Narrabri Underground Mine Stage 3 Extension Project

State Significant Development SSD-10269

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Cover image: Kurrajong Creek Tributary above Proposed Longwall 203 *(Source: Subsidence Assessment)*

Glossary

Abbreviation	Definition
ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AIP	NSW Aquifer Interference Policy
BAM	Biodiversity Assessment Method
BDAR	Biodiversity Development Assessment Report
BC Act	Biodiversity Conservation Act 2016
BCS	Biodiversity, Conservation and Science Directorate, Department of Planning and Environment
BOS	Biodiversity offset strategy
BVT	Biometric vegetation type
CO_2-e	Carbon dioxide-equivalent
CHPP	Coal handling and preparation plant
CWE	Coal wash emplacement
DAWE	Commonwealth Department of Agriculture, Water and the Environment
Department	Planning & Assessment Group, Department of Planning and Environment
DNG	Derived native grassland
DPE - Water	Water Group, Department of Planning and Environment
EA	Economic Assessment
EC	Electrical conductivity
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	*Commonwealth Environment Protection and Biodiversity Conservation Act 1999*

Abbreviation	Definition
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ETL	Electricity transmission line
FTE	Full-time equivalent
FY	Financial year
Goaf	Broken overlying rock strata which collapse into a mining void, especially a void created by longwall mining of coal
GHG	Greenhouse gas
GSP	Gross State Product
HHA	Historic Heritage Assessment
IESC	Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development
LEP	Local Environmental Plan
LW	Longwall
mbgl	Metres below ground level
MEG	Mining, Exploration and Geoscience Group, Department of Regional NSW
Mining Panel	Independent Advisory Panel for Underground Mining
Mining SEPP	State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007
Minister	Minister for Planning
MNES	Matters of National Environmental Significance
ML/day	Megalitres per day
ML/year	Megalitres per year
Mt	Million tonnes
Mtpa	Million tonnes per annum

Abbreviation	Definition
NGERS	National Greenhouse and Energy Reporting Scheme
NDC	Nationally Determined Contribution
NPfI	Noise Policy for Industry
NPV	Net Present Value
NZP1	Net Zero Plan Stage 1: 2020-2030
PCT	Plant community type
PM2.5	Particulate matter in the air with an equivalent aerodynamic diameter of 2.5 micrometres or less
PM10	Particulate matter in the air with an equivalent aerodynamic diameter of 10 micrometres or less
RAP	Registered Aboriginal Party
ROM	Run-of-mine
Secretary	Planning Secretary of the Department
SEPP	State Environmental Planning Policy
SIS	Surface to in-seam
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State Significant Development
t	Tonne
TARP	Trigger Action Response Plan
TDS	Total dissolved solids
TEC	Threatened ecological community
TfNSW	Transport for NSW
TSP	Total suspended particulates
UIS	Underground in-seam
VLAMP	Voluntary Land Acquisition and Mitigation Policy - For State Significant Mining, Petroleum and Extractive Industry Developments
VPA	Voluntary Planning Agreement

Abbreviation	Definition
VWP	Vibrating wire piezometer
WAL	Water access licence
WSP	Water sharing plan

Executive Summary

Narrabri Coal Operations Pty Ltd (NCOPL) is the operator of the Narrabri Mine, an existing underground coal mine located approximately 25 kilometres (km) south-east of Narrabri and approximately 60 km north-west of Gunnedah. The mine is located within the Narrabri Shire Local Government Area and in the North West Slopes and Plains region of NSW and currently employs around 520 workers.

Coal production using bord and pillar and partial extraction methods commenced in 2010. Stage 2 of the existing mine has been extracting coal by longwall methods since June 2012 and allows for the production and processing of up to 11 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 26 July 2031. ROM coal is processed at the mine site to produce thermal coal and smaller quantities of pulverised coal injection (PCI) coal.

NCOPL is now seeking development consent for the Narrabri Underground Mine Stage 3 Extension Project (the Project) to continue longwall mining in a major southern extension area until 2044. The Project also seeks the continued use of existing underground and surface infrastructure, including use of the existing Coal Handling and Preparation Plant (CHPP) at its approved 11 Mtpa capacity. While NCOPL currently has approval to mine until 2031, it is seeking approval for Stage 3 now as it would allow it to efficiently change the extraction sequence for the southern set of longwall panels by mining longer panels.

Strategic Context

The broader region is dominated by agricultural land uses and elevated country that is typically reserved as State forest or national park. The region has significant groundwater resources which support a valuable agricultural industry, including extensive irrigation in the alluvial floodplains of the Namoi River.

This region is also rich in a variety of mineral resources such as coal, coal seam gas and other minerals. Apart from Narrabri Mine, the Gunnedah Coalfield is host to a number of other major coal mine developments, located at distances of 22 – 45 km east and southeast of the Project area. The nearest such mine is Maules Creek Coal Mine. The approved (but not yet constructed) Narrabri Gas Project lies immediately to the northwest, west and southwest of the Project area.

The Narrabri Mine is located to the immediate west of the Kamilaroi Highway and the Werris Creek – Mungindi Railway. The Kamilaroi Highway provides road access to the Narrabri Mine. Product coal from the Narrabri Mine is transported via the Werris Creek – Mungindi Railway to the Port of Newcastle for export. Baan Baa is located approximately 10 km to the south-east of the Pit Top Area and is the closest community to the Project. The Project area is adjacent to Pilliga East State Forest.

Assessment Process

Prior to NCOPL finalising its Environmental Impact Statement (EIS), the Project was considered under the Department's 'Gateway Process'. The Gateway Panel received advice from the Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) and DPE – Water and on 4 June 2019 granted the Project a conditional Gateway Certificate.

The Department publicly exhibited the Project's EIS for a period of 42 days from 5 November 2020. NCOPL provided a Submissions Report, together with an Amendment Report, in May 2021. The Amendment Report included a number of minor amendments to the Project, including removing 31 hectares (ha) of the EIS's indicative Surface Development Footprint no longer required under a refined

Project design; relocating some infrastructure in order to reduce impacts on the threatened flora species Coolabah Bertya by 2.3 ha; and incorporating flaring of pre-mining drained gas in particular parts of the underground mining area, which would reduce total Scope 1 greenhouse gas (GHG) emissions by approximately 1%.

The Department's assessment report and recommended conditions will now be referred to the Independent Planning Commission (the Commission) to hold a public hearing and make a determination on the Project.

Engagement

During the public exhibition of the Project, the Department received 67 public submissions, including six from special interest groups and business entities. Sixty-three of these submissions (94%) supported the Project, primarily because of the ongoing and additional employment opportunities that would be provided at the mine. The three special interest groups which objected to the Project are local community landholder and environmental groups. No individuals lodged objections.

The Department also received advice from 14 government agencies and related entities and from the two local councils most affected by the Project (Narrabri Shire Council and Gunnedah Shire Council).

The Department and the Commonwealth Department of Agriculture Water and Environment sought joint independent expert advice from the IESC on water resource impacts. The Department separately sought advice from the NSW Government's Independent Advisory Panel for Underground Mining (the Mining Panel) on issues related to mine subsidence and groundwater and surface water impacts.

Key Assessment Issues

Given that the proposal is a 'brownfields' (i.e. extension) project, rather than a 'greenfields' (i.e. new) project, many of the key issues have been subject to previous assessment, and the mine has been operating for over a decade with a range of measures to control or reduce impacts (with no major issues or complaints). The Project does not involve any changes to the proposed rate of coal extraction or processing, and very limited changes to the mine's key surface facilities.

The land within the Project area is characterised by a semi-arid climate with ephemeral watercourses. The terrain is gently undulating (generally sloping west to east), and is not deeply incised which can exacerbate subsidence impacts (e.g. as seen in the Southern Coalfield).

The region is characterised by broad acre grazing and dryland cropping, with no irrigated cropping land in the Project area. There are very few community members in close proximity to the Project area, i.e. only 20 residences within 5 km. The Project is located 25 km away from the nearest town (Narrabri) and 10 km from the nearest village (Baan Baa).

However, the longwall panels would be some of the longest (10 km) and widest (400 m) in Australia. This would lead to relatively high levels of subsidence, a highly fractured zone above the mine workings, and associated impacts on water resources. The Narrabri Mine is also a relatively "gassy" mine, which would lead to 'fugitive' GHG emissions. To date, the mine's gas has a high concentration of CO_2 and not amenable to flaring (i.e. due to the low proportion of methane).

The combination of these two features – very long and wide panels, and the 'gassy' nature of the mine – means there is a need for extensive ventilation infrastructure at the surface, which leads to the need for clearing of land and associated impacts on biodiversity.

Consequently, the key issues for this assessment are the potential impacts on groundwater, surface water and biodiversity, and GHG emissions.

Groundwater

The EIS contains a Groundwater Assessment for the Project which includes a detailed 3D numerical groundwater model. While the IESC and DPE Water raised some concerns about the model, the Mining Panel's view on the adequacy of the groundwater model at the regional scale was:

> "Overall, the model can be considered an appropriate model for assessing the regional flow systems and for assessing the likelihood of impacts on the regional aquifer systems … there is little in the groundwater assessment to suggest that the impacts from mining will be excessive at a regional scale both during mining or once mining has been completed."

However, the Panel raised some concerns over the model's ability to predict with sufficient certainty impacts on small features of interest at some distance from the mine, such as springs, groundwater bores and groundwater dependent ecosystems. It addressed these uncertainties through recommendations for additional monitoring and the potential for more regular updates of the groundwater model, while recognising that:

> "… for the purposes of the EIS, the ability to predict all local impacts is not essential and that matching spatial and temporal trends is probably sufficient. This has been accepted by the Panel in assessing the model's applicability as an assessment tool for mining approval."

NCOPL had committed to update the groundwater model two years after commencement of longwall extraction and every five years thereafter. The Mining Panel noted this commitment as being generally appropriate, but recommended that the second update should occur within 3 years of the first and be supported by the collection of new data. The Mining Panel also recommended three additional multilevel vibrating wire piezometer (VWP) groundwater impact monitoring sites above the existing mine and Project area, and increased monitoring of potential impacts on groundwater dependent ecosystems. The Department has recommended conditions to give these recommendations effect.

In respect of the two key regional aquifers in the vicinity (i.e. the Namoi Alluvium and Pilliga Sandstone), the Project is not predicted to have any impact exceeding the *Aquifer Interference Policy's* (AIP's) 'minimal impact' threshold (i.e. >2 m drawdown). In relation to water quality, the Mining Panel concluded that long term disposal within the underground mining area of residual brines left over from the evaporation of mine water is very unlikely to lead to groundwater quality impacts.

