat Creek, effectively disconnecting Big Flat Creek from the underlying groundwater system.

6.8.89 AGE noted that the observed drawdown in monitoring bores is generally consistent with that predicted for and permitted under the Mangoola Mine approval.

6.8.90 Glencore proposes to continue managing impacts to groundwater levels and quality surrounding the Project by extending its groundwater monitoring network to reflect the full Northern Extension Area. Additional monitoring bores would be installed to ensure a long-term groundwater monitoring network in all key groundwater bearing units. The Department notes that these commitments would need to be formalised and reflected in an updated Water Monitoring Program for the Project.

Predicted Groundwater Impacts

Groundwater Take

6.8.91 The GIA identifies that the extraction of the Northern Pit would create a localised area of depressurisation, drawing water from the surrounding aquifers into the Northern Pit and resulting in a perimeter of localised drawdown around the Project (as shown in **Figure 32**).

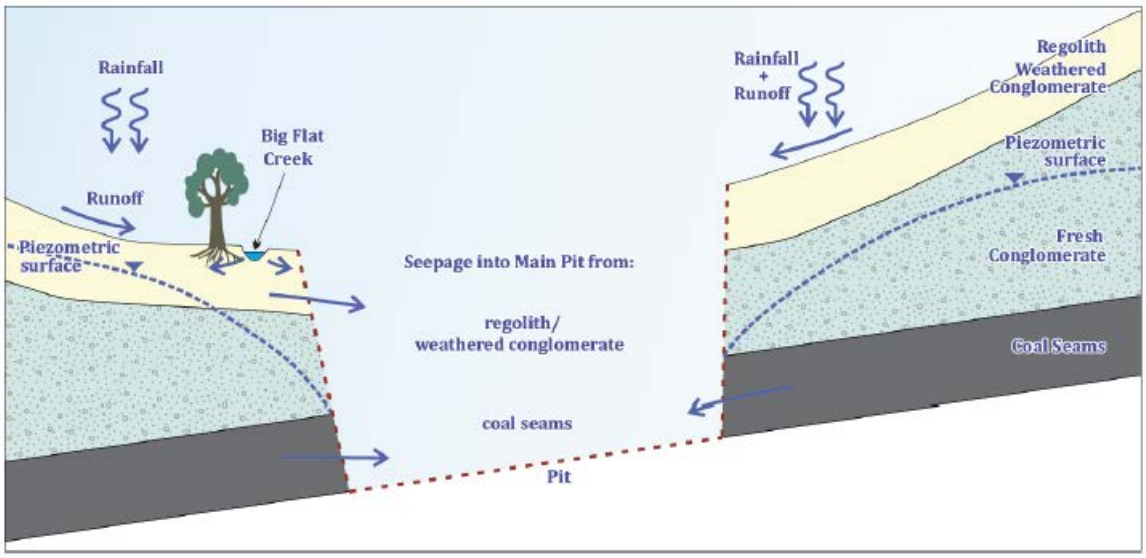

Figure 32 | Conceptual Hydrogeological Model

6.8.92 AGE predicts that the average groundwater inflow from the Permian coal measures over the life of mining would be 123 ML/year. The incremental inflows from the Northern Pit extension are predicted to peak at 210 ML/year in year two of the Project and represent a material increase in short term inflows to the mining areas, before returning to levels similar to the existing Mangoola operations toward the end of the Project life (see **Figure 33**).

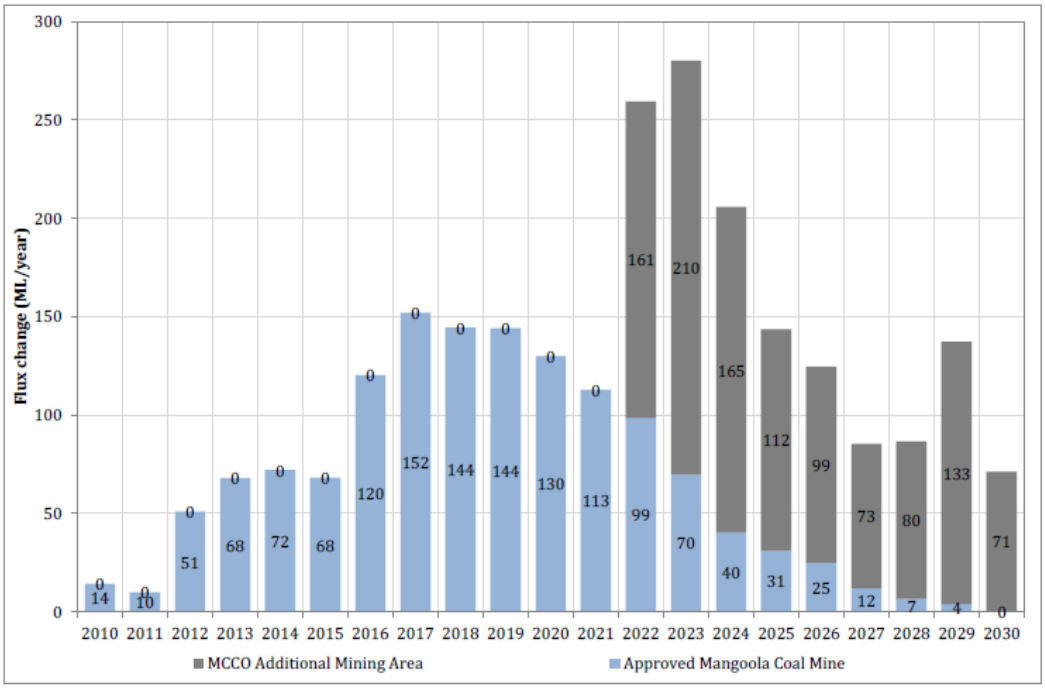

Figure 33 | Predicted groundwater take of the Project and existing Mangoola Mine

Drawdown

6.8.93 As shown in **Figure 35**, the existing Mangoola Mine operations already result in drawdown in excess of 1 m along a thin zone that follows the shallow alluvial and colluvium deposits of Wybong Creek, Sandy Creek and Big Flat Creek. The proposed Northern Pit extension is predicted to extend this drawdown slightly further upstream along Big Flat Creek.

6.8.94 The Northern Pit extension would also be expected to extend the envelope of drawdown within the unweathered conglomerates and Permian coal measures to the north, as shown by the incremental drawdown effects in **Figure 36**. Despite this, the GIA identifies that this predicted increase in drawdown would primarily affect the deeper and less productive Permian groundwater aquifers and would only result in minimal incremental impacts to the areas of overlying Wybong Creek alluvium.

Changes in Groundwater Flux

6.8.95 While mining in the Northern Pit area would not directly intercept alluvial aquifers, depressurisation of the Permian coal measures would cause a slight reduction in flow to the alluvium and needs to be considered in accordance with the *NSW Aquifer Interference Policy* (AIP).

6.8.96 No changes are predicted to the groundwater flux to the Sandy Creek Alluvium. However, **Figure 34** illustrates that the Project would marginally increase the flux in the Wybong Creek Alluvium. The cumulative change in flux is 33 ML/year, of which 30 ML/year is already attributed to the existing Mangoola Mine, with a maximum additional flux of 3 ML/year arising as a result of the incremental changes associated with the Northern Pit.

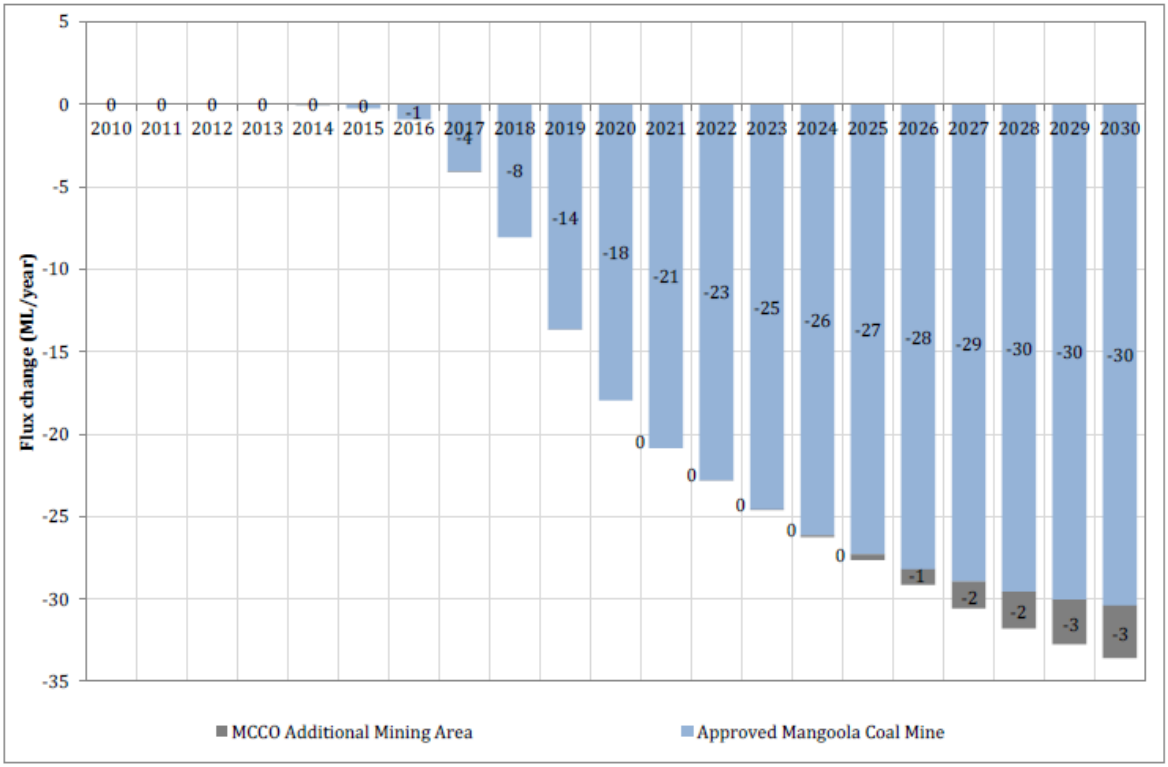

Figure 34 | Change in flux to Wybong Creek alluvium from the Project and existing Mangoola Mine

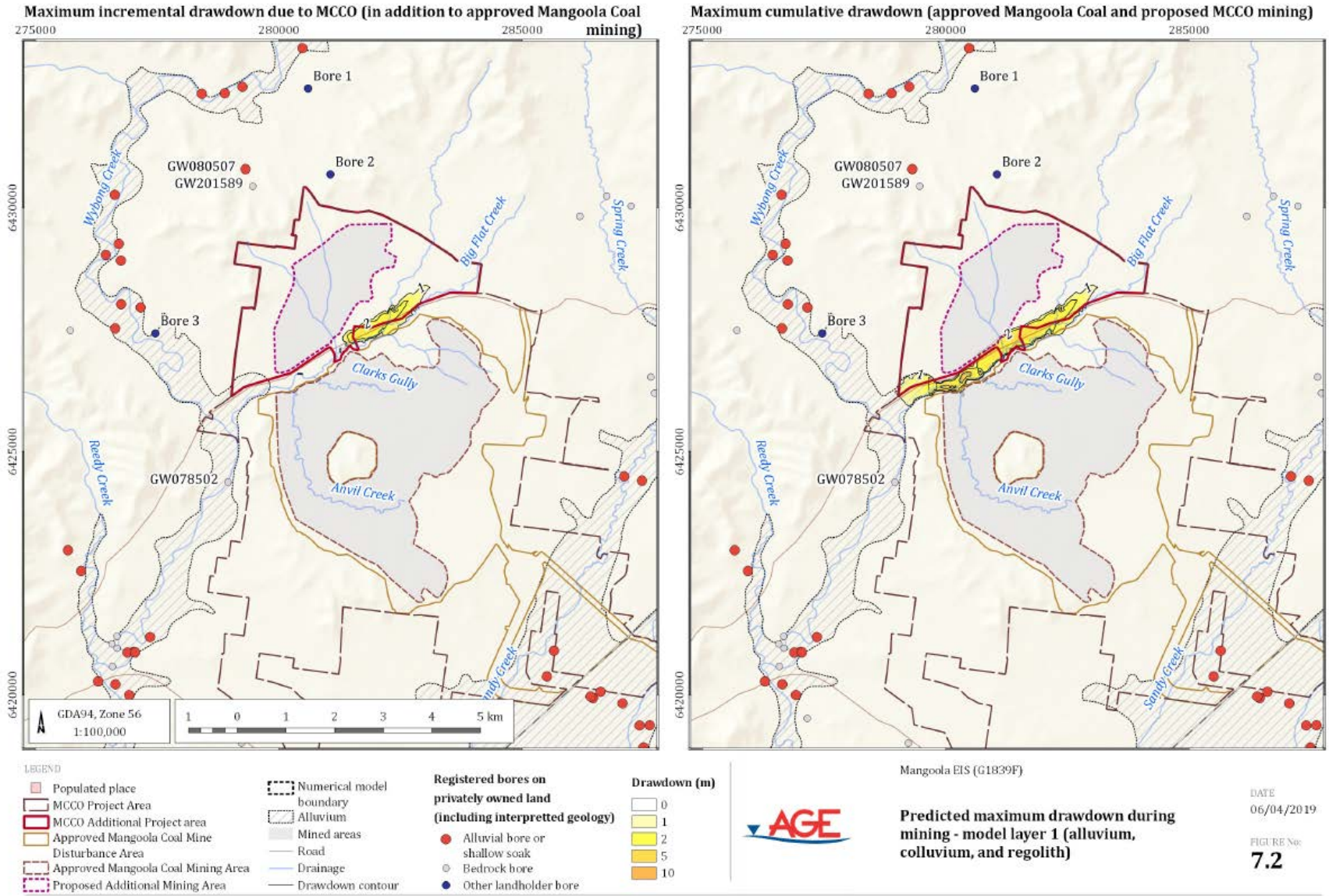

Figure 35 | Incremental and cumulative drawdown in alluvium, colluvium and regolith along Big Flat Creek