However, within the less productive fractured rock aquifers, nine privately-owned 'stock and domestic' bores are modelled to be impacted in the long-term by Project-related drawdowns exceeding the AIP's threshold. NCOPL has committed to 'make good measures' in respect of each of these bores. NCOPL has initiated contact with all owners of land containing bores where impacts exceeding the AIP's 2 m criterion are predicted at any time (i.e. even decades into the future) and has advised that it has provided copies of draft make good agreements to these landowners and will undertake further consultation. The Department has recommended conditions requiring NCOPL to use its "best endeavours" to finalise make good agreements with the owners of these bores, within two years of commencing development under any consent granted for the Project.

The Department considers that the Project's groundwater licensing requirements have been conservatively and appropriately modelled, peaking at 2,406 ML in 2040 (average 1,950 ML/year over the Project life) across all groundwater sources, and that NCOPL should be able to obtain all necessary

water entitlements; whether by transfer from other Whitehaven mining operations, by purchases on the open market, or by purchases during any allocation offers made by DPE – Water.

Surface Water

All creeks affected by the Project are ephemeral with minimal to no baseflow. These streams are generally not deeply incised and in their lower reaches are characterised by open channels and sandy bed sediments. The climate is semi-arid, with rainfall commonly in the form of short storms which lead to short-term runoff and flows in the drainage channels.

The semi-arid climate and ephemeral nature of the creeks means that NCOPL's calculated estimates of the quantity of water diverted from stream flows by surface cracking – a total of 4.2 megalitres/annum (ML/year) from all watercourses, is negligible when compared to the assessed annual runoff from the Project area, which is 5,524 ML/year. This surface water take would have to be approved under the *Water Management Act 2000*. The Department considers that the Project's surface water licensing requirements are not excessive and are well capable of being adequately predicted, monitored and accounted for by NCOPL using its existing entitlements.

The Department considers that potential impacts on stream function would be quite limited, since the overlying terrain has gentle slopes and the streambeds are not deeply incised. Impacts are expected to be primarily ponding and erosion in streambeds associated with the small changes in slope from each longwall subsidence trough. The Department considers that the risks of soil erosion, ponding and sedimentation are well understood and have previously been satisfactorily managed. The Department recommends application of its standard conditions to manage, mitigate and remediate these impacts.

The EIS predicts that the Project would require up to 44 ML/year (during its operational life) and up to 193 ML/year (during post-mining peak drawdown) in surface water entitlements from the *Lower Namoi Regulated River Water Source*. NCOPL already holds a General Security entitlement of 658 ML/year as well as 20 ML/year High Security entitlement in this water source. Consequently, NCOPL is predicting that its surface water licensing requirements can be readily met.

Biodiversity

As a result of the extensive length and width of the longwalls, and the gassy nature of the mine, with the consequent need for mine ventilation and gas extraction for mine safety, the Project requires a comparatively large area of surface disturbance to facilitate underground mining compared to other underground mines in NSW. Some 617 ha of additional native vegetation and habitat for threatened species would be required to be progressively cleared or impacted by subsidence.

NCOPL undertook detailed micro-siting of surface infrastructure to avoid key habitat features including a setback from Bulga Hill, a known topographic feature with rocky outcrops which provide good habitat for both Large-eared Pied Bats and Eastern Cave Bats. In addition, where possible, surface infrastructure has been placed to avoid impacts near creeks and drainage lines with disturbance targeted towards cleared land and derived native grassland (DNG).

The Project was amended in the Amendment Report to further avoid impacts on woodland, with a reduction of 33 ha woodland, 18 ha of DNG and 0.7 ha on Belah Woodland (a highly cleared vegetation community in the bioregion). NCOPL has committed to ongoing review of the disturbance footprint through detailed mine design to further reduce impacts through the Extraction Plan process, with any disturbance to be progressively rehabilitated. NCOPL would also continue to maximise the use of underground pre-mining gas drainage where feasible, which would reduce surface disturbance.

The Plant Community Types (PCTs) proposed to be cleared are all widely occurring in the region. Thirteen PCTs were identified within the Project area and surrounds, several present in both woodland form and DNG form, none of which is listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act). The proposed impacts would require offsetting under the NSW Biodiversity Offsets Scheme established under the BC Act.

Ten 'species credit' species listed under the BC Act were found in habitat either within or adjoining the Project's indicative Surface Development Footprint. The Project's predicted impacts on these ten species would also require offsetting under the Biodiversity Offsets Scheme.

Given that the Project is proposed to operate from 2022 until 2044, NCOPL proposed that its required ecosystem and species credits are retired in six stages, as surface infrastructure required for the Project is progressively developed. Both BCS and the Department accept NCOPL's proposal for staged retirement of credits. The Department has proposed conditions requiring that all credits are retired in accordance with the Offsets Scheme and according to a schedule specified in the consent.

Greenhouse Gas Emissions

The EIS contains a detailed Air Quality and Greenhouse Gas Assessment, which includes an assessment of the Project's predicted GHG emissions. This assessment was supplemented by additional information provided by NCOPL during the assessment process, including an Abatement Technology Assessment and assessment of current use of GHG emissions mitigation technologies in Australian underground coal mines and current and prospective technologies that could be used to mitigate GHG emissions at the Project.

Across the life of the Project, total Scope 1 GHG emissions are estimated to be in the order of 31.19 Mt carbon dioxide equivalent (CO_2-e), averaging 1.36 Mt CO_2-e per financial year. The highest annual emissions occur during FY33 to FY38 (varying from 1.67 to 1.94 Mt CO_2-e), which is when longwall extraction would be occurring in the part of the coal seam with the highest methane concentration.

Predictions for the Project's fugitive emissions are roughly three times higher than historical levels at the mine, which have been around ~0.4-0.5 Mt CO_2-e per FY. The mine's seam gas has so far been very rich in CO_2, which has meant that it was not amenable to flaring (i.e. combustion of the methane component). No flaring has been used to date at the mine. However, there is a substantial increase in the methane percentage in this seam gas (30-40% across the southern and western parts of the Project area, compared with 5-25% in the longwall panels mined to date), which has a major effect on overall GHG emissions in terms of CO_2-e.

Because of this increasing methane component, the Project's Scope 1 GHG emissions would be dominated by fugitive emissions from coal extraction, including gas venting and gas drainage. About 86% of predicted Scope 1 unabated emissions would be from fugitive emissions.

The Department has given careful consideration to the full range of opportunities that might exist (either now or in the future) to address fugitive emissions. The Department has generally adopted the Commission's approach to GHG emissions in the recent Tahmoor South Project, but also proposed to take it one step further by establishing a mechanism to independently review emissions and potentially 'ratchet down' over time. To support this process, the role of NSW's existing independent Mining Panel would be specifically expanded to include the provision of advice on GHG emissions.

Consequently, the Department has recommended the following conditions:

- preparation and implementation of a Fugitive Emissions Minimisation Plan (to be updated and reviewed every 3 years), in consultation with the Mining Panel and key NSW government agencies, to ensure that GHG emission abatement technology continues to be comprehensively investigated and adopted;
- setting performance measures for Scope 1 fugitive emissions intensity based on peak, 5 year rolling average and Project life targets, with offsetting requirements where the performance targets are not met, and ongoing review of the performance targets based on implementation of best practice as determined through the Fugitive Emissions Minimisation Plan;
- requiring implementation of energy efficiency measures and acquisition of green energy to reduce Scope 2 emissions;
- preparation and implementation of comprehensive Gas Extraction Plans as a component of each Extraction Plan; and
- regular reporting through Annual Reviews, End of Panel Reports and the three yearly review of the Fugitive Emissions Minimisation Plan.

Heritage

Aboriginal people of the Kamilaroi (or Gamilaraay) language group previously occupied the North West Slopes of NSW, including the Project area and its vicinity. A literature search, previous surveys and surveys for the Project identified a total of 60 Aboriginal cultural heritage sites within the Project area, comprising predominantly surface artefact scatter and isolated finds. However, two grinding groove sites are also located within the Project area.

The Project's surface disturbance footprint would avoid all known Aboriginal cultural heritage sites. Mine subsidence is generally considered to carry negligible risks for Aboriginal heritage sites located on soil and similar 'flexible' surfaces. Therefore, the artefact scatters and isolated finds located in the soil surface are unlikely to be impacted.

One of the grinding groove sites, comprising two deteriorated grinding grooves located on sandstone boulders within a drainage line, was assessed in the EIS as being of low scientific significance. Since these two boulders are disconnected from bedrock, they are also unlikely to be impacted by subsidence.

The other site (Mayfield GG1) contains at least 48 grinding grooves, ranging in condition from deteriorated to good, on several small sandstone slabs in and near a small drainage line. It was assessed as being of moderate scientific significance and is thought to be at least partly located on sandstone bedrock and, therefore, was assessed as having a 'possible to likely' potential for cracking.

The EIS proposes further investigation of possible connection to bedrock at this site in consultation with a qualified archaeologist and the Registered Aboriginal Parties. NCOPL has proposed that management of Aboriginal cultural heritage sites at risk of subsidence impacts (including Mayfield GG1) would be 'reactive', rather than through applying any avoidance measures.

The Department considers that these measures are reasonable, given that avoidance by way of a barrier pillar (the only feasible avoidance strategy) is expected to cost many tens of millions of dollars (probably in excess of $50 million). The Department also considers that there is a limited likelihood of significant cracking at the site, based on the geomorphology of the site and experience in the Southern Coalfield.

Heritage studies did not identify any items of State or local historic (i.e. non-Indigenous) heritage significance within or close to the Project area. The Department considers that the Project would have no direct or indirect impact on any items or areas of non-indigenous heritage significance.

Economic Costs and Benefits

The EIS contains an Economic Assessment for the Project, prepared in accordance with the Government's Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals and including both a cost benefit analysis and a local effects analysis.

Employment in the region surrounding the Project is dominated by agriculture. However, mining is the second largest employer (9.9% in the 2016 Census). Agriculture and mining are both of much greater local importance for employment than in the overall NSW economy. Even so, unemployment rates in the Narrabri and Gunnedah LGAs have been higher than for both Regional NSW and NSW as a whole for much of the last five years.