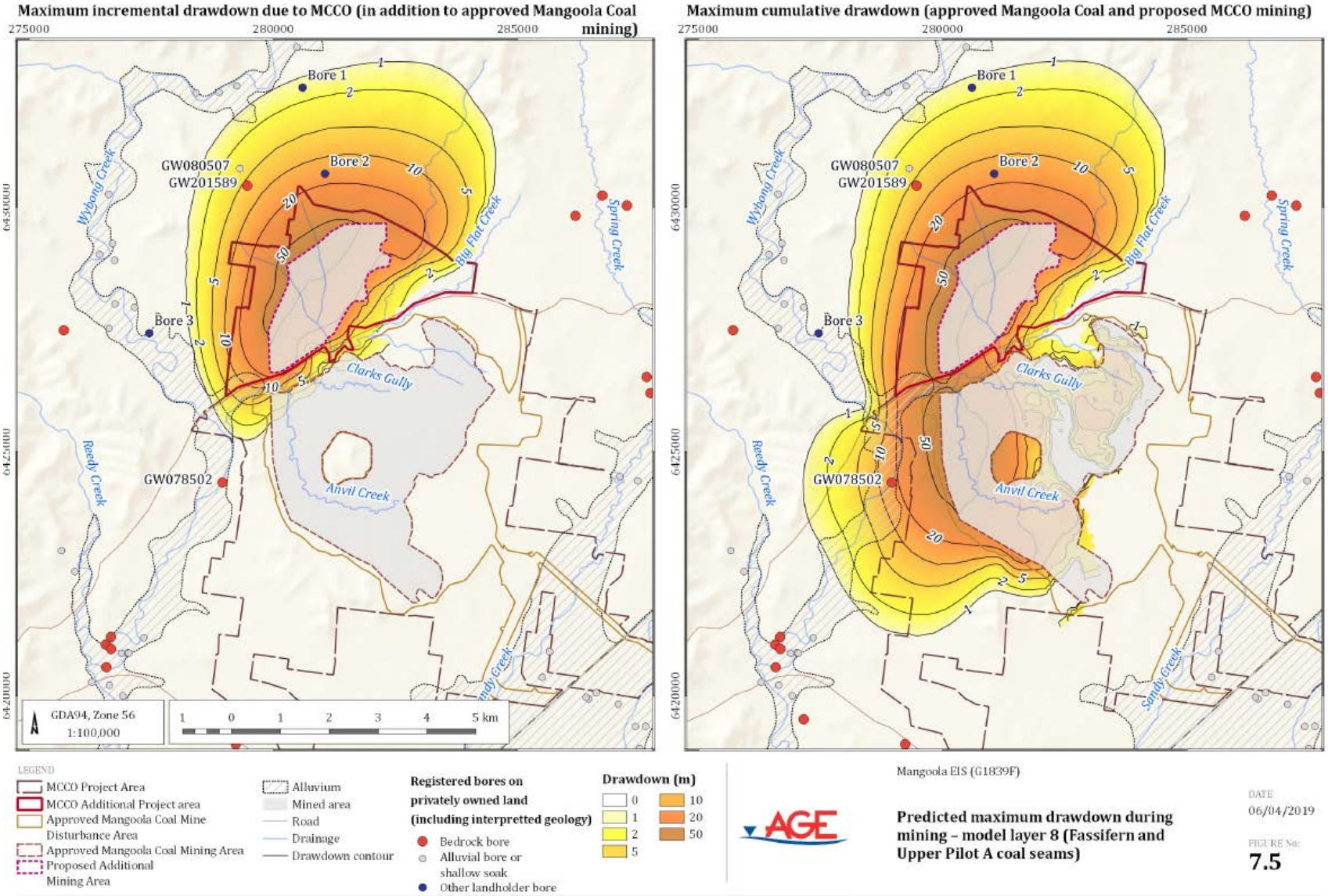

Figure 36 | Incremental and cumulative drawdown in coal seams

6.8.97 The initial change in flux compared to pre-mining conditions is almost entirely due to a reduction in groundwater inflow to the alluvium, which AGE notes would actually reduce the inflow of saline groundwater from the Permian measures into the overlying alluvium. By the end of mining the change in flux is a combination of a reduction on the groundwater inflow to the alluvium from the bedrock and increased loss from the alluvium to bedrock.

6.8.98 AGE notes that the reduced groundwater flux into the overlying Wybong Creek Alluvium would also reduce the rate of groundwater baseflow into the overlying Wybong Creek. AGE predicts this could result in cumulative reduction in flows in Wybong Creek of up to 28 ML/year, comprising 26 ML/year due to the existing Mangoola Mine and a further 2 ML/year as a result of the Project. The Department notes that Wybong Creek has a recorded mean annual flow of 28,287 ML/year. Consequently, the predicted change in baseflows to Wybong Creek is likely to have a minimal impact on overall flow volumes.

6.8.99 In addition, the GIA identified that Big Flat Creek is already likely to have become disconnected from groundwater system due to the existing Mangoola Mine, which accounts for baseflow losses of approximately 10 ML/year from Big Flat Creek. As this equates to the entire base flow component of Big Flat Creek, the Northern Pit extension would not be expected to exacerbate the existing baseflow losses to Big Flat Creek.

Water Licensing

6.8.100 Under the AIP, the groundwater intercepted by mining is considered a 'direct' take from the Permian groundwater system, as opposed to the changes in fluxes in the Quaternary alluvium from depressurisation of Permian strata which are considered an 'indirect' take.

6.8.101 As previously shown in **Figure 33**, the combined groundwater take from the Project is predicted to peak in year two of the Project at 280 ML/year. The Department notes that Glencore currently holds a combined entitlement of 700 ML/year for the North Coast WSP, which substantially exceeds the maximum predicted yearly inflow.

6.8.102 **Table 19** summarises Glencore's existing groundwater licences and the maximum predicted take associated with the existing Mangoola Mine, Northern Pit and consolidated Project.

Table 19 | Summary of Groundwater Licensing Requirements

			Peak Volume from Mining Operations requiring licensing (ML/year)		
Water Sharing Plan (WSP)	**Type**	**Licenced Volume (ML/year)**	**Approved Mangoola Operations**	**Northern Pit Only**	**Approved and Proposed Operations**
North Coast Fractured and Porous Rock WSP	Groundwater	700	152	210	280[#]
Hunter Unregulated and Alluvial WSP	Groundwater	254	4[*]	1[*]	5[*]
	Surface water	861	26	2	28

 # The peak volumes occur in different years

[*] Adjusted from a total of 34 ML/year to avoid double counting

6.8.103 In relation to the Hunter Unregulated WSP, AGE notes that where groundwater and surface water are regulated under the same water sharing plan and within the same water source , the change in the baseflow should be subtracted from the alluvial flux change to prevent double accounting (see **Table 19**).

6.8.104 Overall, the Department is satisfied that Glencore has more than sufficient water licences to cover the direct and indirect take predicted to occur as a result of the Project.

Impacts to Private Groundwater Users

6.8.105 The GIA identified eight potential privately-owned bores located within 3 km of the Project. Of these bores, bore GW050525 has been decommissioned and bore GW080946 has been converted to a Government monitoring bore, leaving six key bores for consideration.

6.8.106 Glencore undertook further investigations to determine the depth of these bores and modelled the predicted drawdown impacts arising from the Project. Three of these bores 3 (Bore 1, GW080507 and GW201589) are located to the north of the Project and appear to be screened at depths where drawdown of less than 1 m is predicted (see **Table 20**), while Bore 2 is predicted to experience drawdown of 1.3 m as a result of the Project.

Table 20 | Privately owned bores predicted to be impacted by the Project

Bore ID	Receiver ID	Depth (m)	Predicted Drawdown Based on Bore Depth (m)	Proposed Mitigation
Bore 1	261	94	0.182	Monitoring of bore at request of landholder
Bore 2	157	85	1.296	
Bore 3	130	30	0.008	
GW080507	144	Unknown*	0.2	
GW201589	144	84	0.3	
GW078502	83	58	7.5 – 14.7	

**Landholder has advised likely to be shallow*

6.8.107 Bore GW078502 is located to the west and is predicted to experience drawdown of more than 2 m, albeit that these impacts are primarily associated with the existing Mangoola operations. In considering the impacts to this bore, the Department considers that it is relevant to note that bore GW078502 is located on land owned by Receiver 83 who is already afforded acquisition rights under the existing approval (see **Sections 6.2** and **6.3**).

6.8.108 In order to mitigate impacts to these landholders, Glencore has committed to monitor these six bores (subject to each landowner's request) and should Project related impacts be detected, offer compensatory measures to ensure that an alternative long term supply of water is provided (which could potentially involve deepening or redrilling the bore).

6.8.109 The Department considers that with the proposed monitoring and mitigation measures are an appropriate response to the potential impacts of the Project and has formalised Glencore's commitments in its recommended conditions (see **Appendix G**). In addition, the Department has strengthened these measures by requiring Glencore to notify Receiver 83 that they are predicted to have a drawdown of over 2 metres as a result of the Project and would be eligible for compensation, and has stipulated that the burden of proving whether the loss of water supply is due to mining impacts rests with Glencore.

Groundwater Quality

6.8.110 The Permian and Triassic groundwater systems in the Northern Extension Area are typically saline and unsuitable for more sensitive uses such as human consumption and irrigation. The GIA notes that Glencore has observed that as drawdown from the existing Mangoola operations has reduced water levels, groundwater in its bores has often become more saline which likely represents the mixing of water from different depths within the groundwater regime.

6.8.111 Despite these monitored changes in groundwater salinity, Glencore has identified that no nearby groundwater users have been affected by these changes and any water moving away from the affected bores would be migrating towards the pit, where it will be captured.

6.8.112 The Department notes that a similar change in water quality could occur as a result of the Project. AGE predicts that any changes in water quality would be restricted to areas closest to the active mine, with the open cut pit acting as a groundwater sink, and that any saline water could be captured and managed within the mine water management system.

6.8.113 In considering the likely impacts on groundwater quality, the IESC questioned why only one round of groundwater quality monitoring was presented in the EIS and requested further details on proposed groundwater quality monitoring regimes, including a discussion of the implications of these results and any causes and trends in groundwater quality.

6.8.114 In response to this request, Glencore advised that it had conducted a long term detailed groundwater quality monitoring program between September 2017 and January 2018. However, as this monitoring program had shown consistent and low variability groundwater quality result over this entire period of time, the EIS described the accumulated results of this program as a single representative data set.

6.8.115 Glencore also noted that while some trace metal concentrations exceeded the ANZECC guideline limits for aquatic ecosystems, irrigation, drinking water and stock, these elevated results are most likely to have occurred through the enrichment of rainfall due to evapo-concentration at the surface before rainfall flows to the underlying water table.

6.8.116 Glencore considered that as the groundwater quality typically exceeds the ANZECC guidelines for irrigation and potable consumption due to natural salinity, further comparison against the guidelines was of little benefit. Glencore also considered that as Big Flat Creek is not well connected to the water table and groundwater does not form a source of baseflow, application of the aquatic ecosystem guidelines was also not appropriate.

6.8.117 Water balance modelling for the Project predicts groundwater inflow would comprise a minor component of system inflows and would have no direct implication for the

surrounding environment as it is relatively limited in volume. Any groundwater requiring pumping from mining areas would be diluted within the surface water storages on site.

6.8.118 The Department notes that Glencore has committed to monitor a broad suite of metals and considers that a comprehensive monitoring program, combined with a detailed TARP with specific water quality levels, would provide an adequate management approach to responding to any potential groundwater quality changes at a localised level. The Department has therefore recommended conditions requiring the development and implementation of groundwater quality monitoring program.

Final Void

6.8.119 In addition to the final void that is already approved to be retained at the Mangoola Mine, Glencore is proposing to leave a second final void in the Northern Extension Area (see **Section 6.6**). To inform the consideration of how this void would integrate within the landscape, the EIS included an assessment of the final void water and salt balance and modelled the indicative post mining changes in hydraulic properties, recharge, water levels and the long term effects on the groundwater system for a period of 500 years.

6.8.120 Water take from the groundwater systems is predicted to continue for a substantial duration after mining ceases, due to the residual drawdown created by flow of groundwater to the final voids. The development of a second void in the extension area is estimated to slightly increase the cumulative operational water take to 34 ML/year in the short term. This operational water take would be initially driven by operations at the existing Mangoola Mine in the short term and incrementally replaced by operations in the Northern Pit toward the end of mine life.

6.8.121 Following the completion of mining, both final voids would form permanent pit lakes and act as localised groundwater sinks. AGE predicts that equilibrium levels in the pit lakes would be reached over a period of more than 200 years, with long term water take estimated at approximately 23 ML/year over this period, and comprising 10 ML/year from the existing Mangoola Mine void and 13 ML/year from proposed Northern Pit void.

6.8.122 The modelling also predicts that surrounding Permian aquifer groundwater levels would gradually recover to reach a final equilibrium level somewhat lower than that was present pre-mining. The Department notes that given the saline nature of groundwater, this is unlikely to significantly impact the availability of regional groundwater resources.

6.8.123 In considering the migration pathways, AGE identified that the proposed Northern Pit void is not predicted to result in any significant outflow to the bedrock and noted that the existing approved Mangoola Mine void may continue to result in some infiltration into bedrock.

6.8.124 The Department notes that AGE's modelling shows that these flows into the bedrock would be expected to occur in deeper strata and would be expected to circulate back towards the final voids, thereby remaining within the deeper strata and not migrating to the surface. Consequently, the Department considers that these long term groundwater flows would be unlikely to impact surrounding groundwater users.

6.8.125 Over time, the salinity levels in both pit lakes is predicted to increase as a result of evapo-concentration, reaching final electrical conductivities in the 'saline' range. Importantly, the final void modelling indicates that the waterbodies within both voids would equilibrate more than 30 m below their respective spill levels, meaning that this water would be wholly contained within the voids with no chance of overflow (see **Figure 37**).

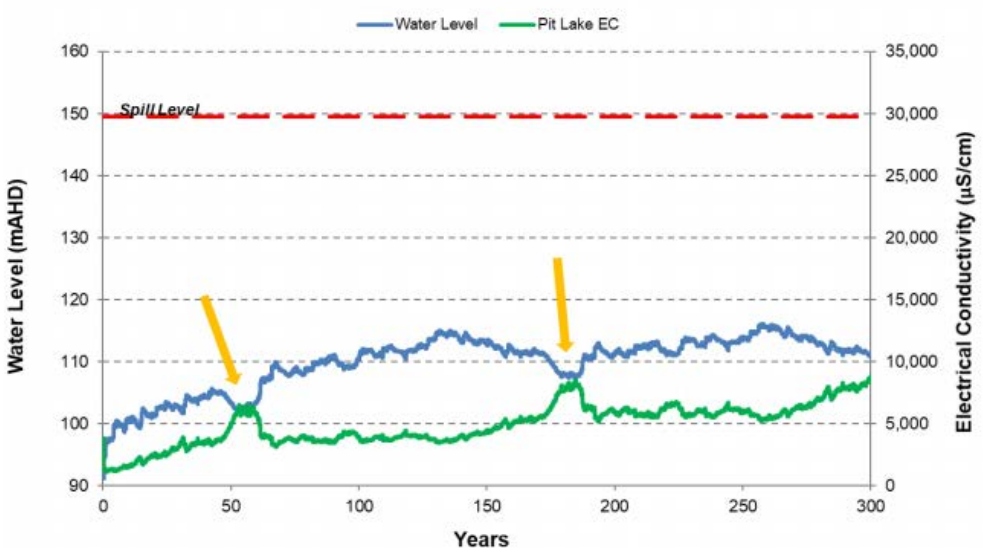

Figure 37 | Predicted Project Pit Lake water and salinity levels (electrical conductivity)

6.8.126 As illustrated in **Figure 37**, after approximately 300 years the pit lakes are predicted to reach a salinity of just under 10,000[6] micro-siemens per centimetre (µS/cm) (which is less than a third of the salinity of seawater). Glencore has identified that a range of fish species live within this salinity range and argues that the final pit lakes would be able to support these fish species post mine closure (see **Section 6.6**).

6.8.127 Overall, the Department is satisfied that the final voids (including the associated catchment areas) have been designed in a manner to ensure that saline water inflows are largely contained within the final voids and do not present a risk of overflows to the surrounding environment.

Matters of National Environmental Significance

6.8.128 Following its review of Glencore's referral documentation, DAWE identified the Project as a controlled action, due in part to its likely significant impacts on a water resource in relation to large coal mining development (see **Section 4.6**).

6.8.129 In making a determination on the 'controlled action', the Commonwealth Minister must consider advice received from the IESC. The Department notes that the IESC identified areas where it considered Glencore should provide further information regarding:

- whether the assessment methods captured all potential GDEs likely to be impacted by the Project;
- the conceptualisation of faults and the impact on groundwater flow;
- relevant monitoring data and information, including:
  - water quality data for both surface water and groundwater and in final voids; and
  - controlled and uncontrolled discharges; and
- specific mitigation measures for the Project's potential impacts.