The key result of the cost benefit analysis was that the Project would provide a net benefit to NSW, estimated as $599 million (NPV), inclusive of estimated costs for environmental externalities and after internalisation of most environmental management costs by NCOPL. The estimated net benefit of the Project for NSW consists of royalties of $259 million (NPV), NSW residents' share of Commonwealth company tax of $177 million (NPV), and NSW shareholders' share of the net producer surplus of $163 million (NPV). The majority of direct benefits would flow to State and local Governments, rather than as a producer surplus to shareholders resident in NSW.

As required by the Guidelines, the cost benefit analysis included a sensitivity analysis which showed that the estimated net benefits of the Project are 'robust' in that they remain strongly positive after testing all key assumptions used in the analysis.

The Department generally accepts the cost benefit analysis's assessment and conclusions, including the sensitivity analysis. The exception is in the treatment of the cost of Scope 1 and Scope 2 GHG emissions, which were apportioned to the NSW community only based on the ratio between NSW Gross State Product and world Gross Domestic Product. Alternative apportionment of these full costs to NSW and Australia have been applied in recent coal mining assessments and determinations. This significantly reduce net benefits.

The local effects analysis estimates that the Project, relative to the Reference Case, would lead to an increase in disposable income of $55 million (NPV) for the local operational workforce living in its 'Project Region' (i.e. the Narrabri and Gunnedah LGAs).

NCOPL's analysis of current operating expenditures at the Narrabri Mine suggests that 70.9% are directed to NSW suppliers, and that 6% are directed to suppliers in the Project Region. This suggests that the Project would lead to additional operating expenditures of $65 million (NPV) in the Project Region. Local rates paid by NCOPL to Narrabri Shire Council (NSC) also represent a direct benefit to the local region. The Project would lead to local rate payments of $3.9 million (NPV), $1.8 million (NPV) higher than the Reference Case.

Significant local benefits would also arise, firstly through the early creation of an additional 13 high paying FTE jobs but (much more significantly) the extension of 370 such FTE jobs from 2034 – 2044, which would lead to significant local expenditure on other goods and services.

Social Costs and Benefits

Sixty-three of the 67 submissions received from members of the general community (61) and community special interest groups (2) focused on the anticipated positive socio-economic benefits of the Project, particularly employment opportunities.

The potential social impacts of the Project were not a significant feature of community and special interest group submissions. Three submissions received from community special interest groups opposed the Project, primarily on environmental grounds. There were no community and special interest group objections relating to noise impacts, traffic impacts, visual impacts and air quality impacts (other than GHG emissions). In addition, no agency expressed concerns relating to negative social impacts arising from the Project.

From the Department's perspective, given that the Project involves continued operation of the existing Narrabri Mine without any increase in annual ROM coal production, it seems clear that there would be limited social costs on top of those that have already arisen for the directly-affected communities of Baan Baa, Boggabri and Gunnedah. The mine's employment, expenditure and community sponsorship also form part of the existing social baseline for both the local and wider region.

The Project would continue to provide a substantial number of employment opportunities from 2031 until 2044, which would support retention of other employment in the Project region. Consequently, it is likely that the Project would support continued provision of important services for the broader community, particularly in the health and education sectors.

NSC and GSC both requested that NCOPL enter into a Voluntary Planning Agreement (VPA) with them. In late July 2021, NCOPL wrote to both Councils offering each a VPA, with the contribution to each Council based on apportionment by primary place of residence (30.3% of employees and contractors residing in the Narrabri Shire and 28.8% residing in the Gunnedah Shire); vehicle movements from the mine (60% turning north toward Narrabri and 40% turning south towards Gunnedah); location of the Project (entirely within Narrabri Shire); and the total to be shared between both Councils to be 1% of the Project's Capital Investment Value, which is $403.67 million.

Based on this formula, NCOPL offered NSC around $2.66 million and GSC around $1.43 million. Both NSC and GSC have since rejected NCOPL's offers.

While NCOPL has continued to meet regularly with representatives of the two Councils, it considered it appropriate to delay formally progressing discussions over the VPAs until after the recent NSW local government elections (held on 4 December 2021) and new councillors are in place.

Consequently, it was not possible for the VPAs to be finalised before the Department completed its assessment and presents its report to the Commission for determination. Therefore, the VPAs are matters which must be finalised by NCOPL and the two Councils during the Commission's public hearing and determination processes, or by way of conditions of consent, or both.

Other Issues

The Department has assessed the impacts of the Project on several other issues including rehabilitation and mine closure and traffic and amenity impacts (including noise, dust and visual/lighting impacts). The Department considers that, following implementation of reasonable and feasible mitigation measures, the residual impacts of the Project can be suitably managed and/or offset.

Evaluation

The Project site is an extension to an existing underground coal mine with surface facilities, including rail loading facilities, that would continue to be used for the Project. That is, the surface disturbance required for coal handling and preparation is substantially reduced as compared to a greenfield site.

The Department considers the site to be well-suited for the Project. The environment above and surrounding the Narrabri Mine and the Project area is not particularly environmentally sensitive and there are no towns located in close proximity to the mine. The area has a semi-arid climate and relatively flat-lying topography. Its watercourses are small and ephemeral and their channels are not deeply incised. The area has been used for extensive pastoralism and forestry and is not heavily populated. Subsidence impacts on the landscape (primarily limited soil cracking and ponding within watercourses) would be remediated as they have been previously.

The primary water sources potentially at risk from the Project are the groundwater resources of the Namoi Alluvium and Pilliga Sandstone, both of which are expected to be largely unaffected by mining. All surface water and groundwater drawdown would be subject to water access licensing under the provisions of the *Water Management Act 2000*.

All recommendations of the Mining Panel regarding mine subsidence and potential impacts on groundwater and surface water resources have been accepted by NCOPL. The Department has proposed conditions to give these recommendations effect.

As is common with coal mining projects, the cost benefit analysis and local effects analysis indicate large net benefits to both the NSW and local communities, noting that the consideration of GHG emissions reduces these overall net benefits. A significant net economic benefit would accrue to the NSW Government, primarily from coal royalty payments. A significant benefit would also arise for the NSW community from the NSW share of Commonwealth income taxes. Shareholders of Whitehaven and other entities which are resident in NSW would also share in the profits made by undertaking the Project, by way of dividends.

The Project would provide major economic and social benefits for the Project region and to NSW, including:

- direct capital investment of $404 million (NPV) in the Project;
- continuation of an existing c. 520 jobs at the Narrabri Mine, together with c. 20 new construction jobs during Project development phases;
- estimated net benefit to NSW of up to $599 million (NPV), as reduced by alternative consideration of GHG Scope 1 and 2 cost apportionment;
- direct revenue for the NSW State Government, including more than $259 million in royalties and $177 million in company tax; and
- estimated increase in disposable income of $317 million (NPV) for the 218 workers expected to live in the Project Region;

The Project is consistent with the NSW Government's NSW Climate Change Policy Framework and its associated Net Zero Plan Stage 1: 2020-2030. Nonetheless, one of the key environmental impacts associated with the Project would be Scope 1 GHG emissions, primarily from fugitive emissions of methane and CO_2 liberated by coal extraction. Higher emission rates are predicted due to increased methane content as the mine progresses to the south. The Department has therefore applied strict

conditions requiring the investigation and implementation of technologies to reduce Scope 1 fugitive emissions and Scope 2 emissions from electricity generation and/or require offsets where emission intensity exceeds predicted levels.

The Department has carefully weighed the environmental impacts of the Project against the significance of the Project's identified coal resources and the socio-economic benefits associated with continued operation of the Narrabri Mine for a further 13 years (from 2031 until 2044). On balance, the Department believes that the Project's benefits significantly outweigh its residual costs, and that it is in the public interest and is approvable, subject to strong conditions.

The Department has recommended a comprehensive and precautionary suite of conditions to ensure that the Project complies with acceptable criteria and standards, that the impacts are consistent with those predicted by NCOPL in its documentation, and that residual impacts are effectively minimised, managed and compensated.

On balance, the Department believes that the Project's benefits significantly outweigh its residual costs, and that it is in the public interest and is approvable, subject to the recommended conditions.

Contents

1 Introduction

1.1 Background

1. Narrabri Coal Operations Pty Ltd (NCOPL) is the operator of the Narrabri Mine, an existing underground coal mine located approximately 25 kilometres (km) south-east of Narrabri and approximately 60 km north-west of Gunnedah. The mine is located within the Narrabri Shire Local Government Area (LGA) and in the North West Slopes and Plains region of NSW (see **Figure 1**).

2. NCOPL operates the Narrabri Mine on behalf of the Narrabri Mine Joint Venture, which consists of Whitehaven Coal Limited's (Whitehaven's) wholly owned subsidiaries Narrabri Coal Pty Ltd (NCPL) (70%) and Narrabri Coal Australia Pty Ltd (7.5%); Upper Horn Investments (Australia) Pty Ltd (7.5%); J-Power Australia Pty Limited (7.5%); Posco International Narrabri Investment Pty Ltd (5%); and Kores Narrabri Pty Limited (2.5%).

3. Stage 1 of the existing mine received development consent in November 2007, and coal production using bord and pillar and partial pillar extraction commenced in 2010. In July 2010, development consent was granted for Stage 2 of the mine, which allowed coal to be extracted using longwall mining methods and an increase in coal production. The mine has been extracting coal by longwall methods since June 2012.

4. NCOPL is now seeking development consent for the Narrabri Underground Mine Stage 3 Extension Project (the Project), which involves continuation of the existing longwall mining and an extension of the underground mining area to the south of the mine (the Stage 3 mining area).

1.2 Existing Operations

5. The approved mine comprises 20 longwall panels, Longwalls 101 to 111 and Longwalls 201 to 209, which extract coal from the Hoskissons Seam. The Stage 2 development consent (08_0144) allows for the production and processing of up to 11 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 26 July 2031.

6. ROM coal is processed at the Narrabri Mine Coal Handling and Preparation Plant (CHPP) to produce thermal coal and smaller quantities of pulverised coal injection (PCI) coal (i.e. coal that can be used for steel production). Product coal is then transported from the site by rail. CHPP rejects are emplaced in a dedicated rejects emplacement area.

7. The Pit Top Area incorporates the majority of the Narrabri Mine's surface infrastructure, including the box cut, CHPP, ROM and product coal stockpiles, rail loop and product coal load-out infrastructure.