[6] *For comparison freshwater is generally between 0 and 1,500 uS/cm and typical sea water around 50,000 uS/cm.*

6.8.130 In response to the IESC's advice, Glencore provided detailed technical clarifications, including representation of ground and surface water quality data, groundwater modelling, impacts on GDEs and proposed mitigation measures (see **Appendix D**).

6.8.131 The Department considers that Glencore's response provided clarification on the issues raised by the IESC and a sound basis for a comprehensive assessment of the Project. Importantly, the Department notes that the additional information provided did not change the overall water resource assessment outcomes as presented in the EIS, which was peer reviewed on behalf of Glencore by Dr Noel Merrick of HydroSimulations and deemed fit for purpose.

6.8.132 In addition to the information provided in response to the IESC, the Department notes that the water resources within the Northern Extension Area are well understood based on information from the existing operations and water monitoring programs. The Department also notes that the existing monitoring program and water models are regularly reviewed and updated as a requirement of the existing conditions of approval.

6.8.133 Overall, the Department considers that the IESC's advise has been adequately discussed and addressed in this assessment report, particularly with respect to GDEs, surface water discharges, flooding and groundwater quality and the final landform design (see Section **6.7** and **Section 6.6**).

Monitoring and Management Strategies

6.8.134 The IESC considered that additional information should be provided on the existing and proposed groundwater monitoring network (including construction details of proposed monitoring bores), TARPs and specific mitigation measures.

6.8.135 In response, Glencore provided further details of its proposed management and mitigation measures (see **Appendix D**), which include:

- updating the existing Water Management Plan to include the extension area,
- retaining sufficient water licences to account for the Project's water take;
- monitoring and compensating landholders with impacted bores; and
- collecting baseline data and implementing an adaptive management strategy.

6.8.136 The Department notes that Glencore has installed new groundwater monitoring sites around the Project (prior to submitting its EIS) and has proposed to install vibrating wire piezometers to monitor depressurisation near the Wybong Creek Alluvium and associated impacts to GDEs.

6.8.137 The Department has carefully considered the advice provided by the IESC and is satisfied that, relative to the existing approved Mangoola Mine, the Project can be undertaken:

- without causing significantly greater impacts to GDEs and other vegetation or as a result of depressurisation, drawdown and flooding; and
- without causing significant additional impacts to the water resources of Big Flat Creek, Wybong Creek and Sandy Creek and their associated alluvium.

6.8.138 The Department is satisfied that Project would not significantly increase the existing impacts to ground and surface water resources in the area and considers that any residual incremental impacts of the Project would be able to be appropriately licensed, monitored and managed through the recommended conditions.

Conclusion

6.8.139 The Department notes that the existing surface water catchments and groundwater aquifers surrounding the Mangoola Mine have already been affected by current mining operations. The Project would increase the total area of surface water runoff captured by the Mangoola Mine and contribute to the depressurisation of the hard rock aquifers in the coal seams over an extended period of time.

6.8.140 Overall, the Department is of the view that these impacts are manageable and licensable, and considers that the Project would not substantially alter the scale of surface and groundwater impacts associated with the existing Mangoola Mine. Additionally, as none of the affected water resources provide significant water supplies for domestic or agricultural use, it is considered unlikely that the Project would have any material effect on water supplies or security for nearby agricultural operations or downstream users.

6.8.141 The Department therefore considers that water-related impacts can be appropriately managed and mitigated through the recommended conditions, including strict performance measures and a comprehensive Water Management Plan that incorporates a sufficient monitoring network and TARPs to proactively identify and manage potential impacts.

6.9 Economics

6.9.1 The EIS was accompanied by an Economic Impact Assessment (EIA) prepared by Cadence Economics (Cadence) in accordance with the *NSW Guidelines for the economic assessment of mining and coal seam gas proposals 2015* (EA Guideline) and *Technical Notes supporting the guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposal*s (Technical Notes).

6.9.2 The EIA included a cost benefit analysis (CBA) that estimates the Project's net benefits to the State of NSW, along with a local effects analysis (LEA) which considers the potential costs and benefits that may accrue to the Upper Hunter region (defined as the Upper Hunter Statistical Area 3 (UHSA 3)). Cadence also provided Computer Generated Equilibrium (CGE) modelling to predict the broader economic effects of the Project.

6.9.3 The EIA was peer reviewed on behalf of Glencore by Emeritus Professor Jeff Bennett who concluded that it was consistent with the EA Guideline and Technical Notes and provided sound findings of the likely economic impacts associated with the Project.

6.9.4 The Department notes that the EIA considers the Project's economic costs and benefits relative to "baseline operations", which represent the exhaustion of currently approved coal resources in 2025 and subsequent closure and rehabilitation of the Mangoola Mine (see **Section 2**).

Predicted Benefits

6.9.5 Cadence estimates that the Project would generate a total NPV benefit to the NSW community of approximately $408 million. This NPV assumes a standard discount rate of 7% and includes $129.5 million in NPV royalties to the NSW Government that would be generated by the additional proposed coal extraction (see **Table 21**).

Table 21 | Predicted Costs and Benefits of Project to NSW

Aspect	Predicted costs and benefits $ million (NPV)
Benefits to NSW	
Direct Benefits	
- Royalty payments	129.5
- Company Tax	43.5
Indirect Benefits	
- Benefit to NSW workers	107.6
- Benefit to NSW suppliers	129.0
Total Project Benefit	**409.6**
Costs to NSW	
- Loss of surplus to other industries	0.93
- Greenhouse Gas Emissions	0.031
- Transport	0.067
Incremental Indirect Cost	***1.03***
Net Benefit to NSW	**408.6**

6.9.6 In considering the value of royalty payments, it is important to recognise that the Project would produce thermal coal, the majority of which would be washed at the Mangoola CHPP to meet export market specifications and maximise product value. MEG has advised that the existing Mangoola Mine currently sells product coal to domestic (27 %) and export markets 73 %). Glencore has indicated that it will continue to supply product coal to both domestic and international markets until 2026, and to exports markets alone beyond 2026.

6.9.7 In estimating the above benefits of the Project, the EIA incorporated an average central case coal price of $70.20 (Australian dollars) per tonne low ash thermal coal and $58.10 (Australian dollars) per tonne for high ash thermal coal. These price assumptions were then subject to further sensitivity analysis to consider the effects that a 15% increase or decrease in assumed coal prices (ie a low ash thermal coal range of approximately $60-80 (Australian dollars) per tonne and high ash thermal coal ranging from approximately $50-67 (Australian dollars) per tonne) would have on the overall forecast Project benefits.

6.9.8 To assist in the consideration of the Project's economic impacts, MEG has reviewed the EIA's estimated royalties and assumptions about future coal prices for thermal coal. MEG advised (in August 2019) that an appropriate average price of export thermal coal would be around $95 (Australian dollars) per tonne. The Department recognises that since this time the Covid-19 pandemic has resulted in a short-term weakening of coal prices, however export coal prices have begun to recover in recent months with export thermal coal

currently trading at around $115 (Australian dollars) per tonne. Overall, the Department considers that the EIA sensitivity analysis adequately captures the reasonable variability in long term coal prices.

6.9.9 MEG also noted that the Project would be expected to product coal with a higher than average ash content, meaning that the royalties from the Project should be adjusted to provide a conservative estimate of sales prices, which reflect the lower end of the spectrum of potential coal price scenarios.

6.9.10 MEG identified that based on its consideration of realistic coal prices, the Project could be expected to deliver around $35 million/year in royalties, equating to around $160 million NPV over the life of the Project. The Department notes the Cadence's baseline assessment provides an even more conservative estimate of royalties in the order of $129.5 million NPV and is therefore satisfied that the EIA provides a reasonable basis for considering the NPV royalties that would be generated by the Project (see **Table 21**).

6.9.11 Cadence has also provided an analysis of other benefits that would arise from the Project in the form of company tax, net producer surplus and economic benefits to workers and suppliers, which would provide over $280 million NPV in additional benefit.

Predicted Costs

6.9.12 Consistent with the EA Guidelines, Cadence provided qualitative predictions of potential costs arising from the project, along with qualitative assessments for costs associated with air quality, Aboriginal cultural heritage, residual land values and visual amenity.

6.9.13 In total, the predicted incremental costs of the Project to the community of NSW are predicted to be in the order of $1.03 million NPV and comprise:

- $0.93 million in lost agricultural output due to changes in land uses;
- scope 1 and 2 greenhouse gas emissions proportioned to NSW of $0.03 million[7]; and
- additional travel time for users of Wybong PO Road of $0.067 million.

6.9.14 A range of additional costs incurred to manage social and environmental impacts (eg noise mitigation and biodiversity offsets) that have been directly attributed to the NSW community have also been included as part of Glencore's operating costs.

6.9.15 Overall, the Project is predicted to return a significant net benefit to the NSW community and would need to incur significant unaccounted for in order to negate the predicted benefits to NSW. As illustrated in **Figure 38** (below), these externalities would need to be in excess of $408 million NPV (central case) or $350.6 million (under the worst case modelled scenario) in order to return negate the benefits to NSW. The Department considers this to be unlikely, particularly given the brownfield nature of the Project, the limited capital expenditure required to realise the project, the limited duration of extended amenity impacts and the proposed environmental management and offsetting approaches.

[7] The EA Guidelines and Technical Notes explain that a CBA should include all first round (primary) impacts both direct and indirect but not secondary impacts. As Scope 3 emissions are a secondary impact, they would be accounted for as the Scope 1 and 2 emissions of downstream end users and are not counted for the purposes of calculating the NPV for the Project.

Wybong PO Road Alternative

6.9.16 As discussed in **Section 6.5**, in response to Council's MARNP Glencore has offered to provide an equivalent funding arrangement towards improvements in the local road network to account for the closure of Wybong PO Road, as an alternative to the proposed Wybong PO Road realignment.

6.9.17 To inform the consideration of this alternative, Glencore has provided an assessment of the potential change in economic impacts of not realigning Wybong PO Road (see **Appendix D**). While this assessment indicates that the annual total cost of travel time for road users who previously used the Wybong PO Road would increase when travelling to/from Muswellbrook by 3.5 km (equivalent to around 2 minutes), Glencore considers that there would be no significant change to the overall outcomes or findings of the EIA.

6.9.18 The Department acknowledges that $0.067 million in travel time costs have already been accounted for in relation to the Wybong PO Road realignment and considers that while Council's proposed alternative may incur a slightly higher cost, these incremental costs would not be sufficient to negate the $408 million in (central case) NPV benefits to NSW and would not alter the overall conclusion regarding the Project's net benefits to NSW.

Sensitivity Analysis

6.9.19 Given the Project's relatively low capital requirement, extraction and processing costs, together with relatively modest residual costs to the NSW community, the EIA concludes that the Project would be economically viable and generate an overall benefit to NSW.

6.9.20 Nevertheless, coal prices are a key factor influencing the forecast royalties and profits generated by the Project, and associated benefits to NSW. Cadence considered variations in the coal price over the life of the Project based on anticipated consumer export markets. The Department is confident that given the Project's relatively short timescale, it is expected that there will be sustained thermal coal demand over the life of the Project.

6.9.21 To address any residual uncertainty with the economic analysis, Cadence completed a sensitivity analysis which considered several different scenarios as shown in **Figure 38**.

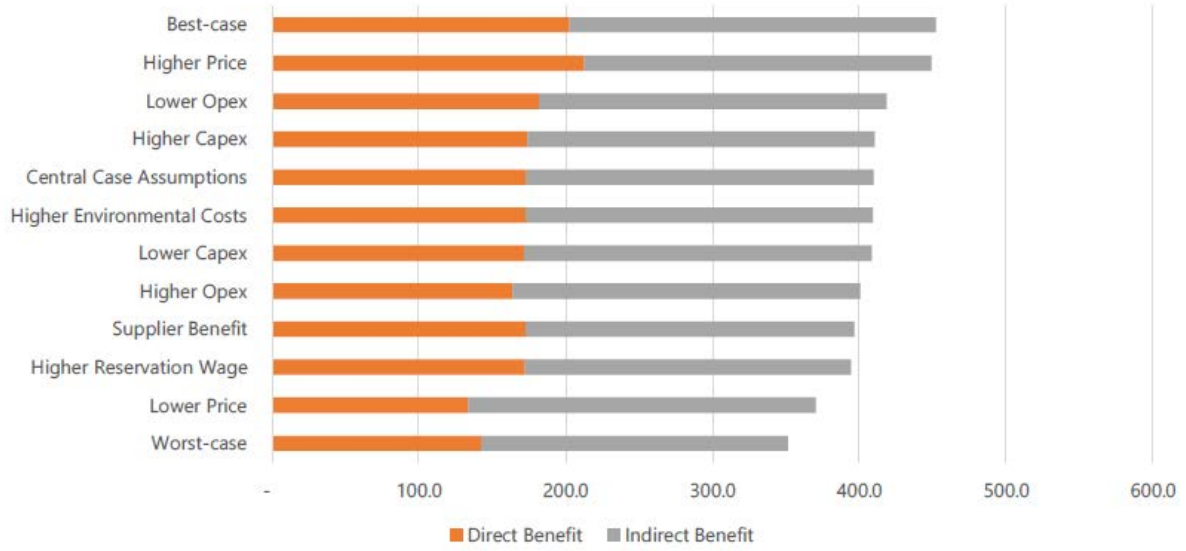

Figure 38 | Sensitivity Analysis of key CBA assumptions ($ millions, NPV)

6.9.22 This analysis confirmed that the Project's forecast benefits are most susceptible to coal price variations. However, Cadence identifies that even under a "lower price" scenario which assumes a 15% reduction in coal price relative to the "central case", the net benefits of the Project are still predicted to be $369.6 million NPV.

6.9.23 Likewise, the 'worst-case' modelled scenario which incorporated a 15% reduction in estimated coal prices (ie around $60 (Australian dollars) per tonne for a low ash thermal coal and $50 (Australian dollars) per tonne for high ash thermal coal), higher capital and operational expenditure, increased environmental costs and lower supplier and worker benefits are also predicted to return a net benefit of $350.6 million NPV. Accordingly, Cadence asserts that even under conservative assumptions the Project would still generate benefits to NSW.

6.9.24 Having considered the EIA predictions and sensitivity analysis, the Department is confident the Project could deliver a material net benefit to NSW.

Local Effects Analysis

6.9.25 The LEA considered the employment and broader economic effects of the Project on the local area (the Upper Hunter Statistical Area 3 (UHSA 3)), which includes the regional centre of Muswellbrook and towns of Denman and Aberdeen.

6.9.26 The LEA analysis found that the Project would generate NPV benefits of $14.1 million to local suppliers and $76.8 million to employees, along with a net incremental increase in local rates totalling $2.7 million NPV. When considered against the $1 million NPV in locally accruing indirect costs associated with the loss of agriculture output and travel time costs for the users of Wybong PO Road, the Project is expected to generate a net benefit of around $92.6 million NPV for the UHSA 3 (under the "central case" sensitivity analysis).

6.9.27 Further sensitivity analysis of the LEA demonstrates that even under worst case conditions the Project would continue to generate local net benefits of around $79.9 million NPV.

6.9.28 These benefits were recognised in a number of community submitters in support of the Project, which cited the positive economic benefits to the local community that had already been generated by the existing Mangoola Mine and were expected to continue under the proposed Project (see **Section 5**).

6.9.29 Conversely, those submitters opposed to the Project raised concerns that many of the potential direct benefits would accrue to local towns, while the mitigation costs would be experienced by nearby landholders.