8. The existing mine is also regulated under Mining Lease (ML) 1609 and a number of other approvals under other State legislation. It also has a Commonwealth approval (EPBC 2009/5003).

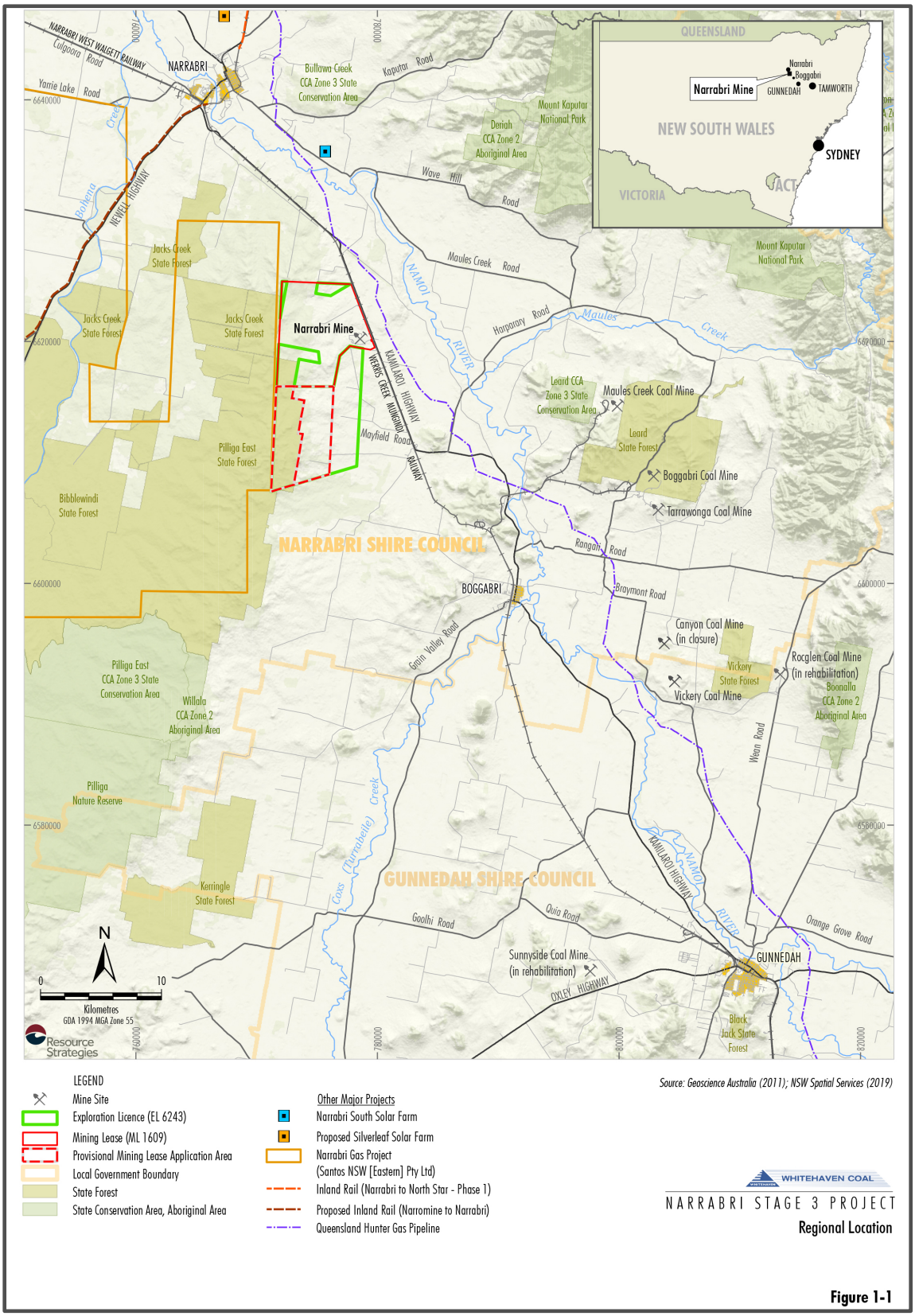


Figure 1 | Regional Context Map *(Source: EIS)*

2 Project

2.1 Project Overview

9. The Project would involve continued mining of existing longwalls and an extension of the underground mining area to the south (Stage 3 of the mine's development). Stage 3 would involve extensions of the existing approved Longwalls 203 to 209 and development of an additional longwall (Longwall 210). It would also involve additional surface infrastructure for access and support in the new mining area.

10. The development application for the Project seeks to incorporate and replace the existing consent 08_0144, which would be surrendered to the Department of Planning and Environment (the Department) if the Project is approved.

11. Stage 3 would require the grant of new mining leases over the southern extension area. NCOPL has lodged two mining lease applications (MLA 1 and MLA 2) with the Mining, Exploration and Geoscience Division of the Department of Regional NSW. The terms MLA 1 and MLA 2 are used regularly in the EIS to describe the southern extension area.

12. A summary of the main components of the Project, compared with those of the existing approved operations at Narrabri Mine, is set out in **Table 1**.

Table 1 | Main Components of the Project, Compared with Existing Approved Operations

Aspect	Existing Narrabri Mine	Project
Mine Life	Until 26 July 2031	Until 2044
Mining Method	Underground extraction using longwall mining methods	No change
Coal Resource	Mining of the Hoskissons Seam	No change, with seam dipping to the south west
Underground Mining Layout and Geometry	Twenty longwall panels (LW 101 - 111 and LW 201 - 209), with 295 metre (m) wide panels for LW 101 - 106; and approximately 400 m wide panels for LW 107 - 111 and LW 201 - 209	No change to LW 101 – 111, LW 201 and LW 202. Major extensions of LW 203 - 209 to the south, approximately 400-410 m wide and 6.2 km long (total longwall panel length with extension would be around 10.2 km) Additional longwall panel (LW 210), approximately 415 m wide and 3.93 km long
Annual Production	Handling and processing of up to 11 Mtpa of ROM coal	No change
Total Coal Resource to be Recovered	Approved total ROM coal production of approximately 170 Mt, however, expected actual production, based on current mine planning, is approximately 145 Mt	ROM coal production of approximately 252 Mt (additional 82 Mt).
Mining Leases	Mining operations within ML 1609	Continued mining operations within ML 1609 Mining operations within two new mining leases.
Surface Development Footprint	Approximately 616 hectares (ha) of surface disturbance	609.5 ha of additional Surface Development Footprint to support underground mining

Aspect	Existing Narrabri Mine	Project
Underground Mine Surface Infrastructure	Ventilation shafts, pre-drainage and post-drainage sites, 'pre-conditioning' sites, access roads and electricity transmission lines	Establishment of two additional ventilation complexes Extension of existing gas drainage, 'pre-conditioning', mine ventilation systems, services corridors and boreholes, access tracks and electricity transmission lines in the new mining area
Underground Mine Access	Via three drifts at the box cut at the Pit Top Area	No change
Site Access	Primary access from the Kamilaroi Highway via a sealed mine access road to the Pit Top Area	No change
Coal Washing	CHPP and secondary crusher/screen	Continued use of existing facilities, with replacement or upgrades of components as required
Coal Handling and Stockpiling	ROM coal stockpile capacity of approximately 700,000 tonnes (t) Product coal stockpile capacity of approximately 500,000 t	No change
Management of Mining Waste	CHPP rejects placed in reject emplacement area	Continued disposal of coal rejects in the reject emplacement area. Disposal of exploration drilling waste in the reject emplacement area, including potential receipt and disposal of exploration drilling waste products from off-site
Product Coal Transport	Product coal transported from site by rail Average of four trains per day with a peak of eight trains per day	No change
Water Supply	Make-up water demand to be met from: • mine dewatering; • runoff recovered from operational areas; and • licensed extraction from Namoi River and Namoi Alluvium	No change
Water Management	Conducted in accordance with the Water Management Plan (including discharge under the conditions of EPL 12789 and development consent 08_0144	Water management strategy generally unchanged Development of Southern Mine Water Storage to the south of the new mining area
Electricity	Permanent mains power supplied via a spur line from a 66 kV powerline located to the east of Kamilaroi Highway. Power converted from 66 kV to 11 kV on-site and reticulated, using progressively developed 11 kV powerlines.	No change to key power supply infrastructure, but demand for mains power would increase. Continued progressive development of electricity transmission lines to service the extended underground mining area and associated surface infrastructure

Aspect	Existing Narrabri Mine	Project
Workforce	Operational workforce (employees and contractors) of approximately 520 FTE personnel	Continued employment of up to approximately 520 FTE personnel. Possible short-term increases in employment for planned development activities and potential additional development activities
Hours of Operation	Operated on a continuous basis, 24 hours per day, seven days per week	No change
Rehabilitation Strategy	Conducted in accordance with the Mining Operations Plan (MOP)	No change
Capital Investment Value	Not applicable	$404 million

2.2 Underground Mining

13. Longwalls 203 to 209 would be extended from their current approved length of approximately 4 km to approximately 10.2 km. They would have approximate overall void widths of between 400 and 410 m (including first workings), consistent with the approved Narrabri Mine layout. Longwall 210 would be approximately 3.93 km long.

14. The conceptual layout of Longwalls 203 to 209 is shown in **Figure 2**. However, the final layout and mining order of the longwalls would depend on a number of factors, including localised geological features; detailed mine design; and adaptive management requirements, and would therefore be subject to review and approval as a component of future Extraction Plans.

15. As the Project's current conceptual mine layout maximises coal resource recovery, NCOPL expects that any such adaptation to the conceptual mine geometry would generally result in *reduced* subsidence effects and consequential environmental impacts. This issue would also be addressed in the relevant Extraction Plan.

2.3 Surface Development

16. Additional surface development would be required to support the extended area of longwall mining. This includes gas management infrastructure, exploration and service boreholes, services corridors and access tracks etc.

17. Narrabri Mine is known as a "gassy" mine. I.e. the coal seam is characterised by large quantities of gas adsorbed onto the coal itself and also contained within fractures ('cleats') in the coal. This coal seam gas must be substantially reduced in quantity in order that mining may take place safely and efficiently.

18. A significant proportion of gas drainage must take place prior to longwall extraction. Drilling and gas drainage are primarily carried out underground (i.e. 'underground in-seam' (UIS) drilling), with drained gas conveyed to the surface through 'service boreholes'. Surface to in-seam (SIS) drilling may also be used for pre-development drainage. This would require holes to be drilled from the surface using a specialised drill rig operating from a bigger drill pad (80 – 100 m^2, or up to 1 ha).