6.9.30 Glencore advised that around 73% of current employees at the Mangoola Mine live within the Muswellbrook and Upper Hunter LGAs and approximately 84% of the Mangoola Mine inputs are sourced from NSW-based suppliers. Overall, the Project is expected to generate indirect benefits to local suppliers of $14.1 million NPV, compared to minor indirect costs of $1 million associated with transport and loss of agricultural output.

6.9.31 Furthermore, Glencore confirmed that mitigation costs for landholders (ie as required by the VLAMP and AIP) had been included in the cost benefit analysis in accordance with EA

guidelines, including a range of costs associated with mitigation measures at nearby residences in response to noise impacts.

6.9.32 In its comments on the EIA, Council requested clarification on the assumption that 73% of the workforce for the Project would be supplied from the UHSA 3 region. Glencore advised that this assumption was chosen as a reasonable prediction of workforce dynamics, based on the residential information of its existing workforce and noted that it would continue to use its best endeavours to employ people from the local community for the Project.

6.9.33 The Department considers this to be an appropriate basis for assessing the likely workforce distribution and supports Glencore's commitment to continuing to aim to continue to use reasonable endeavours to source its workforce from the local area.

6.9.34 Council also advised that it considered the EIA did not account for the cumulative air pollution in the entire Muswellbrook LGA and expressed concern that increases in fine particulate pollution being statistically likely to lead to an increase in health impacts.

6.9.35 Glencore explained that the EIA relies on the predictions of the air quality assessment when considering the Project's likely air quality costs. **Section 6.3** details the Department's assessment of the Project's predicted air quality impacts, which includes consideration of cumulative air quality impacts.

6.9.36 While the Department acknowledges the concerns of Council and the local community about air quality, the Department considers that the air quality assessment has been undertaken in a comprehensive and robust manner by a range of experts and that the environmental costs of the Project have be appropriately assessed in accordance with the Technical Notes. In this regard, the results of this assessment clearly show that the Project would not result in any exceedances of the criteria imposed by the EPA at nearby receivers or in nearby towns such as Muswellbrook.

6.9.37 Lastly, Council argued that the equitable distribution of environmental benefits and burdens of the Project is not considered, and that the cost and benefits of the Project are only calculated for the current population and do not adequately consider future generations.

6.9.38 In response to these comments, Glencore noted that the equitable distribution of environmental impacts has been appropriately considered in the LEA analysis and in the conservative assumptions used for the sensitivity analysis. Further, the Department considers that potential impacts to future generations and the consideration of intergenerational equity has been appropriately addressed through its assessment of the Project against the objects of the EP&A Act (see **Appendix F**).

Conclusion

6.9.39 The Department considers that the EIA provides a robust assessment of the Project's potential economic impacts. Overall, the Department considers that the Project's benefits to the local, regional and State economies would outweigh its potential costs.

6.10 Social

Background

6.10.1 The EIS included a Social Impact Assessment (SIA) prepared by Umwelt (Australia) Pty Ltd, in accordance with the Department's *Social Impact Assessment Guidelines for State significant mining, petroleum production and extractive industry development.*

6.10.2 The SIA included an assessment of the negative and positive social impacts of the Project on adjacent landowners, local and regional communities and provided consideration of mitigation and management measures proposed in response to these potential impacts.

6.10.3 In the locality surrounding the Northern Extension Area, the Wybong Community Hall is identified as a prominent community feature for the smaller communities living to the west and north of the project. These communities reported a strong, close-knit and resilient community, but expressed their reservations that mining can cause people to move away from the area.

6.10.4 The broader Muswellbrook LGA is described in the SIA as a well-developed regional area with a range of recreational and open spaces, education facilities (including schools, TAFE and remote university campus), library and Civic Centre.

6.10.5 The Muswellbrook LGA has a diverse economy with significant industries including coal mining and power generation, viticulture, agriculture, thoroughbred horse breeding and tourism. Mining is been a long-standing and important industry to the local area, with underground coal mining commencing in the late 1800s and growing to a significant local employer through the expansion of primarily open cut mining since in the late 1940s.

6.10.6 In comparison to the NSW state averages, the Muswellbrook LGA has an aging population with heighted levels of population mobility and socio-economic disadvantage. This population mobility may to some degree reflect the transient workforce associated with the mining industry and other agricultural industries in the region.

6.10.7 The LGA has also been subject to large variations in historical unemployment rates which peaked in December 2015 at 13%. However, the SIA reported a more recent, pre-COVID pandemic unemployment rate of around 3.5%. Most of the current labour force is employed within the above industries, with many of the local mining jobs providing well paid skilled employment as technicians, tradespeople, machinery operators and managers.

Assessment of Social Impacts

6.10.8 The SIA identified that those landholders located closest to the Project (ie in the areas of Mangoola, Castle Rock, Wybong and Manobalai) perceived the Project as likely to result in negative social outcomes, principally related to:

- environmental, amenity, health and wellbeing impacts related to air quality, noise, blasting, visual, water and transport impacts;
- personal and property rights; and
- impacts on rural lifestyle and sense of community.

6.10.9 These concerns are generally consistent with the issues raised by these community members during the exhibition period (see **Section 5**). The Department has carefully considered these concerns and the Project's social and environmental impacts throughout this assessment. In particular, the Department notes that Glencore has reduced, where possible, the extent of amenity impacts on nearby residents though the design of the Project (see **Section 2.4**).

6.10.10 While the potential impacts arising from the Project are predicted to remain within relevant assessment criteria or could be appropriately addressed in accordance with established NSW Government policies and guidelines, such as the application of the VLAMP in the case of noise impacts, the Department acknowledges that people may experience these impacts differently and that these individuals are still likely to have concerns about the potential for the Project to impact their lifestyles, amenity or wellbeing. In recognition of this, Glencore has proposed a range of mitigation measures, which are discussed below.

Impacts to Property Values and Rural Lifestyles

6.10.11 The Department recognises that a subset of the local community raised concerns in the SIA about the potential for the project to effect property values and their ability to sell their properties given uncertainties regarding the future of the Project and acquisition zones.

6.10.12 Importantly, the Department notes that the NSW Land and Environment Court has consistently held that concerns regarding property devaluation can be given little weight in the absence of supporting evidence and the EP&A Act does not provide any compensation mechanism for development which is permissible under relevant planning controls.

6.10.13 Nevertheless, the SIA included analysis to investigate the potential impacts that the existing Mangoola Mine has had on the value of surrounding property and the Submissions Report contained further analysis of the likelihood that the Project would drive particular changes in property values.

6.10.14 Overall, the analysis concluded that mining operations have the potential for both positive and negative impacts on property values and did not find evidence to support assertions that the Project would detrimentally impact property values. In particular, this analysis found that there were no discernible property value impacts on surrounding properties that met relevant assessment criteria (ie noise and air quality). It is relevant to note that properties subject to exceedances of the relevant noise and air quality assessment criteria would also be afforded appropriate protection from reductions in property values through application of the VLAMP (ie application of voluntary mitigation and acquisition rights – which include a compensation component).

6.10.15 In addition to the above, the SIA indicates that some community members expressed concerns that the Project would result in a depletion of the local population, loss of local history through property acquisitions and loss of local community cohesion (particularly associated with a perception that rental tenants were less likely to participation in local social events such as dances and barbeques at the Wybong Hall).

6.10.16 The Department acknowledges the genuine nature of the concerns expressed by the local community and notes that these major mining developments have been known to generate these types of impacts in some communities around the State. Conversely, mining proposals are also known to present material benefits to local communities and the State,

which is reflected in the 72 % of submissions that supported the project. As these projects have a finite lifespan, the careful consideration and management of potential social impacts over this operational period must be weighed up against the potential benefits to the community and State. The recognition of these positive and negative effects is a key aspect of the Department's *Social Impact Assessment Guidelines for State significant mining, petroleum production and extractive industry development.*

6.10.17 During the SIA process, Glencore also acknowledged the concerns expressed by this subset of the local community and has proposed a range of mitigation measures to address these matters. This includes development of a Community Enhancement Program which aims to maintain the sense of community, application of property specific mitigation measures for a number of nearby landholders and continued application of existing rights for private landowners listed under PA 06_0014 over the extended duration of the Project (regardless of whether these properties now comply with relevant assessment criteria).

Matters raised by Council

6.10.18 As outlined in **Section 5**, Council raised a range of concerns regarding the consideration of perceived social impacts that may arise from the Project. Council considered that any reduction in population would reduce the number of residents available to volunteer in community organisations (ie Rural Fire Service), participate in local community events, provide neighbour support and ensure the resilience and heritage of the community post mining. Council also considered that mining related acquisition of properties has impacted availability and affordability on housing in the LGA. To address this, Council requested that Glencore be required to build replacement housing around Wybong Hall and undertake a program of community building activities that would extend through the mine closure period.

6.10.19 In response to comments on the impacts of population on volunteering numbers, Glencore reviewed volunteering statistics in the Muswellbrook LGA and noted that volunteer numbers in the area were consistent with the State average at 18%, while Manobalai, Denman and Mangoola had considerably higher proportions of volunteering. Glencore also identified that several of its existing employees currently volunteer in the Rural Fire Service, and that the Mangoola Mine has an established leave policy that entitles employees to take leave in order to volunteer in the emergency services.

6.10.20 The Department considers that the Project would be unlikely to prevent volunteering in community organisations such as the Rural Fire Service. In fact, should any acquired properties be rented to mine workers, Glencore's existing leave arrangements would make it more likely that there would be an increase in volunteers. In addition to this, the Department notes that from a local bushfire perspective, the recommended conditions also require Glencore to ensure it is prepared to deal with bushfire situations on site and assist the Rural Fire Service and emergency services to the extent practicable if there is a fire in the vicinity of the site (as discussed in **Section 6.11**).

6.10.21 Having considered Council's comments, the Department notes that the Project would not be expected to materially impact the availability of housing in the Wybong area, particularly given that the vast majority of mine owned properties would be rented out over the life of the Project (including many homes that are rented back to longstanding members of local communities) and could be resold in future following the completion of mining.

6.10.22 Further, the Department notes that the supply and demand for housing is driven by market demand and that any genuine and economically significant shortfall in housing supply in the LGA could and should be addressed by developers and landowners through Council's existing development application processes. Consequently, the Department does not consider this separate development process to have any relevant nexus to the Project and does not support Council's recommendation that Glencore be required to fund or construct affordable housing around Wybong Hall or in the township of Muswellbrook.

6.10.23 Mine Closure Planning is a long process which builds on incremental planning through the mine life and culminates in the development of final closure strategies several years prior to cessation of mining operations. Glencore has committed to continue to investigate post mining land uses for the site and would continue to consult with relevant NSW Government agencies and Council. The Department considers that the recommended mine closure planning conditions allow for further investigation of post-mining land uses for the site.

Management and Mitigation

6.10.24 To reduce the Project's environmental and social impacts, Glencore has proposed to extend and continue to implement its existing strategies. These comprise:

- a community engagement plan;
- environmental management plans (ie noise, air quality, blasting, etc);
- at residence mitigation for residences, which may include:
  - house sealing and noise mitigation;
  - cleaning and installation of filters in water tanks;
  - cleaning solar panels;
  - planting trees/landscaping on private properties; and
  - installation and maintenance of air-conditioning and electricity subsidies;
- local employment and procurement;
- development of a detailed post mining land use strategy (with a range of post mining land uses considered);
- a voluntary planning agreement (VPA); and
- a community investment program.

6.10.25 In addition to these existing measures, Glencore has proposed further measures to address social impacts, comprising:

- property specific measures;
- a community enhancement program; and
- development of a social impact management plan.

Property Specific Measures

6.10.26 The Department is aware that Glencore has offered tailored "property specific measures" to landholders located in the north west of the Northern Extension Area, who are outside the VLAMP acquisition zone. These measures are in addition to the requirements of relevant policies and guidelines and have been voluntarily offered by Glencore to address concerns raised by property owners who would not otherwise be afforded rights under contemporary assessment standards.

6.10.27 To preserve the privacy of these landholders, Glencore has kept the specific details of these measures confidential, however the Department acknowledges this action and considers that the offer of any such additional mitigation measures would help to offset some of the Project's negative social impacts for these landholders.

Community Enhancement Program

6.10.28 The proposed Community Enhancement Program would aim to address issues relating to perceptions of impacts to property values, declining sense of community and social amenity for residents within the acquisition/mitigation management zones. Glencore considers that the key objectives of this program would include:

- collaboration to develop environmental and community benefits for the Wybong district;
- facilitating enhancement initiatives for residents in the management zones;
- addressing perceived issues relating to property devaluation; and
- targeting community investment and contributing to the local community.

6.10.29 Glencore is proposing to develop this Community Enhancement Program as part of its development contribution made to Council under a proposed VPA (see below).

Social Impact Management Plan

6.10.30 Glencore also proposes to develop and implement a Social Impact Management Plan to:

- identify opportunities to enhance positive social and economic impacts while mitigating the negative impacts;
- describe adaptive management and mitigation strategies that would be applied for the Project;
- identify appropriate stakeholder responsibilities;
- monitor, report and review on the outcomes of the plan; and
- outline an engagement process to collaborate with the community and record their observations and experiences.

6.10.31 The Department considers that the development of a Social Impact Management Plan is an important part of continuing to work with the community to implement the proposed mitigation strategies and monitor the effectiveness over time and has recommended a condition to give effect to this commitment.

Voluntary Planning Agreement

6.10.32 In accordance with PA 06_0014, Glencore has already entered into an existing VPA with Council for the Mangoola Mine.

6.10.33 While the Project is only seeking to extend the approved life of the existing Mangoola Mine by approximately 1 year to December 2030, should the Project be refused Glencore has forecast that it would exhaust its approved extractable coal resources in 2025 (see **Section 1.2**). As the existing VPA only requires payments to be made based on operational years, the Project effectively represents a further 5 years of payments and annual contributions to Council.

6.10.34 In recognition of this, Glencore has proposed to continue its existing VPA commitments for the duration of the Project (including an increase to account for CPI) and provide ongoing

support for a range of environmental and community projects within the Muswellbrook LGA. The terms of Glencore's existing and proposed VPA are summarised in **Table 22**.

Table 22 | Comparison of the existing Mangoola Mine VPA and proposed VPA

Nature of Funding	Existing VPA Contribution to Council (Mangoola Mine)	Status	Proposed VPA*
Local Environmental Management	$100,000 per year for 5 years	Completed	$22,948 per year during mining operations and for a period of 12 months following the end of mining operations
	$20,000 per year during mining operations	Ongoing	
Local Employment	$600,000 for an Education and Training Strategy	Completed	-
	Glencore to use its best endeavours to engage 6 apprentices per year sourced from residents within the Muswellbrook Shire and Aberdeen	Ongoing	Glencore to use its best endeavours to engage 6 apprentices per year sourced from residents within the Muswellbrook Shire and Aberdeen
Road Maintenance	$55,000 per year for part of Wybong Road	Ongoing	$58,887 per year during mining operations and for a period of 12 months following the end of mining operations, for part of Wybong Road
	$220,000 per year for general mine affected roads	Ongoing	$253,467 a year during mining operations and for a period of 12 months following the end of mining operations
Environmental and Community Projects	A combined total of $335,000 per year for additional environmental and community projects	Ongoing	A total of $379,697 per year during mining operations and for a period of 12 months following the end of mining operations
Community Projects	$1,200,000 Recreation Assets Renewal Fund	Completed	-
Community Infrastructure	$2,200,000 Denman recreation area enhancements	Completed	-

* *Contribution values in the proposed VPA have been based on the values of the existing VPA and adjusted for actual payments subject to CPI indexations from the commencement of the original agreement until the 31 December 2019*

6.10.35 The Department understands that Council has advised that it is generally supportive of the VPA, but has not yet provided any alternative terms or agreed to the proposed VPA. Glencore considers that the proposed VPA is reasonable and would represent ongoing contributions in the order of $5 million.