19. After longwall extraction, additional gas accumulates in the collapsed rock ('goaf') that develops in and above the longwall void. This goaf gas must also be drained to ensure the continued safety of mining operations. Goaf gas drainage is also undertaken from the surface and would require additional boreholes, which would be located within a 33 m wide corridor along the entire length of the longwall.

20. The Project would also include the establishment of two additional ventilation facilities.

21. The exact locations of surface infrastructure would be subject to further detailed mine planning, operational/mine safety requirements and for specific siting of infrastructure to minimise impacts. However, an indicative Surface Development Footprint for the Project, including a more detailed inset, is shown in **Figure 3**.

22. Surface construction and development would generally occur from 7.00 am to 6.00 pm, seven days per week. Activities undertaken outside of these hours would include excavation of ventilation shafts and other drilling activities, which would be conducted up to 24 hours per day, seven days per week.

2.4 Amended Development Application

23. Clause 55AA (previously clause 55) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) provides that an applicant may, with the agreement of the consent authority, amend or vary a development application at any time before its determination.

24. In correspondence dated 30 May 2021, NCOPL submitted an Amendment Report for the Project (see **Appendix D**), lodged via the Department's web portal, as required by clause 55. In a letter dated 25 October 2021, a delegate of the Minister agreed to the amendment of the development application for the Project, as set out in the Amendment Report.

25. The Amendment Report sets out three relatively minor but important amendments to the Project. In summary, these:
    - remove 31 ha of the indicative Surface Development Footprint that are no longer required under a refined Project design;
    - incorporate flaring of pre-mining drained gas in particular parts of the underground mining area. Due to the limited predicted occurrence of combustible mine gases, this would reduce total Scope 1 greenhouse gas (GHG) emissions by approximately 1%; and
    - relocate some components of the indicative Surface Development Footprint in order to reduce impacts on a threatened plant species (Coolabah Bertya) by 2.3 ha.

26. These proposed amendments would result in a small reduction in the Project's environmental impacts as set out in the EIS. The amendments would lead to no change in the Project's total coal resource, mine life, workforce, peak production rate, hours of operation and longwall setback commitments. i.e.

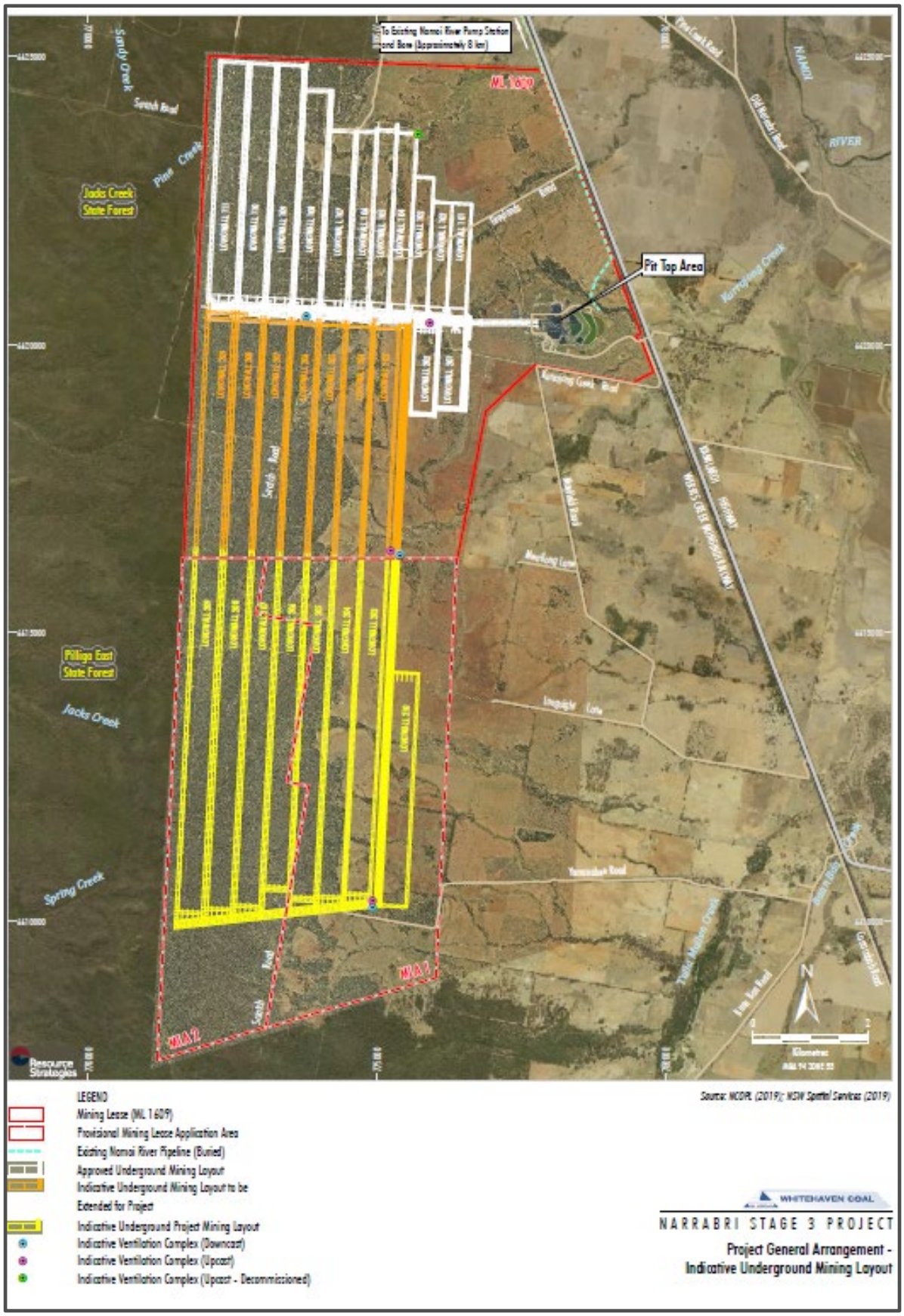


Figure 2 | Project Longwall Layout *(Source: EIS)*

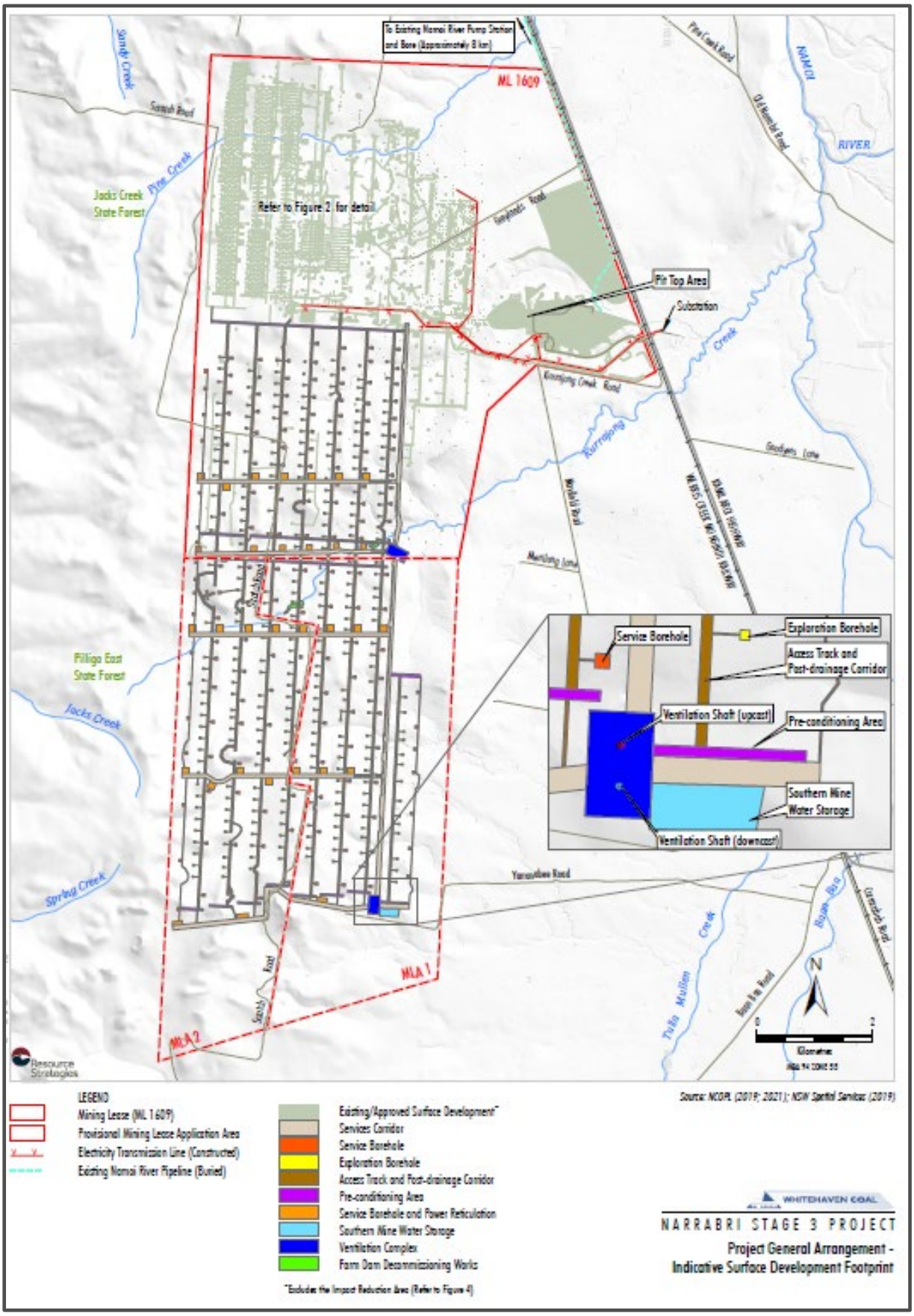


Figure 3 | Project Indicative Surface Development Footprint *(Source: Amendment Report)*

3 Strategic Context

3.1 Introduction

27. The Project is located in the Narrabri Shire LGA, which is part of the New England North West region of NSW. This region includes river valleys dominated by agricultural land uses and elevated vegetated country typically managed as State forest or national park.

28. The region includes strong broadacre cropping and grazing sectors, and emerging intensive agriculture and food processing sectors. The key agricultural commodities produced in the region (by value) are beef cattle, cereal grains, cotton, poultry and wool.

29. This region is also rich in a variety of mineral resources such as coal, coal seam gas (CSG) and other minerals. Apart from Narrabri Mine, the Gunnedah Coalfield is host to a number of major coal mine developments. These other mines are located at distances of 22 - 45 km east and southeast of the Project area. The nearest such mine is Maules Creek Coal Mine, an open cut also majority owned by Whitehaven.

30. The Project is located approximately 25 km south-east of Narrabri and approximately 60 km north-west of Gunnedah (see **Figure 1**). The village of Baan Baa is located approximately 10 km to the south-east of the Pit Top Area and is the closest community to the Project.

31. The Narrabri Mine is located to the immediate west of the Kamilaroi Highway and the Werris Creek - Mungindi Railway. The Kamilaroi Highway provides road access to the Narrabri Mine. Product coal from the Narrabri Mine is transported via the Werris Creek - Mungindi Railway to the Port of Newcastle for export.

32. Existing land uses in the immediate vicinity of the Project are characterised by a combination of coal mining, agricultural enterprises, rural dwellings and forestry operations (Pilliga East and Jacks Creek State Forests). The Project area is immediately east of Pilliga East State Forest.

33. The approved (but not yet constructed) Narrabri Gas Project lies immediately to the northwest, west and southwest of the Project area. The proposed pipeline alignment of the approved (but not yet constructed) Queensland Hunter Gas Pipeline lies 1.3 km east of the existing Narrabri Mine, but is considerably farther from the Project area.

3.2 Policies, Guidelines and Plans

UNFCCC Paris Agreement 2015

34. Under the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement 2015 (Paris Agreement), each signatory must identify its own post-2020 climate actions to achieve a balance between anthropogenic GHG emissions and removal by GHG sinks in the latter half of this century. These actions are referred to as a Nationally Determined Contribution (NDC).

35. Australia's NDC adopts a target of net zero emissions by 2050 by committing to seven low emissions technology stretch goals. These include clean hydrogen production, ultra-low-cost solar, energy storage, low emissions steel production, low emissions aluminium production, carbon capture and storage and soil carbon measurements.

36. Australia's updated NDC (dated October 2021) also reaffirms its commitment to reduce national GHG emissions by 26-28% from 2005 levels by 2030. Australia's 2021 emissions projections demonstrate that it is on track to reduce emissions by up to 35% below 2005 levels by 2030.

37. The established national policy frameworks focus on broader structural economic adjustment and abatement measures to achieve GHG emissions reduction targets and outcomes, and do not seek to restrict private development in order to meet Australia's commitments under the Paris Agreement.

38. These frameworks do not impose any prescriptive emissions criteria or targets which can be applied in development assessment of individual projects.

Australia's Long-Term Emissions Reduction Plan

39. The Commonwealth Government has recently developed *Australia's Long-Term Emissions Reduction Plan* (the Emissions Reduction Plan) which is a whole-of-economy plan to achieve net zero GHG emissions by 2050.

40. The Emissions Reduction Plan has a key focus of investing in low GHG emission technologies through implementation of the *Technology Investment Roadmap*. This roadmap aims to:
    - deliver low-cost, clean and reliable energy to households and industry;
    - increase productivity, create jobs and substantially reduce GHG emissions from Australia's primary industries;
    - expand Australian manufacturing and capture new export markets for low GHG emissions commodities; and
    - help Australia store CO_2 in soils, plants and underground reservoirs.

41. The Commonwealth Government asserts that by following the *Technology Investment Roadmap* and building new industries, Australia will create new export markets and jobs which will help offset long-term impacts in sectors like thermal coal which will be affected by falling global demand and the shifting choices of international consumers.

42. The Emissions Reduction Plan aims to ensure regional communities are able to capitalise on the opportunities of the new energy economy in order to experience new sources of growth. Of particular relevance to this Project, the Emissions Reduction Plan states:

> "These shifts will unfold over decades, and these sectors (including coal and gas) will continue to provide jobs and underpin regional communities for many years to come."

43. Australia's long-term strategy and domestic actions, as outlined in the Emissions Reduction Plan, are underpinned by rigorous emissions monitoring and accountability systems. This includes the *National Greenhouse and Energy Reporting Scheme* (NGERS) and the associated 'Safeguard Mechanism'.

44. As a participant in the NGERS, NCOPL would be expected to continue to undertake regular reviews of the technologies being used and abatement measures being implemented at its operations to continue to reduce GHG emissions.

NSW Climate Change Policy Framework

45. The NSW Government's 2016 *NSW Climate Change Policy Framework* (CCPF) committed NSW to an 'aspirational long-term objective' of achieving net-zero GHG emissions by 2050. The framework addresses actions to limit GHG emissions which are by or on behalf of the Government. However, this document does not control or directly relate to actions by private entities (such as NCOPL).

46. In March 2020, the Government announced a new 10-year plan to help it achieve the CCPF's objective of achieving net-zero GHG emissions by 2050, the Net Zero Plan Stage 1: 2020-2030 (Net Zero Plan).

47. In September 2021, the Government released its *Net Zero Plan Stage 1: 2020-2030 Implementation Update*, which outlines the actions it proposes to undertake in order to achieve the State's objective to deliver a 47-52% reduction in GHG emissions by 2030 compared to 2005 levels.

48. One initiative outlined in the Net Zero Plan of relevance to the Project is the Coal Innovation Program. The Coal Innovation Program recognises that the mining sector is one of NSW's biggest economic contributors and states that:

> "Mining will continue to be an important part of the economy into the future and it is important that the State's action on climate change does not undermine those businesses and the jobs and communities they support."

49. The Coal Innovation Program is primarily focused on limiting fugitive GHG emissions that come from coal mining through the capture and combustion of these emissions to provide new revenue streams to the mining sector.

50. The Department's assessment on GHG emissions, including consideration of measures to reduce fugitive emissions is provided in **Section 6.6**.

Strategic Statement on Coal Exploration and Mining in NSW

51. In July 2020, the NSW Government updated its previous 2014 *Strategic Statement on NSW Coal* by publishing a new *Strategic Statement on Coal Exploration and Mining in NSW* (the Strategic Coal Statement). The Strategic Coal Statement recognises the value of continued coal production to the State, including the potential for coal production to deliver significant economic benefits to regional communities; to contribute to export earnings, and to fund public services and infrastructure through mineral royalties.

52. The Strategic Coal Statement also sets out that, despite a global transition away from fossil fuels, coal production for export markets will continue to have an important role to play in the short to medium term, as coal remains a critical global energy source around the world.

53. The Statement also recognises that the use of coal for the manufacturing of steel (i.e. metallurgical/coking coal) is likely to be sustained for a longer period as there are currently limited practical substitutes available.

54. To support the intentions of the Statement, the NSW Government has identified a portion of the State's coal regions where mining is not supported and/or is prohibited, and areas considered for proactive release for coal exploration. The Project would not be located in any of these 'no-go' areas, but would be located in an area where coal exploration and mining titles already exist.

Other Strategic Planning Documents

55. The *New England North West Regional Plan 2036* (2017) applies to the Narrabri Shire LGA. The Project is therefore within the area covered by this Plan, which outlines the Department's land use planning priorities for the region over a 20-year period until 2036.

56. The Regional Plan contains four strategic goals. It recognises the significance of the region's mineral resources and includes the growth of mineral resource development in its overall vision for the region.

The Regional Plan also acknowledges that mining has the potential to affect economic, social and environmental values in the region and states: *"Mining activities need to be undertaken sensitively to minimise negative impacts on the environment, important agricultural land, neighbouring businesses and the community."*

57. The Project would provide continued growth of mineral resource development in the region. The EIS considers that the Project is consistent with the goals of the Plan. The Department agrees, but notes that the Project must also satisfy the other requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

58. The *Narrabri Shire Community Strategic Plan 2017 – 2027* (2016) is the Narrabri Shire Council's current 10-year strategic plan for the Narrabri Shire. This Plan contains four strategic directions, including: *"A strong, diverse economy that attracts, retains and inspires business, industry and tourism growth."* The EIS considers that the Project is generally consistent with this Plan's strategic direction. The Department supports this view.

59. The *North West Local Land Services – Local Strategic Plan 2016-2021* (2016) outlines four key goals. The EIS considers that the Project is generally consistent with this Plan's strategic direction. The Department supports this view.

4 Statutory Context

4.1 State Significance

60. The Project is declared to be State significant development (SSD) under section 4.36 of the EP&A Act by virtue of the operation of clause 8 of the *State Environmental Planning Policy (SEPP) (State and Regional Development) 2011.* As the Project is 'development for the purposes of coal mining', it falls within the scope of clause 5(1)(a) of Schedule 1 of that SEPP.

4.2 Permissibility

61. The Project area is within the Narrabri Shire LGA, which is covered by the *Narrabri Local Environmental Plan 2012* (the Narrabri LEP). The Project area includes land zoned under the Narrabri LEP as:
    - Zone RU1 (Primary Production); and
    - Zone RU3 (Forestry).

62. Under the Narrabri LEP, open cut mining is explicitly permissible with consent within Zone RU1, however underground mining is prohibited development. All mining is prohibited development within Zone RU3. However, the provisions of *State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007* (the Mining SEPP) override these LEP provisions.

63. Clause 5(3) of the Mining SEPP provides that that SEPP prevails over other environmental planning instruments (EPIs) made under the EP&A Act, such as LEPs. Clause 7(1) of the Mining SEPP provides that 'underground mining carried out on any land' is permissible with development consent. That is, notwithstanding any prohibition in the Narrabri LEP, development for the purposes of the underground mining may be carried out with consent. This permissibility extends to facilities for the processing and transportation of coal.

64. Therefore, the Project is permissible with consent.

4.3 Consent Authority

65. In accordance with section 4.5 of the EP&A Act, the Minister for Planning, the Hon Anthony Roberts MP, is the consent authority for the Project. Under clause 8A(1) of *SEPP (State and Regional Development) 2011*, the Independent Planning Commission (the Commission) would have been the consent authority for the Project, *if* at least 50 public submissions in the nature of objection were received, or an objection from Narrabri Shire Council had been received, or a reportable political donation had been disclosed. However, since none of these preconditions were met, the Minister remains the consent authority. However, the Commission may determine the application as the Minister's delegate under an Instrument of Delegation signed by the then Minister for Planning on 28 September 2011.