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

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

6.10.37 The PA Guidelines provide that the value of any contributions made under a proposed VPA 'must be fair and reasonable, considering the impacts of the mine on the local community.' However, there is no prescribed methodology for determining the quantum of community

contributions under a VPA. While these agreements are relatively routine in the context of mining projects, they remain voluntary and the precise quantum may vary considerably depending on the scope of a Project's impacts. As such, the PA Guidelines provide flexibility for Councils and Applicants to negotiate a mutually agreeable outcome.

6.10.38 The quantum can be based on a percentage of the Project's CIV (typically in the order of 1 percent) or a fixed rate per tonne of coal produced or another mutually agreed methodology. However, the Department notes that none of these approaches should be considered to reflect or compensate for the scope of a Project's impacts. In this case a VPA based on 1 percent of the CIV would be in the order of $525,000, while the Applicant's offer is approximately $5 million, excluding the value of the apprenticeship program.

6.10.39 Overall, the Department considers that the VPA terms proposed by the Applicant are fair and reasonable, noting that the total contributions proposed over the life of the Project are similar to the current arrangements and considerably higher than the general 1 percent of CIV. It is the Department's view that the proposed VPA, if agreed to by Council, would deliver material community benefits over the life of the Project. However, it may not be possible for an agreement to be reached prior to a determination.

6.10.40 The Department notes that under Section 7.7 of the EP&A Act, a consent authority cannot refuse to grant development consent on the grounds that a VPA has not been entered into in relation to a proposed development. However, a consent authority can require a VPA to be entered into as a condition of a development consent, provided the VPA being required is in the terms offered by the Applicant in connection with the development application.

6.10.41 Accordingly, the Department has recommended conditions requiring the Applicant to make all reasonable efforts to enter into a VPA with Council within 6 months of starting construction. The VPA would, at a minimum, need to reflect the proposed offer outlined in **Table 21**. If the VPA is not entered into within the timeframe, then within a further 3 months, Glencore would be required to make a Section 7.12 of the EP&A Act contribution to Council commensurate to 1% of the capital investment value of the Project (ie $525,000). This amount would need to be directed towards projects in the Muswellbrook area and would be made in accordance with Section 7.12 of the EP&A Act and the provisions of the *Muswellbrook Shire Council Section 94A Development Contributions Plan 2010*.

Conclusion

6.10.42 The Department acknowledges that Council and members of the local community have raised genuine concerns about the potential for the Project to generate impacts on the lifestyles, amenity or wellbeing of the community.

6.10.43 Overall, the Department considers that the social impacts of the Project have been adequately assessed and minimised, where appropriate, through project design and the proposed mitigation and management strategies. The Department considers that any residual social impacts could be appropriately managed under the recommended plans and programs or compensated for through Glencore's proposed VPA with Council.

6.11 Other issues

6.11.1 Following its assessment of the Project, the Department is satisfied that the other impacts associated with the proposal are relatively minor and can be managed, mitigated and monitored to achieve acceptable environmental and amenity outcomes in accordance with standard conditions. Consideration of these other impacts is provided in **Table 23** below.

Table 23 | Other Issues

Issue	Findings	Recommendation
Visual	• The EIS assessment of potential visual impacts found that the proposed Northern Pit would not be visible from any private residences due to intervening topography and vegetation. • However, mining areas would be visible from sections of the surrounding road network (including Wybong Road and Ridgelands Road). However, these short-term intermittent views would be somewhat mitigated by the speeds being travelled, changing orientations of the road and the intervening vegetation. • Glencore has committed to progressively rehabilitate overburden emplacement areas to reduce visual impacts and proposes to plant tree screens along parts of Wybong Road, the realigned section of Wybong PO Road and Ridgelands Road. It would also construct a visual bund along Wybong Road to minimise the visual impacts associated with the Project. • Overall, the Department considers that Project would not result in any direct or material impact to the visual amenity of private receivers. While the Project may be visible from the local road network at times, the Department considers that with the proposed mitigation measures these impacts would be limited.	• The Department supports the proposed visual mitigation measures and recommends that they be detailed and managed under a Visual Impact Management Plan. • The Department has also recommended conditions requiring Glencore to establish and maintain tree screens and visual bund for the duration of the Project.
Lighting	• As the Project is located within 200 km the Siding Springs Observatory (at a distance of. approximately 185 km), Glencore assessed the Project's potential lighting impacts in accordance with the *Dark Sky Planning Guideline – Protecting the Observing Conditions and Siding Springs*. • Importantly, the existing Mangoola Coal Mine infrastructure areas (including the CHPP, workshops and loadout facilities where the majority of fixed lighting is present) are also located within the 'Dark Sky Region' some 192 km from the from the observatory and Glencore has not proposed to change these currently approved lighting arrangements. • The Department notes that site lighting is required to meet operational and safety requirements, including the use of mobile lighting plants and equipment headlights in the Northern Pit area. The EIS considers that this would not impact any private receivers due to the screening effects of intervening topography, vegetation and overburden emplacements. • The lighting assessment found that the Project's lighting impacts are expected to be minimal in comparison to the existing operations given the small amount of additional fixed lighting and lack of direct lighting impacts on private residences. • Further to this, Glencore had committed to install and maintain all new fixed lighting in accordance with	• The Department considers that through a combination of distance, screening effects and the proposed mitigation measures, the Project would result in minimal lighting impacts to private receivers and the observatory. • The Department has recommended conditions requiring Glencore to install and maintain lighting in accordance with Australian Standard AS4282, and to minimise light pollution on the surrounding environment.

	Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting. • Any residual mobile lighting impacts could be managed through strategic placement of equipment, ensuring lights are not directed off-site and shielding of light sources by walls, overburden emplacements and surrounding vegetation.	
Agricultural Impacts	• The EIS included an Agriculture Impact Statement (AIS) prepared by Umwelt in consideration of the Agricultural Impact Statement Technical Notes, the SRLUP, and the Mining SEPP. • As discussed in Section 4.4 the Northern Extension Area does not contain any BSAL or CIC land and a site verification certificate was issued on 10 December 2018. • While around 5% of the Northern Extension Area is categorised as LSC Class 3, this land is unlikely to be suitable for cropping given its small size and remoteness. The remainder of the Northern Extension Area is categorised as Class 4 or 5 and is only suitable for grazing. • Portions of the Northern Extension Area and the proposed Wybong Heights and Mangoola biodiversity offset sites are currently used for cattle grazing by a Glencore subsidiary, Colinta Pty Ltd (Colinta). • Securing these biodiversity offsets would remove them from potential future use for grazing purposes. In total, the Northern Extension Area and biodiversity offsets would removal approximately 2,104 ha of potential future agricultural land. • Glencore has noted that while proposed offset areas would be lost for agriculture, there would be no negative impacts to the land itself and it would retain its current soil and land use capability. • The 612 ha of agricultural land to be removed within the extension area is exclusively managed by Colinta and would account for 11% Colinta's NSW operations and 1% of its Australian operations. • Given the limited potential for cropping and the minimal reduction in potential grazing land associated with the land proposed to be removed from agricultural production, the Department considers that the use of the land as biodiversity offsets is suitable.	• Overall, the Department considers that the Project's impact on agricultural land use within the area would be relatively minor. • No specific conditions are recommended to address impacts on agricultural land, however the Department has recommended comprehensive conditions to manage rehabilitation activities and biodiversity offsets.
Aboriginal Cultural Heritage	• The EIS included an Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared by Australian Cultural Heritage Management in consultation with 37 RAPs [8] . The ACHAR also included an Aboriginal Archaeological Impact Assessment prepared by OzArk Environmental, which assessed the archaeological values of sites identified within the Northern Extension Area. • The ACHAR draws on historical archaeological assessments undertaken since the 1980s, supplemented by contemporary surveys undertaken in February and May 2018. • The ACHAR identified a total of 71 Aboriginal sites within the Northern Extension area, of which 26 are within the proposed disturbance area. These sites include 15 artefact scatters and 11 isolated finds.	• The Department considers that the Aboriginal cultural heritage impacts of the Project are likely to be minimal and could be suitably managed under conditions of consent. • To this end, the Department has recommended conditions requiring the Applicant to implement an updated ACHAR in consultation with the RAPs and relevant agencies prior to commencing disturbance within the Northern Extension Area.

[8] *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment (*DEC, 2005), *Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010a)*, and the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011)*.

	• Two sites near Big Flat Creek were identified as having low-moderate or moderate scientific significance and occur within the footprint of the proposed haul road overpass. The remaining sites were assessed as having low scientific significance. • Glencore initially proposed to salvage the 26 sites in the disturbance area and conduct further investigations within the Rockshelter Complex (AHIMS 37-2-5443, 37-2-5444, 37-2-5445, 37-2-5446 and 37-2-5447), located outside the disturbance area. • Heritage NSW raised concerns about the recommended test excavations of the rock shelter sites advising that these sites should be preserved. Glencore has since agreed to not conduct test excavations in these areas unless Heritage NSW agrees otherwise. • Glencore has committed to update the Aboriginal Cultural Heritage Management Plan (ACHMP) prepared for the existing approved Mangoola Mine to include the salvage of additional sites and ongoing management of Aboriginal cultural heritage associated with the Project. • Heritage NSW (formerly the Heritage Division of BCS) advised that it is satisfied with the ACHAR and recommended that the salvage occur in accordance with the protocols in the approved ACHMP.	
Historic Heritage	• The EIS included a Historic Heritage Assessment (HHA) and Statement of Heritage Impact prepared by Umwelt. • No items of historic heritage significance were identified within the Northern Extension Area. • The nearest historic heritage items are located between 1,680 m and 3,490 m from the Northern Extension Area. The only potential impacts to these sites would be from blasting operations and the vibration predicted to be generated by the Project is well below the relevant impact criteria at these locations (see **Section 6.5**). • Glencore has proposed to continue to implement the existing Conservation Management Strategy for the Mangoola Mine, which includes protocols in the event of unexpected finds. • Heritage NSW has expressed its support for these proposed measures.	• The Department considers the impacts of the Project on historic heritage are likely to be negligible and could be suitably managed under conditions of consent. • To this end, the Department has recommended conditions requiring Glencore to update and implement the protocols in the approved Conservation Management Strategy for the Project.
Bushfire	• Glencore provided a Bushfire Threat Assessment in the EIS. Bushfire risk is managed at the existing operations under a Bushfire Management Plan, which includes the existing Mangoola Mine and biodiversity offset areas. • Parts of the proposed extension area contain bushfire prone land (including areas that are currently or proposed to be cleared of vegetation), as identified by Council's Bushfire Prone Land map. • Glencore has committed to continue managing bushfire risk through a revised Bushfire Management Plan. This includes identifying asset protection and buffer zones, maintaining existing roads and fire trials, ensuring there is sufficient water available for a bushfire response, and establishing an emergency management procedure in the event of a bushfire event. • The Department considers that the described bushfire management procedures would be reasonable to respond to bushfire risks in the surrounding area.	• The Department has recommended conditions requiring the Applicant to implement asset protection zones in accordance with the *Planning for Bush Fire Protection 2019 guideline,* ensure there is suitable firefighting equipment available on site and assist the RFS and emergency services in the event of a bushfire emergency. • The Department has also recommended a condition requiring the development of a Bushfire Management Plan in consultation with the Rural Fire Service.

Waste	• The Project is predicted to generate waste streams during the construction and operational phases, including concrete and steel from construction; office, ablution and domestic waste from employees; and hazardous and special waste from workshop maintenance and mining equipment. • Glencore currently implements a detailed Waste Management Plan at the Mangoola Mine and proposes to revise and extend this plan to incorporate the Project. • The updated Waste Management Plan would detail the types of waste and appropriate disposal methods, opportunities for beneficial re-use and recycling, and monitoring of waste volumes. • The Department considers that Glencore's proposed waste management practices would ensure that waste is minimised and re-used, recycled or disposed of appropriately.	• The Department has recommended conditions requiring Glencore to classify all waste in accordance with EPA guidelines and Council requirements and ensure it is disposed of appropriately.
Public Safety and Health	• The EIS includes a risk assessment of potential impacts to public safety and health. In relation to noise, blasting, air quality, groundwater, bushfire, dangerous goods and contaminated land, Glencore found that the risk was either very low or within relevant assessment criteria. • Glencore also proposed relevant mitigation measures to further minimise risks to public safety and health. • The Department considers that with the applicant of the proposed mitigation measures, the Project would not result in any unacceptable risks to public safety and health.	• The Department has recommended conditions requiring compliance with noise, blasting and air quality limits to protect public health and safety. • The Department has also recommended rehabilitation objectives that require Glencore to ensure that the rehabilitated site is designed to ensure public safety and that all areas of the site are safe, stable and non-polluting.
Hazards	• Glencore provided a Preliminary Hazard Analysis (PHA) that considered the potential risks of changes to its current storage locations for a range of hazardous materials in accordance with the *NSW Hazardous Industry Planning and Assessment Guidelines* and *State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)*. • The PHA identified that if explosive materials were stored a minimum of 500 m from off-site land users then there would be no off-site impacts of an explosive incident. Additionally, a buffer of at least 1000 m would ensure that no off-site impacts would result from any fire incident from the storage of explosive materials. • Overall, the PHA concluded that the Project would not be defined as hazardous under SEPP 33. • Glencore has committed to maintain the recommended separation distances between hazardous materials storages and off-site land users.	• The Department considers that with the implementation of appropriate buffers, any off-site impacts would be very unlikely to occur. • The Department does not consider that any additional conditions are required to manage potential hazards.

7 Evaluation

7.1.1 The Department has completed its whole-of-government assessment of the Project in accordance with the relevant requirements of the EP&A Act. The Department has carefully considered the potential environmental, social and economic impacts on both the natural and built environments, and surrounding community.

7.1.2 In assessing the Project, the Department has considered the development application, EIS, Submissions Report and additional information provided by Glencore, including peer reviews commissioned by Glencore to inform its technical assessment of noise, air quality, groundwater, flood modelling, economics, property value analysis and the final landform.

7.1.3 The Department has also paid careful consideration to all submissions received from the community during the exhibition period, obtained independent expert advice on the air quality aspects of the Project and considered the advice provided by NSW Government agencies, Muswellbrook Shire Council, DAWE and the IESC.

7.1.4 The Department recognises that a number of local residents still have concerns about the potential for the Project to impact their lifestyles, amenity or wellbeing. Equally, the Department recognises that a large proportion of the community has expressed its support for the Project and the potential economic, employment and social benefits it represents. The Department has carefully considered these different viewpoints and the Project's social and environmental impacts throughout its assessment.

7.1.5 On balance, the Department's assessment has concluded that the impacts of the Project would generally comply with relevant assessment criteria, policies and guidelines, and that the residual environmental and social impacts of the Project could be managed through Glencore's proposed mitigation measures, the Department's recommended conditions and a detailed suite of management plans.

7.1.6 The Department considers that the Project represents a logical 'brownfield' extension of the open cut mining operations at Mangoola Mine, consistent with the NSW Government's recently released *Strategic Statement on Coal Exploration and Mining in NSW.* The Project would allow for the efficient recovery of an additional 52 Mt of ROM, adjacent to an existing open cut operation, while making use of the existing Mangoola CHPP and rail infrastructure.