66. On 19 November 2021, the previous Minister requested under section 2.9(1)(d) of the EP&A Act that the Commission hold a public hearing into the carrying out of the Project. The terms of the Minister's request are as follows (see Appendix F):

1) Conduct a public hearing into the carrying out of the Narrabri Underground Mine Stage 3 Extension Project (SSD 10269) prior to determining the development application for the Project under the EP&A Act, paying particular attention to:
   - the Department of Planning and Environment's assessment report, including any recommended conditions of consent;
   - key issues raised in public submissions during the public hearing; and
   - any other documents or information relevant to the determination of the development application.
2) Complete the public hearing and make its determination of the development application within 12 weeks of receiving the Department's assessment report in respect of the Project, unless the Planning Secretary agrees otherwise.

4.4 Mandatory Matters for Consideration

67. Under Section 4.40 of the EP&A Act, the Commission is required to evaluate the merits of the Project against the relevant matters for consideration set out in Section 4.15 of the prior to making its determination. This includes:
   - the provisions of any EPIs;
   - the terms of the Applicant's offer to enter into planning agreements and whether it should impose a condition on the Project;
   - the likely impacts of the Project, including the environmental impacts on both the natural and built environments, and social and economic impacts in the locality;
   - the suitability of the site for the Project; and
   - the public interest, which includes considering the relevant objects of the EP&A Act and Ecologically Sustainable Development (ESD).

68. The Department has considered all of these matters in its assessment of the Project and has provided a summary in this report. Further consideration has been provided in **Appendix G**.

4.5 Surrender of Development Consent

69. Section 4.63 of the EP&A Act (voluntary surrender of development consent) 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.

70. If the Project is approved, NCOPL would surrender the Stage 2 development consent (08_0144) and the mining operations on the current site would be regulated under the new development consent.

71. The Department has recommended conditions that incorporate the relevant requirements of the approved project that are not being re-assessed, for example existing biodiversity offset obligations.

4.6 Gateway Certificate

72. Clause 50A of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) requires that a development application for mining or petroleum development on certain identified land must be accompanied by either a:
    - gateway certificate, or
    - 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).

73. NCOPL applied for a Gateway Certificate pursuant to the Department's Mining & Petroleum Gateway Process (the Gateway Process) established under clauses 17A – 17U of the Mining SEPP. The Gateway Panel granted a conditional Gateway Certificate in respect of the Project on 4 June 2019, together with certain recommendations regarding NCOPL's environmental impact assessment of matters related to BSAL and water resources for the Project.

74. A requirement to have regard to the Gateway Panel's recommendations was included in the Secretary's Environmental Assessment Requirements (SEARs) for the Project.

4.7 Biodiversity Development Assessment Report

75. Section 7.9(2) of the *Biodiversity Conservation Act 2016* requires all applications for SSD to be accompanied by a Biodiversity Development Assessment Report (BDAR) unless it is determined that the proposed development is not likely to have any significant impact on biodiversity values.

76. The EIS contained a BDAR (see the EIS's Appendix D). NCOPL provided a revised BDAR on 21 September 2021 (see **Appendix F**).

4.8 Commonwealth Matters

77. On 30 September 2019, a delegate of the Commonwealth Minister for the Environment and Energy determined that the Project is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to its potential impacts on Matters of National Environmental Significance (MNES), specifically:

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

78. Under the current Bilateral Agreement between the Commonwealth and NSW governments, the Commonwealth has accredited the NSW assessment process under the EP&A Act for the controlled action (EPBC 2019/8427), to enable a single integrated assessment of the Project. However, the Commonwealth's decision-maker maintains a separate approval role, which will be exercised following the Commission's determination of the development application.

79. Following provision of the then Commonwealth Department of Environment and Energy's assessment requirements, the Department issued revised SEARs for the Project, including an attachment covering the Commonwealth's matters. The Department has assessed the potential impact of the Project on the applicable MNES in accordance with the requirements of the Bilateral Agreement. These matters are addressed in **Section 6** and further addressed in **Appendix I**.

4.9 Integrated and Other NSW Approvals

80. Under section 4.41 of the EP&A Act, a number of approvals are integrated into the SSD approval process, and consequently are not required to be separately obtained for the Project. These include:
- various approvals relating to fisheries under the *Fisheries Management Act 1994*;
- various approvals relating to Aboriginal and other heritage required under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1997*; and
- certain approvals under the *Water Management Act 2000.*

81. Under section 4.42 of the EP&A Act, a number of other approvals (if required) cannot be refused and must be granted in terms substantially consistent with any development consent for the Project. These include:
- mining leases under the *Mining Act 1992*;
- approvals under the *Coal Mine Subsidence Compensation Act 2017*;
- Environment Protection Licences (EPLs) under the *Protection of the Environment Operations Act 1997*; and
- consents under section 138 of the *Roads Act 1993* for the re-alignment of public roads, intersection upgrades and mining beneath public roads.

82. The Project would require an additional mining lease under the *Mining Act 1992*. NCOPL has already lodged applications for this lease, which cannot be granted until the Project obtains the necessary development consent. The Project would also require variations to Narrabri Mine's existing EPL, being EPL 12789. If any approval under section 138 of the *Roads Act 1993* is required for the Project, then NCOPL would obtain this, in consultation with the relevant roads authority.

83. The Department has consulted with the relevant government authorities responsible for the integrated and other approvals and considered their advice in its assessment of the Project.

4.10 Modification 7 to the Stage 2 Consent

84. On 30 June 2021, NCOPL lodged an application to modify its existing development consent (MOD 7) to revise the mining method for two approved longwall mining panels from longwall to bord and pillar mining. The affected panels are LW 201 and LW 202 (see **Figure 3**).

85. The MOD 7 application was determined (i.e. approved) by the Department on 23 November 2021. However, it must be noted that the Stage 3 development application and EIS were framed to seek approval of *longwall* mining of these two panels. As such, this assessment report must assess *longwall* extraction of LW 201 and LW 202, rather than *bord and pillar* extraction.

86. This inconsistency has arisen because the MOD 7 application postdates the development application and EIS for the Project and also postdates the Amendment Report. i.e..

87. NCOPL has addressed this uncertainty in correspondence dated 16 September 2021 in which it sought that "any approval given for Mod 7 is suitably reflected in and preserved by any development consent granted for the Stage 3 Project."

88. The Department supports this approach and is recommending conditions to that effect. However, of necessity, this current assessment report must also consider extraction of the two affected panels by longwall mining methods.

5 Engagement

5.1 Department's Engagement and Consultation

89. After accepting it, the Department publicly exhibited the EIS for an extended 42-day period from 5 November 2020 and advertised the exhibition in local and national newspapers. The Department notified Narrabri and Gunnedah Shire Councils, relevant government agencies, and landowners adjoining the Project boundary.

90. The Department met with representatives of the Boggabri/Baan Baa Landowners special interest group on 24 February 2021 concerning the Project. The Department also undertook a site inspection of the mine and Project area on the same day with representatives of NCOPL and its consultants.

91. The Department has engaged regularly with representatives of NCOPL and its principal consultant, Resource Strategies, throughout the assessment process. It has also engaged regularly with members and representatives of the local community and with officers of affected Government agencies.

92. On 30 October 2020, the Department and the Commonwealth Department of Agriculture, Water and the Environment (DAWE) jointly requested the Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC) to provide advice on the Project. The IESC provided its advice in November 2020 (see **Appendix F**). This advice is summarised in **Section 5.3** and further discussed and considered in **Section 6**.

93. In undertaking these processes, the Department considers that its engagement process met the notification requirements of clause 9 of Schedule 1 of the EP&A Act and the relevant EPIs. The Department also considers that this process has fulfilled the State's obligation under its Bilateral Agreement with the Commonwealth Government.

5.2 Summary of Submissions and Agency Advice

94. During the exhibition period, the Department received a total of 67 public submissions, including 61 submissions from individuals and 6 from special interest groups (see **Appendix B**). These submissions comprised:

- 63 (94%) submissions expressing support for the Project, including 61 from public submissions and 2 from special interest groups;
- 3 (4.5%) submissions objecting to the Project, all from special interest groups; and
- 1 (1.5%) submission from a special interest group providing comments on the Project.

95. Of the submissions received from special interest groups, the two organisations which supported the Project (WesTrac Pty Ltd and Projence Pty Ltd) are business entities which are suppliers to NCOPL.

96. The three special interest groups which objected to the Project are local community landholder and environmental groups. In addition, the Siding Springs Observatory provided advice that it would not be providing any comments on the Project.

97. All 61 public submissions expressed support for the Project with more than a third (21) that came from the Narrabri Shire LGA. Almost an additional third (19) came from the neighbouring Gunnedah Shire LGA, where a number of Whitehaven's other coal mining operations are located.

98. Only two public submissions came from the Sydney Metropolitan area. Thirteen came from other areas of NSW. These were mainly from localities where coal mines are located (e.g. the Newcastle and Lake Macquarie areas). Six submissions came from localities in southern Queensland (see **Table 2**).

Table 2 | Summary of Public Submissions

Local Government Area	Total submissions	In Support (% of Total)
Narrabri	21	21 (34.4)
Gunnedah	19	19 (31.1)
Sydney Metropolitan Area	2	2 (3.3)
Other NSW	13	13 (21.3)
Queensland	6	6 (9.8)
Total	**61**	**61 (100)**

99. A summary of the issues raised in public submissions is discussed in **Section 5.4**.

100. The Department also received advice on the Project from 16 government agencies and related entities including the IESC and Gunnedah and Narrabri Shire Councils. The issues raised in the agency advice are discussed is **Section 5.3**.

101. Agency advice is listed in **Appendix E**.

5.3 Advice from Government Agencies

102. No government agencies 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.

103. **Table 3** below provides a summary and overview of key comments made by public authorities. Further consideration of agency advice is provided in **Section 6**.