7.1.7 The mine plan has been designed to efficiently recover the coal resource while minimising impacts on immediate landholders and would help to better integrate the final landform of the Mangoola Mine with the surrounding landscape. The Project would facilitate ongoing mining operations to 2030, preventing the early closure of the existing mining operations and represents a 13 month extension to the approved life of the existing mine.

7.1.8 The Project would generate approximately 145 jobs during construction and would provide ongoing employment 400 existing employees and employment for a further 80 operational employees. Additionally, Glencore has offered to provide additional VPA contributions in the order of $5 million to Muswellbrook Shire Council, which includes funding for a community enhancement program and road maintenance. Glencore considers that the Project would provide wide-ranging economic benefits for the region and the State, and is expected to generate net benefits to NSW in the order of $408 million NPV.

7.1.9 Overall, the Department considers that the Project has been designed to minimise environmental and amenity impacts and that the benefits of the Project outweigh its potential negative impacts. Consequently, the Department considers that the Project is in the public interest, and is approvable, subject to stringent conditions.

7.1.10 This assessment report is hereby presented to the Independent Planning Commission to determine the development application.

29/01/2021

Matthew Sprott
Director
Resource Assessments

29/01/2021

Mike Young
Executive Director
Energy, Industry and Compliance

Appendices

Appendix A – Environmental Impact Statement

https://www.planningportal.nsw.gov.au/major-projects/project/10131

Appendix B – Submissions

https://www.planningportal.nsw.gov.au/major-projects/project/10131

Appendix C – Submissions Report

https://www.planningportal.nsw.gov.au/major-projects/project/10131

Appendix D – Additional Information

https://www.planningportal.nsw.gov.au/major-projects/project/10131

Appendix E – Matters of National Environmental Significance

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

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

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

- the Environmental Impact Statement (EIS) for the Project, particularly Appendices 11, 12, 13 and 24 (see **Appendix A**);
- the Applicant's Submissions Report (see **Appendix C**);
- advice provided by the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC) (see **Appendix B**);
- Glencore's Response to the IESC (see **Appendix D**);
- supplementary information provided by Glencore during the assessment process (see **Appendix D**);
- advice provided by the Water Group and the Biodiversity Conservation Services Directorate (BCS) within the Department (see **Appendix B**); and
- advice provided by the Commonwealth Department of Agriculture, Water and the Environment (DAWE).

This Appendix is supplementary to, and should be read in conjunction with, the main volume of the Department's Assessment Report which includes the Department's consideration of impacts to listed threatened species and communities and water resources in **Section 6.7** and **Section 6.8**, respectively.

E.1 Impacts to Listed Threatened Species and Communities

The Project's direct impacts on EPBC-listed threatened species and communities are summarised in **Table E1** below.

In addition to proposed clearing and associated loss and/or fragmentation of habitat, the Project has the potential to result in indirect impacts on the threatened species and communities outlined in **Table E1**. Potential indirect impacts include dust and noise generation, erosion and sedimentation, lighting impacts and increased risk of bushfire and pest and weed infestation.

Glencore has proposed a range of management strategies to minimise the severity of these impacts. These strategies are discussed in **Section E3**.

Table E1 | Summary of likely impacts on threatened species listed under the EPBC Act

Ecological Feature	EPBC Listing Status	Direct Disturbance of Potential Habitat (Hectares Ha)	Significant Impact Predicted	Comments
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EEC/CEEC)	Critically Endangered	24	Yes	Relevant Ecosystem credits – PCTs 1607 and 1598 (both forms) (15.6 ha woodland, 8.4 ha DNG)
Tarengo leek orchid (*Prasophyllum petilum sp. Wybong*)	Critically Endangered	691 (individuals)	Yes	Species Credit Species
Regent Honeyeater *(Anthochaera phrygia)*	Critically Endangered	147.97	No	Relevant Ecosystem credits – PCTs 1602, 1603 and 1607
Swift parrot (*Lathamus discolor*)	Critically Endangered	27.4	No	Relevant Ecosystem credits – PCTs 1598, 1602 and 1607 (woodland form)
Grey-headed flying-fox (*Pteropus poliocephalus*)	Vulnerable	162.6	No	Relevant Ecosystem credits – PCTs 1602, 1603 and 1607

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

The Project involves the clearance of 24 ha of Box Gum Woodland CEEC, comprising 15.6 ha of woodland and 8.4 ha of derived native grassland (DNG).

While the Project is likely to have a significant impact on Box Gum Woodland CEEC, the Assessment of Commonwealth Matters (ACM) undertaken to accompany the EIS concludes that the Project is unlikely to lead to a substantial reduction in the quality or integrity of remaining Box Gum Woodland CEEC in the locality or modify natural processes or systems necessary for the survival of the community.

Glencore has committed to a range of measures to manage indirect 'edge effects' of Box Gum Woodland CEEC, including the delineation of clearance areas to avoid unnecessary impacts and clearance of surrounding vegetation, development of a Vegetation Clearance Protocol and Bushfire Management Plan and the ongoing management of dust, weeds and erosion and sedimentation (see **Section E3**).

Glencore also proposes rehabilitation of the Northern Extension Area post mining to include habitat enhancement measures such as the installation of nest boxes, salvaged hollows, fallen timber, hollow logs and rocks.

The impacts of the Project on this EEC have been calculated in accordance with the FBA. Glencore has committed to offset the residual impacts of the Project on Box Gum Woodland CEEC on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*, including through the provision of local land based biodiversity offsets which include habitat regeneration areas.

The Department's recommended conditions require Glencore to secure the required biodiversity offsets for the Project, rehabilitate the Project disturbance areas and prepare a Biodiversity Management Plan, which must include a focus on the regeneration, enhancement and re-establishment of the EECs impacted by the Project, including Box Gum Woodland CEEC.

Tarengo leek orchid (Prasophyllum sp. Wybong)[9]

The Project involves the clearance of approximately 691 individuals of the Tarengo Leek Orchid. Surveys undertaken to date have identified 5,806 individuals of the Tarengo Leek Orchid in Mangoola's land holdings, with a total estimated population of 15,000 individuals within land owned by Glencore. While conditions during the survey period were not favourable, BCS is satisfied that the collective survey effort for this species meets the requirements of the FBA.

Under the BBAM *Prasophyllum petilum* is a species-credit species, and the clearing of 691 plants generates an offset obligation of 8,983 credits to be met in the offset package. Glencore proposes to offset the loss of these 691 individuals by establishing offset sites and through the restoration of approximately 500 ha of native vegetation communities. All together these sites would result in the retiring of approximately 15,392 credits, well in excess of the offset credit requirements for the Project.

The Department's recommended conditions would require Glencore to offset any residual impacts on the Tarengo Leek Orchid associated with development of the Northern Extension Area on a like-for-like basis, in accordance with the *NSW Biodiversity Offsets Scheme*.

[9] *Under the FBA, Prasophyllum petilum includes Prasophyllum 'sp. Wybong', the latter is a synonym as determined by the National Herbarium of NSW. Prasophyllum petilum is listed as 'Endangered' under the BC Act 2016 whereas Prasophyllum 'sp. Wybong' is listed as 'Critically Endangered' under the EPBC Act.*

The Department's recommended conditions would also require Glencore to continue to implement the mitigation and management measures for the identified orchids and other threatened flora species within the existing Mangoola Mine disturbance area in accordance with the approved *Translocation Plan for Orchids and Other Threatened Flora*, dated September 2012 and prepared by Umwelt.

During the assessment of the proposal, DAWE advised that the biodiversity offsets proposed for *Prasophyllum sp. Wybong* under the NSW FBA did not have sufficient known records to fully satisfy its requirements and that it required further certainty of the sufficiency of offsets.

Based on survey efforts undertaken to inform the EIS Glencore identified the *Prasophyllum sp. Wybong* within 143.2 ha of the proposed offset sites for the Project. However, under the agreed calculations Glencore is required to provide 193 ha of known habitat for the *Prasophyllum sp. Wybong.*

In response to this deficiency, Glencore undertook further studies during the 2020 flowering period for the *Prasophyllum sp. Wybong* and identified additional species within the proposed land-based offsets for the Project. The confirmed additional species increases the area of offset land with known habitat for *Prasophyllum sp. Wybong* of 197.5 ha, which exceeds the DAWE offset requirements for the species.

The Department is therefore satisfied that impacts to the *Prasophyllum sp. Wybong* could be fully offset through the retirement of the recommended biodiversity offsets and has recommended a Biodiversity Management Plan to ensure Glencore implements its proposed mitigation measures.

Regent Honeyeater (Anthochaera phrygia)

The Regent Honeyeater was not recorded within the Northern Extension Area, with the nearest recorded sighting of this species being approximately 16 km to the northwest in 1996. Additionally, no breeding habitat was identified within the disturbance footprint.

The Referral Decision identified 255.9 ha of potential foraging or breeding habitat for the Regent Honeyeater, based on DAWE's approach of considering all Plant Community Types (PCTs) that contain at least one species of Ironbark to be suitable habitat for this species. However, detailed vegetation mapping of the Northern Extension Area undertaken to inform the EIS identified that only 147.97 hectares in the Northern Extension Area would be potentially suitable habitat, based on the wooded extent of three PCTs that contain either Spotted Gum or Narrow-leaved Ironbark (PCT 1602, PCT 1603 and PCT 1607).

While the MNES assessment in the EIS was initially based on this 147.97 hectares of potential habitat, following consideration of the quality of Regent Honeyeater habitat as defined by the *National Recovery Plan for the Regent Honeyeater* and application of their own local knowledge, Umwelt further reduced the area considered to be suitable habitat for the Regent Honeyeater to 6.3 ha. As such, the larger area considered in the MNES assessment has been refined to a 6.3 ha area for the purposes of the BAR.

Overall, the information presented in the BDAR indicates that the Project is unlikely to result in a significant impact on this species. No breeding or nesting habitat has been identified within the proposed disturbance area and the Regent Honeyeater has not been recorded within the Northern Extension Area in contemporary or historical surveys.

BCS has advised that it agrees with the conclusion that the Project is unlikely to have a significant impact on the Regent Honeyeater due to the small area (6.3 hectares) of suitable foraging habitat to be affected. This impact generates 369 ecosystem-credits which would be adequately met through the

retirement of the proposed Mangoola Offset Site and the Wybong Heights Offset Site. These offset sites would protect around 184.7 ha of this PCT, which equates to the generation of 2,784 ecosystem credits.

Glencore has also proposed a range of measures to minimise potential indirect impacts on the Regent Honeyeater, including the preparation and implementation of a vegetation clearance protocol (see **Section E3**). The Department is satisfied that impacts to the Regent Honeyeater could be fully offset and has recommended a Biodiversity Management Plan to ensure Glencore implements its proposed mitigation measures.

Swift parrot (Lathamus discolor)

The Swift Parrot was not recorded within the Northern Extension Area or surrounding area and no breeding habitat was identified within the disturbance footprint. However, the ACM considered that the Swift Parrot may infrequently use seasonal forage habitat within the study area and identified that 27.4 ha of potential foraging habitat would be cleared by the Project.

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

The Department notes that loss of potential foraging habitat for this species would generate 1,773 ecosystem credits, which are proposed to be met through the Offset Strategy, which includes the generation of 8,058 ecosystem credits for those same PCTs. Accordingly, residual impacts on the Swift Parrot could be offset using the relevant ecosystem credits as shown in **Table E1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

Glencore has also proposed measures to minimise potential indirect impacts on the Swift Parrot, including the preparation and implementation of a vegetation clearance protocol (see **Section E3**).

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

Grey-headed Flying Fox (Pteropus poliocephalus)

The Grey-headed Flying Fox was not recorded within the Northern Extension Area or surrounding area and no breeding habitat was identified within the disturbance footprint. The closest known Grey-headed Flying Fox camp is at Muswellbrook, about 17 kilometres east of the Project area. The closest record of the Grey-headed Flying Fox is 10 kilometres to the south of the Project.

The Project involves the clearance of up to 162.6 ha of Eucalypt-dominated vegetation communities, which are potential foraging habitat for the Grey-headed Flying Fox. Given the availability of equivalent foraging habitat in the area, the ACM indicates that habitat within the proposed disturbance area is unlikely to be critical to the survival of the species.

Nonetheless, Glencore has proposed a range of measures to minimise potential impacts on threatened bats, as outlined in **Section E3**. The residual impacts of the Project on the Grey-headed Flying Fox would be offset under the relevant ecosystem credits as shown in **Table E1**, in accordance with the *NSW Biodiversity Offsets Scheme*.

E.2 Impacts to Water Resources

A detailed assessment of the Project's potential impacts on water resources is provided in **Section 6.8** while impacts on Groundwater Dependent Ecosystems is provided in **Section 6.7** of the Department's Assessment Report.

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

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

- the preparation and implementation of a comprehensive, site-wide Water Management Plan, including a program to monitor groundwater levels and surface and groundwater quality;
- the provision of compensatory water supplies for any affected groundwater user;
- compliance with water management performance measures; and
- the implementation of suitable ground and surface water Trigger Action Response Plans to monitor, respond, and mitigate impacts on water resources.

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

Avoidance of Biodiversity Impacts

Glencore notes that the design of the Project has been refined to reduce its disturbance by approximately 401 ha, including the relocation of Project infrastructure to avoid 23.7 ha of threatened ecological communities and 1,022 individually recorded threatened species (including 34 *Prasophyllum sp. Wybong).*

While the Project, as proposed, would result in the total clearance of 24 ha of CEEC, the Department notes that:

- as a 'brownfield' development, the Project would utilise existing cleared areas at the Mangoola Infrastructure site, thereby reducing the total impact area required for the development; and
- the biodiversity offset for the Project would include targeted rehabilitation of the CEEC.

Mitigation and Management of Indirect Biodiversity Impacts

Glencore has committed to:

- develop and implement a vegetation clearance protocol;
- delineate approved disturbance areas to prevent accidental damage of adjacent vegetation and habitat;
- salvage and re-use potential habitat features, such as tree hollows and bush rock;
- prepare and implement an Erosion and Sedimentation Control Plan;
- implement a weed and feral animal management and monitoring program;
- progressive rehabilitation of disturbed areas and ongoing dust suppression on haul roads to reduce dust emissions;

- rehabilitate the site to help establish wildlife corridors and connectivity between remnant vegetation;
- management of noise and blasting impacts; and
- develop and implement a bushfire management procedure.

The Department's recommended conditions would require Glencore to implement best practice air quality management in accordance with a detailed Air Quality and Greenhouse Gas Management Plan.

Blasting impacts are also likely to be minor, as Glencore would design blasts to minimise ground vibration and overblast pressure within applicable criteria.

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

Biodiversity Offset Strategy

The Department's recommended conditions require Glencore to implement its Biodiversity Offset Strategy, as described in the EIS and additional information, which accounts for the residual impacts of the Project that cannot be addressed through the proposed avoidance and mitigation measures, as outlined in **Table E2.**

Table E2 | Summary of biodiversity credit requirements for MNES

Credit Type	Credits Required
Ecosystem Credit	
PCT1598 Forest Red Gum grassy open forest on floodplains of the lower Hunter[a,c]	**1,874**
PCT1602 Spotted Gum – Narrow-leaved Ironbark shrub – grass open forest of the central and lower Hunter[b,c]	**369**
PCT1603 Narrow-leaved Ironbark – Bull Oak – Grey Box shrub – grass open forest of the central and lower Hunter[b]	**13,457**
PCT1607 Blakely's Red Gum – Narrow-leaved Ironbark – Rough-barked apply shrubby woodland of the Hunter[a,b,c]	**253**
Species Credits	
Tarengo leek orchid (*Prasophyllum petilum sp. Wybong*)	**8,983**

[a] *Commensurate with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the EPBC Act*
[b] *suitable foraging habitat for Regent honeyeater and Grey-headed flying fox*
[c] *suitable foraging habitat for Swift parrot*

Glencore proposes to retire the required credits in accordance with the Biodiversity Assessment Method, using one or a combination of offsetting mechanisms available under the Biodiversity Offset Scheme, including the establishment of two Biodiversity Offset Sites, use of available credits from other offset

sites, payment into the Biodiversity Conservation Fund and mine site ecological rehabilitation. Credits relating to MNES would be retired on a like-for-like basis.

Glencore has identified two biodiversity offset areas that adjoin existing Mangoola Biodiversity Offset Areas and would facilitate the expansion of a movement corridor linking offset and rehabilitation areas to the north and west of the Northern Extension Area (see **Section 6.7** of the Department's Assessment Report). The combined credits provided by the offset sites and proposed rehabilitation indicate that these areas are likely to satisfy the credit requirements for the majority of MNES impacted by the Project.

The offset package contains a minimum of 904 known individuals of *Prasophyllum 'sp. Wybong'*, which represents a shortfall of about 380 individuals to meet FBA requirements. The BAR included an Expert Report (**EIS: Appendix 13, Appendix C**) to estimate the total number of *Prasophyllum petilum 'sp. Wybong'* individuals in the offset areas. The Expert Report concluded that the offsets are estimated to contain at least 2,218 *Prasophyllum petilum* individuals (**Appendix C**) and BCS has confirmed its satisfaction that the offsets should contain sufficient orchids to meet the FBA requirements.

Further to the above, the Department notes that the additional surveys completed by Glencore during 2020 identified additional plants and have verified that the offsets contain more than enough individuals to meet the DAWE offset requirements for the species.

The Department accepts that all offset methods proposed are in accordance with the FBA and are considered 'like for like' in accordance with the *NSW Biodiversity Offset Policy for Major Projects* and the EPBC Act *Environmental Offset Policy*.

Avoidance, Mitigation and Offsetting of Impacts on Water Resources

The Department's recommended conditions impose strict performance measures for the Project. These performance measures would require Glencore to ensure that its operations:

- have negligible impacts on alluvial aquifers (including changes to water quality, water levels or impacts on groundwater users) beyond those predicted in the EIS;
- maintain or improve base channel stability for Big Flat Creek and Wybong Creek; and
- have negligible impacts on aquatic and riparian ecosystems within Wybong Creek and its tributaries beyond those predicted in the EIS.

The recommended conditions would require the development of detailed Water Management Plans, including surface and groundwater monitoring programs and Trigger Action Response Plans to manage risks during mining operations.

The recommended conditions also provide a mechanism for remediation of unexpected impacts on water resources. In the event that these impacts cannot be suitably remediated, the recommended conditions would require Glencore to provide a proportionate offset, in consultation with relevant Government agencies.

E.4 Requirements for Decisions About Threatened Species and Endangered Ecological Communities

In accordance with section 139 of the EPBC Act, in deciding whether or not to approve, for the purposes of a subsection of either section 18 or section 18A of the EPBC Act, the taking of an action and what conditions to attach to such an approval, the Commonwealth Minister must not act inconsistently with

certain international environmental obligations, Recovery Plans or Threat Abatement Plans. The Commonwealth Minister must also have regard to relevant approved Conservation Advice.

E.4.1 Australia's International Obligations

Australia's obligations under the *Convention on Biological Diversity* (Biodiversity Convention) include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

The recommendations of this report are not inconsistent with the Biodiversity Convention, which promotes environmental impact assessment (as has been undertaken for this proposal) to avoid and minimise adverse impacts on biological diversity. The Department's recommended conditions require avoidance, mitigation and management measures for listed threatened species and communities and all information related to the proposed action is required to be publicly available to ensure equitable sharing of information and improved knowledge relating to biodiversity.

Australia's obligations under the *Convention on Conservation of Nature in the South Pacific* (Apia Convention) include encouraging the creation of protected areas which together with existing protected areas will safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations and regions. Additional obligations include using best endeavours to protect fauna and flora (special attention being given to migratory species) so as to safeguard them from unwise exploitation and other threats that may lead to their extinction. The Apia Convention was suspended on 13 September 2006. Nonetheless, Australia's obligations under the Convention have been taken into consideration. The recommended approvals are not inconsistent with the Convention which generally aims to promote the conservation of biodiversity.

The *Convention on International Trade in Endangered Species of Wild Flora and Fauna* (CITES) is an international agreement between governments which seeks to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The recommended approvals are not inconsistent with CITES as the proposed action does not involve international trade in specimens of wild animals and plants.

E.4.2 Recovery Plans and Approved Conservation Advices

The Department has undertaken a detailed and comprehensive assessment of the potential impacts of the Project on listed threatened species and communities under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. The Department has taken into consideration approved Conservation Advice and Recovery Plans for the species and communities which may be impacted by the Project.

Conservation Advice

The following Conservation Advice is relevant to the proposed action:

- *Approved Conservation Advice for Prasophyllum petilum 'sp. Wybong'* (October 2009);
- *Conservation Advice* Lathamus discolor *Swift Parrot* (May 2016); and
- *Conservation Advice* Anthochaera phrygia *Regent Honeyeater* (July 2015).

There is no approved Conservation Advice in respect of *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* or Grey-headed Flying-fox.

The Department has considered relevant Conservation Advice in its assessment of the Project, particularly in respect to *Prasophyllum petilum 'sp. Wybong'* which has the potential to be significantly impacted by the Project.

The key threats to MNES species include mining-related vegetation clearing and landscape fragmentation, introduction of weeds, predation (particularly by feral cats and foxes), removal of fallen timber and bush rock, habitat degradation by livestock and altered fire regimes.

The Department's recommended conditions would require Glencore to:

- engage a suitably qualified person to undertake pre-clearance surveys and relocate threatened fauna encountered during surface disturbance;
- minimise indirect 'edge effects' on vegetation adjacent to disturbance areas;
- manage weeds and feral pests in accordance with a detailed Biodiversity Management Plan;
- maximise the salvage of fallen timber and tree hollows from disturbance areas to improve habitat integrity in existing and proposed biodiversity offset areas;
- manage spontaneous combustion risks and develop and implement a Bushfire Management Plan;
- progressively rehabilitate the Project and establish woodland corridors to connect surrounding habitat; and
- offset the residual impacts of the Project in accordance with the BAM and Biodiversity Offsets Scheme.

The Department considers that the Project can be carried out in a manner that is consistent with relevant Conservation Advice for impacted MNES.

Recovery Plans

The following Recovery Plans are relevant to the proposed action:

- *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland;*
- *National Recovery Plan for the Tarengo Leek Orchid (Prasophyllum petilum);*
- *National Recovery Plan for the Swift Parrot (Lathamus discolor); and*
- *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia).*

There are no approved recovery plans in respect of the Grey-headed Flying-fox.

The key objectives of the relevant Recovery Plans include:

- achieving no net loss in extent and condition of Box Gum Woodland CEEC;
- increasing protection of sites containing Box Gum Woodland CEEC with high recovery potential;
- increasing landscape functionality of Box Gum Woodland CEEC through management and restoration of degraded sites;
- increasing transitional zones and linkages between areas of remnant Box Gum Woodland CEEC;
- ensuring that all natural populations of Tarengo Leek Orchid are stable or increasing in size;
- preventing a further decline in the Swift Parrot population and achieving a demonstrable sustained improvement in the quality and quantity of habitat;
- reverse the long-term population trend of decline and increase the number of Regent Honeyeaters to a level where there is a viable, wild breeding population even in poor breeding years; and

- enhance the condition of Regent Honeyeater habitat to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation.

Glencore has committed to offset the impacts of the Project on MNES on a like-for-like basis in accordance with the BAM and the Biodiversity Offsets Scheme. This will include the establishment of land-based offset sites to the north of the Northern Extension Area and a smaller parcel to the southwest. These sites would be secured and managed in perpetuity under a Biodiversity Stewardship Agreement.

The Department's recommended conditions would also require Glencore to manage indirect impacts on MNES, including predation by feral pests and altered fire regimes, under a detailed Biodiversity Management Plan.

On this basis, the Department considers that the Project can be carried out in a manner that is consistent with the key objectives of the relevant National Recovery Plans.

E.4.2 Threat Abatement Plans (TAPs)

The Department has considered the Threat Abatement Plans (TAPs) relevant to the Project under the EPBC Act. These TAPs are available at http://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/approved. The TAPs which are relevant to the Project are as follows:

- *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*in relation to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC*).*
- *Threat Abatement Plan for competition and land degradation by rabbits* (in relation to *Prasophyllum petilum* and the Regent Honeyeater).
- *Threat abatement plan for predation by feral cats* (in relation to the Swift Parrot).

The Project has the potential to:

- facilitate the spread, or lead to a higher abundance of feral pigs and cats (and other unmanaged or feral fauna) through the clearance and modification of habitat; and
- increase the amount of disturbed and modified habitats, which rabbits tend to colonise, and lead to an increase in rabbit populations.

The Department has included measures for the control of feral animals under the recommended Biodiversity Management Plan for the Project, including specific requirements for Glencore to consider the actions identified in relevant TAPs. With these measures in place, the Department considers that the action can be carried out in a manner which is compatible with the relevant TAPs.

The following TAPs apply to species and communities affected by the action, but are not considered relevant to the Project:

- *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads* (this TAP is relevant to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC, but is not considered relevant for the Muswellbrook region); and
- *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomic* (this TAP is relevant to *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC, however the BDAR indicates that *Phytophthora cinnamomi* is unlikely to occur in the region, due to its relatively dry climate).

E.5 Additional EPBC Act Considerations

Table E3 contains a range of further mandatory considerations to be taken into account and factors to have regard to under the provisions of the EPBC Act.

Table E3 | Additional Considerations for the Commonwealth Minister under the EPBC Act

EPBC Act Section	Consideration	Conclusion
Mandatory considerations		
136(1)(b)	Social and economic matters are discussed in the EIS and **Sections 6.9** and **6.10** of this Report.	The Department considers that the proposed development would result in a range of benefits for the local and regional economies and would allow for the continued and valuable production of coal from the region
Factors to be taken into account		
136(2)(a)	Principles of ecologically sustainable development (ESD), including the precautionary principle, have been taken into account, in particular in: • long and short-term economic, environmental, social and equity considerations relevant to this decision; • conditions that restrict environmental impacts, impose monitoring and adaptive management requirements and reduce uncertainty concerning the potential impacts of the Project; • conditions requiring the Project to be operated in a sustainable way that protects the environment for future generations and conserves MNES; • advice provided within this report which reflects the importance of conserving biological diversity and ecological integrity in relation to the controlling provisions for this Project; and • mitigation measures to be implemented which reflect improved valuation, pricing and incentive mechanisms that promote a financial cost to the applicant to mitigate the environmental impacts of the Project.	The Department considers that, subject to the recommended conditions of consent, the Project could be undertaken in a manner that is consistent with the principles of ESD.
136(2)(e)	Other information on the relevant impacts of the action.	The Department considers that all information relevant to the impacts of the Project has been taken into account.
136(2)(fa)	Advice was sought from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC)	The Department has reviewed the advice and recommendations of the IESC, and considered Glencore's response (see **Appendix D**) to these matters in **Section 6.2**
Factors to have regard to		
176(5)	Bioregional Plans	The Commonwealth Government released its bioregional assessment package for the Northern Sydney Basin - Hunter Subregion in May 2018.

		The Department notes that the Northern Extension Area is not within the Bioregional Assessment area. However, Glencore reviewed this mapping in relation to GDEs within the Northern Extension Area. The Department also notes that a more contemporary and detailed assessment of the Project's potential impacts on water resources and biodiversity has been provided in the EIS. The Department considers that these assessments are more likely to provide an accurate prediction of cumulative environmental impacts of the Project than any regional-scale assessment tool.
Considerations on deciding conditions		
134(4)	Must consider: • information provided by the person proposing to undertake the action or by the designated applicant of the action; and • desirability of ensuring as far as practicable that the condition is a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition.	Documents provided by Glencore are provided at **Appendices A**, **C** and **D** of this report. • The Department considers that the recommended conditions of consent in **Appendix G** are a practicable and cost-effective means to achieve their purposes. • These conditions have been prepared following careful considerations of material provided by Glencore and following consultation with NSW Government Agencies and DAWE.

E.6 Conclusions on Controlling Provisions

E.6.1 Threatened Species and Communities (sections 18 and 18A of the EPBC Act)

The information provided to date identifies that the Project could have the potential to result in significant impacts on the following threatened species and communities listed under the EPBC Act:

- Box Gum Woodland CEEC; and
- Tarengo Leek Orchid (*Prasophyllum petilum*).

The Project also has potential to significantly impact the Swift Parrot and Regent Honeyeater, however the ACM indicates that significant impacts to these species are unlikely to arise.

The Department considers that the impacts of the proposed action on threatened species and communities would be acceptable, subject to the avoidance, mitigation, offsetting and management measures described in Glencore's environmental assessment documents, and the requirements of the Department's recommended conditions of consent (see **Appendix G**).

Glencore has committed to offset the impacts of the Project on threatened species and communities, as outlined in **Table E2**, in accordance with the requirements of the NSW *Biodiversity Offsets Scheme*.

The recommended conditions provide flexibility for Glencore to use one or more of the mechanisms available under the Biodiversity Offsets Scheme, provided that all credits relating to MNES are retired on a like-for-like basis.

Glencore would be required to retire all of the credits required for the Project prior to commencing mining operations in the Northern Extension Area, or other timeframe agreed by the Planning Secretary. This timing reflects the need to retire relevant biodiversity offset credits prior to disturbance, but also

allows for flexibility in the commencement of limited construction activities where the Planning Secretary is satisfied that sufficient credits have been retired for these works (eg through payment into the BCF), while a Biodiversity Stewardship Agreement is being entered into for the land based offsets.

The Department has also recommended a condition requiring Glencore to prepare a detailed Biodiversity Management Plan. This plan would describe the measures to be implemented to:

- avoid and minimise impacts to threatened species and communities;
- regenerate, enhance and re-establish Box Gum Woodland CEEC;
- re-establish habit and foraging resources for the Swift Parrot and Regent Honeyeater; and
- control feral pests in accordance with the relevant TAPs.

The Department recommends that the Commonwealth Minister require Glencore to implement the State's conditions, where they relate to the management of impacts on threatened species and communities listed under the EPBC Act.

E.6.2 Water Resources (sections 24D and 24E of the EPBC Act)

The Project was jointly referred by the Department and DAWE to the IESC, requesting advice on potential surface water and groundwater impacts, including potential impacts on GDEs, downstream water users and receiving environments. The IESC's advice is included in **Appendix B**.

The Department has considered the IESC's advice and Mangoola's response in its assessment of the Project and in its recommended conditions (see **Appendix G**).

E.7 Other Protected Matters

DAWE has determined that other matters under the EPBC Act are not controlling provisions with respect to the proposed action. These include listed World Heritage places, National Heritage places, migratory species, Ramsar wetlands, the Commonwealth marine environment, Commonwealth land, Commonwealth actions, nuclear actions, the Great Barrier Reef Marine Park and Commonwealth Heritage places located overseas.

E.8 Conclusions

Threatened species and communities (Sections 18 and 18A of the EPBC Act)

For the reasons set out in **Section 6.7** and this Appendix, the Department recommends that the impacts of the action would be acceptable, subject to the avoidance and mitigation measures described in Glencore's EIS (see **Appendix A**) and Submissions Report (see **Appendix C**), and the Department's recommended conditions of consent (see **Appendix G**).

A water resource, in relation to coal seam gas development and large coal mining development (Sections 24D and 24E of the EPBC Act)

For the reasons set out in **Section 6.8** and this Appendix, the Department recommends that the impacts of the action on a water resource, in relation large coal mining development would be acceptable, subject to the avoidance and mitigation measures described in Glencore's EIS (see **Appendix A**), Submissions Report (see **Appendix C**) and additional supporting information (see **Appendix D**), and the Department's recommended conditions of consent (see **Appendix G**).

Appendix F – Statutory Considerations

The Department's assessment of the Project has given detailed consideration to a number of statutory requirements (see **Section 4** - Statutory Context and **Section 6** – Assessment). These include:

- the objects found in Section 1.3 of the EP&A Act; and
- the matters listed under Section 4.15(1) of the EP&A Act, including applicable environmental planning instruments and regulations.

The Department has considered all of these matters in its assessment of the Project. A summary of these considerations is provided below. Reference should also be made to Sections 4 and 9 of the EIS, where Glencore has also considered applicable legislation and environmental planning instruments in detail.

F.1 Objects of the EP&A Act

Table F1 summarises how the relevant objects of the EP&A Act have been considered in the Department's assessment of the Project.

Table F1 | Consideration of the proposal against the relevant objects of the EP&A Act

Objects of the EP&A Act	Consideration
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;	• The Project would provide significant economic benefits to the local community and to the State of NSW. These benefits are discussed further in **Section 6.9**. • While the Project has the potential to result in both positive and negative social impacts, overall, the Department considers that any negative social impacts can be appropriately managed under recommended conditions. Social impacts are discussed further in **Section 6.10**.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;	• The Department's assessment has sought to integrate all significant environmental, social and economic considerations. • The Department considers that the Project can be carried out in a manner that is consistent with the principles of ESD (see below).
(c) to promote the orderly and economic use and development of land;	• The Project involves a brownfield expansion of an existing coal mine, which can be largely carried out using existing site and transport infrastructure. The Department considers that this represents an orderly and economic use of land.
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;	• The Department has assessed the biodiversity impacts of the Project in accordance with relevant State and Commonwealth legislation, policies and guidelines. • The Department considers that the Project avoids and minimises, to the greatest extent practicable, impacts on threatened species and communities and key habitats. • The Department has recommended conditions to ensure that the residual biodiversity impacts of the Project would be appropriately managed and offset (see **Section 6.7**).
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage);	• The Department has assessed the likely impacts of the Project on Aboriginal cultural heritage and historic heritage. These matters are discussed further in **Section 6.11**.
(i) to promote the sharing of the responsibility for environmental planning	• The Department engaged with Council and other NSW government authorities on the Project. This engagement process is discussed further in **Section 5**.

Objects of the EP&A Act	Consideration
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 Department has carefully considered issues raised by the community during the public exhibition period in its assessment of the Project. These issues are discussed further in **Section 5**.

F.2 Ecological Sustainable Development

The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*, as follows:

"ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

(a) the precautionary principle;
(b) inter-generational equity;
(c) conservation of biological diversity and ecological integrity; and
(d) improved valuation, pricing and incentive mechanisms."

The Department has considered the integration of economic and environmental matters in is detailed assessment of the Project, including the principles and programs of ESD, as follows:

Precautionary Principle

The Department has assessed the Project's threat of irreversible environmental damage and considers that there is sufficient scientific certainty to enable the determination of the application. The Department has considered all the available information presented and consulted closely with independent experts and key Government agencies to obtain advice on various aspects of the Project.

While it is acknowledged that the Project would result in a number of environmental impacts of varying significance, the key matters that could result in serious or irreversible damage relate to unmitigated impacts on biodiversity values and impacts on water resources.

The EIS and Department's assessment has identified management and mitigation measures to address potential environmental impacts, and include commitments and requirements to implement monitoring, auditing and reporting mechanisms.

Overall, the Department has assessed these matters in detail (see **Section 6**) and considers that the recommended risk-based conditions and performance measures would provide appropriate protection for the environment and minimise the potential for any serious or irreversible environmental damage.

Intergenerational equity

Intergenerational equity has been addressed through maximising efficiency and coal resource recovery and developing environmental management measures which are aimed at ensuring the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The Department acknowledges that coal and other fossil fuel combustion is a contributor to climate change, which has the potential to impact future generations. However, the Department also recognises that there remains a clear need to develop coal deposits to meet society's basic energy requirements for the foreseeable future in Australia and overseas.

This is supported by the NSW Government's *Strategic Statement on Coal Exploration and Mining in NSW* (2020), which identified the need to transition away from fossil fuels, but that in the medium term there will still be a strong global demand for thermal coal for power generation for at least the duration of the Project.

The Department's assessment of direct energy use and associated GHGE's (ie Scope 1 and Scope 2 emissions) has found that these emissions would be low and comprise a very small contribution towards climate change at both the national and global scale (see **Section 6.3**).

Scope 3 emissions are also a consequence of the Project and would contribute to global climate change. However, as discussed in the report, while these emissions can be considered under the EP&A Act, they are regulated through broader national policies and international agreements, and the Department does not consider the emissions from the Project are so significant that these emissions should be considered as a reason to refuse the Project, particularly given the other economic and social benefits of the Project to the region and NSW as a whole.

Overall, while recognising the need to transition to renewable energy sources, the Department considers that the socio-economic benefits and downstream energy generated by the Project would benefit current and future generations, particularly through contributing to national and international energy needs in the short to medium term.

Conservation of Biological Diversity and Ecological Integrity

The Project's potential impacts on biodiversity have been outlined in the Department's assessment of the Project (**Section 6.7**). The Department considers that the conservation of biological diversity and ecological integrity has been applied through avoiding and minimising biodiversity impacts. The Department considers that the Project's potential impacts would be reasonably mitigated and/or offset to enable the long-term biodiversity outcomes to be achieved for the region.

Improved Valuation, Pricing and Incentive Mechanisms

Valuation and pricing of coal resources has been considered through economic, social and cost-benefit analyses which have been completed as part of the EIS. The cost benefit analyses sought to weigh up the Project's costs and benefits based on its full range of environmental, social and economic impacts.

The Department has carefully considered the costs and economic benefits of the Project and supports the conclusion that it would deliver a significant net benefit to the local region and the State of NSW (see **Section 6.9**). The Department has also recommended performance-based conditions, where possible, to provide incentive to Glencore to achieve environmental outcomes and objectives in the most cost effective way.

F.3 Environmental Planning Instruments

Under Section 4.15 of the EP&A Act, the consent authority is required to consider, amongst other things, the provisions of the relevant EPI's, including any exhibited draft EPI[10]. **Section 4** of the assessment report provides a summary of the Department's consideration of the relevant EPI's and notes Glencore's consideration of applicable provisions of relevant EPIs in its EIS. Further consideration is provided in the Department's assessment (see **Section 6**) and below.

State Environmental Planning Policy (Infrastructure) 2007

The Project involves the realignment of an 11 kV power line, as well as carrying out blasting near a 500 kV transmission line and transmission towers.

The Department consulted with Ausgrid and Transgrid regarding the Project's impacts on electricity infrastructure during the public exhibition period. Ausgrid advised that it would require a site specific assessment during the design phase for any assets impacted by the Project to ensure reliable supply to nearby communities is maintained and noted that its design certification process would ensure that specific design and access requirements are met during relocation.

Transgrid also provided comments on Glencore's proposals. Following this consultation, Glencore advised that it had signed an agreement with Transgrid in relation to the Project's potential impacts. The Department has recommended conditions to manage blasting impacts on existing infrastructure.

The Department has also consulted with TfNSW and Council regarding the Project's impacts on the State and local road networks (see **Section 6.5**). The Department has recommended conditions of consent to appropriately address the advice received. The Department considers that these conditions would provide appropriate protection for public infrastructure. As such, the Department considers that the requirements of the Infrastructure SEPP have been satisfied.

SEPP No. 33 – Hazardous and Offensive Development (SEPP 33)

The key aims of SEPP 33 are to ensure that, in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impacts and that any measures proposed to be employed to reduce the impact of the development are taken into account.

Clause 12 of SEPP 33 requires persons proposing to carry out development for the purposes of potentially hazardous industry to prepare a Preliminary Hazard Analysis (PHA) and to submit this along with their development application. The EIS considered the potential hazards and risks associated with the Project, including the storage of hazardous goods, potential for fire and/or explosion and contained a PHA (see Appendix 23 of the EIS).

The Department has considered Glencore's assessment of these matters and commitments to maintain appropriate setbacks between hazardous substance facilities and nearby land users. The Department considers that suitable mitigation measures could be incorporated into the design of the Project to ensure that it would meet relevant standards and be compatible with the existing or likely future use of land surrounding the Project. With the proposed measures in place, the PHA demonstrated that the potential hazards associated with the Project could be managed.

[10] Due to the effect of clause 11 of the SRD SEPP, development control plans do not apply to SSD.

The Department has also consulted with relevant public authorities during its assessment of the Project, including the EPA, TfNSW and NSW Health. Overall, the Department considers that the Project would not increase risks to public safety and would not alter the consequences or likelihood of a hazardous event on the site or during materials transport. As such, the Department considers that the Project is consistent with the provisions of SEPP 33.

SEPP No. 2020 – Koala Habitat Protection (SEPP 2020)

State Environmental Planning Policy (Koala Habitat Protection) 2020 (Koala SEPP 2020) commenced on 30 November 2020 and replaced *State Environmental Planning Policy (Koala Habitat Protection) 2019*. The Koala SEPP 2020 aims to replicate the objectives and provisions of the former *State Environmental Planning Policy No.44 (Koala Habitat Protection)*.

The Koala SEPP 2020 applies to the determination of development applications by Councils in the local government areas listed in Schedule 1 of the Koala SEPP 2020 and does not apply to this development application.

Nevertheless, the Department has considered whether the Project would be likely to result in impacts on Koalas. The Department notes that the Project Area does not contain 'core Koala habitat', but does contain some Koala feed trees and could therefore meet the definition of 'potential Koala habitat'.

The BAR accompanying the EIS included detailed investigations of the site, but was unable to find any Koalas or evidence of a Koala population. Additionally, the BAR stated that there are no known records of this species occurring within the Project area and noted that the closest record of the species occurs approximately 6 km to the south of the Project area. Consequently, if the species were to occasionally utilise the site, it would be in small numbers, on a sporadic basis. Consequently, no specific actions or offsets are required in order to manage impacts on Koalas under the BAM.

Nevertheless, the Department has recommended conditions requiring Glencore to prepare a Biodiversity Management Plan and undertake pre-clearance surveys to ensure any potential impacts on threatened species, including the Koala, are minimised.

SEPP No. 55 – Remediation of Land (SEPP 55)

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

The LCA found that no contaminated sites are recorded with the Northern Extension Area. The Northern Extension Area has historically been uses for intensive agricultural use and there are no known contaminated areas with the Northern Extension Area.

Potential sources of contamination (such as petroleum products) would be used during the operation of the Project. Glencore has committed to implement a range of mitigation measures to minimise the risk of contamination and would remediate any contamination as part of the mine closure process.

The Department notes that the additional areas of disturbance associated with the Project are considered unlikely to have a significant risk of existing contamination and considers that the proposal is generally consistent with the aims, objectives, and provisions of SEPP 55.

SEPP (State and Reginal Development) 2011 (the SRD SEPP)

Under Section 4.36 of the EP&A Act the Project is considered a State Significant Development (SSD), because it is development for the purposes of coal mining.

In accordance with section 4.5 of the EP&A Act and clause 8A(1) of the SRD SEPP, the Commission is the consent authority and must determine the application, as more than 50 unique public submissions in the nature of objection were received.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industry) 2007 (Mining SEPP)

Permissibility

Clause 7(1)(b) of the Mining SEPP identifies that mining is permissible with consent on any land where development for the purposes of agriculture or industry may be carried out (with or without consent). Clause 7(1)(d) provides that 'facilities for the processing or transportation of minerals or mineral bearing ores' are permissible with consent on land 'on which mining may be carried out (with or without development consent), but only if they were mined from that land or adjoining land'. Consequently, the proposed development is permissible with consent under the Mining SEPP, and the Commission may determine the application.

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

Clause	Matters for Consideration	Consideration
12AB	Non-discretionary development standards for mining	• The Project is generally predicted to comply with non-discretionary standards with respect to noise, air quality, airblast and overpressure impacts. • The Project is predicted to exceed the Level 1 minimal impact consideration thresholds at one private bore. The Department has recommended conditions requiring monitoring and compensatory measures (see **Section 6.8**).
12	Compatibility of proposed mine, petroleum production or extractive industry with other land uses	• The Department has carefully considered the merits of the Project, having regard to existing and approved land uses in the vicinity of the site. The Department has also considered what it understands to be the preferred uses of land in the area, having regard to relevant strategic plans (see **Section 3**). • The Department is satisfied that the Project has been designed in a manner that could be managed to be compatible with and not significantly impact adjacent current or future mining-related activities. • The public benefits generated by the Project is discussed in **Section 6.9**.
12A	Consideration of voluntary land acquisition and mitigation policy (VLAMP)	• Voluntary acquisition rights have been afforded to 6 privately-owned receivers as a result of the Project. • Voluntary noise mitigation rights have been afforded to 8 privately-owned receivers as a result of the Project (see **Section 6.2)**. • Existing acquisition and mitigation rights under the Mangoola Mine project approval (PA 06_0014) would also be retained.
13	Compatibility of proposed development with mining, petroleum production or extractive industry	• The Department considers that the Project represents a logical use of existing mine infrastructure at the existing Mangoola Mine. • The Department is of the view that the Project would likely complement, rather than conflict with, existing mining operations in the locality.
14	Natural resource management and environmental management	• The Department has recommended a robust suite of conditions to ensure that the Project is undertaken in an

		environmentally responsible manner. These include conditions to avoid, or minimise, to the greatest extent practicable: – impacts on significant water resources (see **Section 6.8**) – impacts on biodiversity, including threatened species (see **Section 6.7**); and – GHGEs (see **Section 6.3**) • The Department has considered the assessment of GHGEs provided in the EIS (including downstream emissions), having regard to applicable State and national policies, programs and guidelines (see **Section 6.3**).
15	Resource recovery	• The Department has considered the efficiency of the Project with respect to resource recovery, in consultation with MEG and the Resources Regulator. • The Department is of the view that the Project represents an efficient recovery of resources and has not recommended any specific conditions in this regard.
16	Transport	• The Project would not involve any coal transport by public road. However, the Project would involve the closure and potential realignment of Wybong Post Office Road. • The Department consulted with Council and TfNSW during its assessment of the Project. • The Department has recommended conditions requiring the preparation of a Traffic Management Plan for the Project, in consultation with relevant agencies.
17	Rehabilitation	• The Department has recommended strict conditions to ensure that both the existing Mangoola Mine site and the Project area are rehabilitated in a timely and integrated manner and that the final landform is made safe, stable and non-polluting. • Rehabilitation outcomes are discussed further in **Section 6.6**.

Summary of Mining SEPP

Based on its assessment of the development, the Department considers that the Project can be managed in a manner that is generally consistent with the aims, objectives and provisions of the SEPP.

D.3 Other Relevant Considerations

Other regional plans and strategies relevant to the Project include:

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

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

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

- *Land Use Development Strategy* (2015)

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

Appendix G – Recommended Instrument of Consent

https://www.planningportal.nsw.gov.au/major-projects/project/10131