Table 3 | Summary of Agency Advice

Agency	Advice
DPE - Water	• Initially requested additional information and clarification in relation to NCOPL's groundwater entitlements, subsidence impacts on watercourses, drawdown and water quality impacts, groundwater modelling and updates to the mine's Water Management Plan. • Requested further information following its review of the Submissions Report and Amendment Report. • Accepted the subsequent additional information provided by NCOPL to address DPE - Water's initial comments. • Recommended the following post approval requirements, if the Project is approved: – the provision of a strategy to ensure there is enough suitable entitlement to account for operational and post operational wate take; and – the requirement to ensure surface water take due to subsidence is adequately monitored and accounted for. • These matters are discussed further in **Sections 6.3 and 6.4**.
Biodiversity Conservation and Science Directorate (BCS)	• Initially raised concerns about the Project's predicted and potential biodiversity impacts and highlighted several additional requirements to be completed for the BDAR, including its certification, before it could be accepted. • Advised that as the *Ancillary Rules: use of Mine Site Ecological Rehabilitation as an Offset* under the Biodiversity Offsets Scheme (BOS) were only in draft form, this offsetting option could not be incorporated into the BDAR. • Noted that potential flood extent would remain consistent with existing conditions and had no further comment on potential flood behaviour or hydrology. • Following its review if of the Submissions Report, Amendment Report and updated BDAR, BCS confirmed it was satisfied with the additional information, noting the reduction of biodiversity impacts as compared to the exhibited EIS, specifically in regard to serious and irreversible impact (SAII) entities. • Provided additional recommendations in relation to the proposed biodiversity offsets and additional information to assist NCOPL with any future re-assessment of the Glossy-black Cockatoo within the Project assessment area. • Following review of the draft conditions, BCS provided recommendations for biodiversity conditions, which have been incorporated by the Department in finalising recommended conditions of consent for the Project. • These matters are discussed further in **Section 6.5**.
Environment Protection Authority (EPA)	• Confirmed that the Project would require an EPL and provided several comments and indicative conditions in relation to water, noise, air and waste. • Following its review of the Submissions Report and Amendment Report, the EPA confirmed its initial advice had been addressed and reiterated its previous comments and recommendations. • These matters are discussed further in **Sections 6.3, 6.4** and **6.10**.
Climate and Atmospheric Science (CAS) Branch within Environment Energy and Science Division	• With the release of the *Net Zero Plan Stage 1: 2020-2030 Implementation Update,* the Department also sought advice from CAS to provide targeted advice on GHG emissions estimates, comparison to assumptions used in the 2030 reduction target and 2050 net zero target, and on any additional mitigation measures. • The Department has considered this advice and included recommendations to address concerns raised by CAS. • These matters are discussed further in **Section 6.6**.

Agency	Advice
Mining, Exploration & Geosciences (MEG) Division of the Department of Regional NSW	• Provided a detailed Resource and Economic Assessment for the Project. • Did not raise any concerns and advised that the Project would be an efficient use of resources ensuring an appropriate return to NSW Government including $726 million in royalties (in current dollars) and $10.7 billion total sales revenue (current dollars). • Noted that NCOPL held the appropriate mining titles for the Project and considered that the objects of the *Mining Act 1992* and clause 15 of the Mining SEPP are satisfied. • These matters are further discussed in **Section 6.7.**
NSW Resources Regulator	• Initially requested additional information to assess the suitability of geomorphic design principles for the final landform of the reject emplacement area (REA). • Noted that, similar to the existing Narrabri Mine, surface features would experience the full range of subsidence movements and acknowledged that the three dwellings located over proposed mining areas would be vacated prior to any potential impacts occurring. • Accepted NCOPL's subsequent additional information to confirm subsidence impacts on dwellings had been addressed and recommended that, if the Project is approved, NCOPL design the final landform of the REA using geomorphic principles and ensure negligible instability risk for all landforms. • These matters are further discussed in **Section 6.2** and **6.10.**
Transport for NSW (TfNSW)	• Initially requested additional information on several matters and highlighted its concerns about potential impacts from the increased workforce at the Narrabri Mine on the existing intersection of the Kamilaroi Highway, Kurrajong Creek Road and the Mine Access Road, particularly when the level crossing (LX534) is closed due to coal train movements, resulting in queuing in the Kamilaroi Highway's turning lanes into the Mine Access Road and a potential road safety hazard. • Requested further information following its review of the Submissions Report. • Accepted NCOPL's subsequent additional information in which it acknowledged road safety risks at the intersection and agreed to contribute to the intersection upgrade. • Following review of the draft conditions, TfNSW provided recommendations for the transport conditions, including the intersection upgrade conditions, which have been considered by the Department. • These matters are further discussed in **Section 6.10.**
Department of Primary Industries	
DPI Fisheries	• Did not raise any concerns and noted that subsidence impacts on waterways would be minor.
DPI Agriculture	• Initially requested additional information in relation to potential impacts on agricultural resources and industries. • NCOPL provided additional information in its Submissions Report, including a response to address potential impacts on BSAL. • Following review of the Submissions Report, DPI Agriculture reiterated its comments in relation to the use of potential agricultural land used as biodiversity offsets and requested the Department include conditions preventing offsets located on BSAL. • The Department has considered DPI's comments in **Section 6** and in in its recommended conditions.
NSW Rural Fire Service	• Recommended that a Fire Management Plan be prepared in consultation with the Namoi Fire Control Centre.

Agency	Advice
Heritage NSW	• Considered that the Aboriginal cultural heritage assessment for the Project is adequate and noted that the Project would have minimal impacts on Aboriginal cultural heritage. • Following its review of the Submissions Report, Heritage NSW confirmed it is satisfied with the proposed management approach and acknowledged further opportunities for Registered Aboriginal Parties (RAPs) to be incorporated into biodiversity management and rehabilitation activities, in the post approval stage. These matters are further discussed in **Section 6.9.**
DPE Crown Lands	• Noted that the proposal would include some surface infrastructure located upon or within close proximity to Crown roads. • Indicated that all Crown land and Crown roads within a mining lease must be subject to a compensation agreement issued under section 265 of the *Mining Act 1992*, to be agreed and executed prior to any mining activity taking place. • Advised that any compensation agreement may include conditions requiring the mining leaseholder to purchase Crown land impacted by mining activity. • NCOPL acknowledged these requirements and confirmed it would consult and obtain relevant authorisations prior to any work impacting Crown land.
Subsidence Advisory NSW (SA NSW)	• Noted potential subsidence impacts on a privately-owned partially completed dwelling. • Follow its review of the Submissions Report, SA NSW accepted that NCOPL is currently negotiating acquisition of the partially completed dwelling and advised it had no further comments.
Forestry Corporation of NSW (FCNSW)	• Initially provided comments in relation to proposed electricity transmission line corridors, future consultation with FCNSW on rehabilitation management, requirement for a bushfire management strategy and the potential impacts from subsidence on State forest land. • Following its review of the Submissions Report and Amendment Report, FCNSW provided additional comments in relation to potential flaring in bushfire prone land, locations of monitoring sites and potential impacts from electricity transmission line corridors • NCOPL provided a supplementary response to the additional FCNSW comments and the Department has considered this in **Section 6** and in its recommended conditions.
Narrabri Shire Council (NSC)	• Provided comments in relation to bushfire impacts, road maintenance, continued transport of coal via rail, existing and proposed new VPA, cumulative impacts associated with the Narrabri Gas Project and the inclusion of mitigation measures as proposed in the EIS. • Following its review of the Submissions Report and Amendment Report, NSC confirmed that most of its initial comments had been addressed and provided further comments on the same matters, primarily in relation to proposed conditions.
Gunnedah Shire Council (GSC)	• Noted that, while the Project is located entirely with Narrabri Shire, the EIS identifies impacts for employees residing within the Gunnedah Shire, including potential positive and negative social impacts, impacts from the proposed extended mine life and subsequent use of rail infrastructure and traffic impacts. • Further noted that the EIS acknowledges that approximately 39% of employees (145 people) reside in Gunnedah Shire and commented that it is generally supportive of the proposal and recognises the benefits provided to the wider community, but emphasised the need for ongoing management of social impacts. • Requested that NCOPL enter into a VPA with GSC based on the ratio of employees residing in Gunnedah Shire, and that a suitable VPA condition be included in the consent. • These matters are further discussed in **Section 6.7** and **6.8.**

Agency	Advice
Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC)	• Noted the significance of the Namoi River and its alluvium, springs and other Groundwater Dependent Ecosystems (GDEs) and considered its earlier advice to the Gateway Process in 2019 had not been adequately addressed in the EIS. • Considered that there is still a material risk of impacts to water resources due to the intensive use of groundwater in the region and the predicted impacts from the Project. • Identified a number of areas where it considered additional work is required, including in relation to: – surface water modelling; – consideration of additional mitigation measures to protect water resources; – further groundwater sensitivity modelling to examine a greater range in hydraulic parameters; – expansion of the monitoring network, particularly in areas of suspected groundwater-surface water interaction; – additional monitoring of the effects of groundwater movement on groundwater levels; – further investigation and modelling of brine reinjection in the groundwater system; – additional information on hydrochemistry and treatment of mine affected water before its release into the Namoi River; – address inconsistencies in risk assessment of GDEs; – assessment of groundwater dependence of vegetation communities in the zone of predicted drawdown with consideration of arboreal fauna likely to be impacted; – additional data and information on the ecohydrology of the three identified springs to inform mitigation measures; and – additional sample data to inform potential impacts on stygofauna. • These matters are further discussed in **Section 6.3, 6.4** and **6.5.**

5.4 Public Submissions

Submissions in Support

104. The key issues raised in all submissions from the 2 organisations and 61 members of the public who supported the Project related to its positive socio-economic benefits, especially the continuation of employment for the existing Narrabri Mine workforce. The degree to which this issue dominated all submissions can be seen in **Figure 4**.

105. The great majority of these submissions were from the regional area (between 5 and 100 km from the Project) with a smaller proportion from the broader community (>100 km from the Project).

106. The Submissions Report provided no particular comments on the matters raised by submissions in support of the Project (see Attachment 1 of the Submissions Report).

Submissions in Objection

107. The three organisations which objected to the Project were the Leard Forest Research Node, the Lock the Gate Alliance, and the Boggabri/Baan Baa Landowners.

108. The Leard Forest Research Node raised concerns about the practice of surface to seam degassing of coal seams resulting in the release of greenhouse gases to the atmosphere and biodiversity impacts associated with the clearing of vegetation.

109. The Lock the Gate Alliance raised a number of concerns including about groundwater impacts, impacts to productive agricultural land, surface water impacts including potential surface to seam cracking and

subsidence impacts to watercourses, social impacts, the release of greenhouse gases and biodiversity impacts as a result of vegetation clearing.

110. The Boggabri/Baan Baa Landowners submission raised concerns about the thoroughness of the groundwater assessment, particularly in relation to the exclusion of some bores from the assessment, drawdown impacts and the loss of groundwater resources. Concerns were also raised about the viability of make good provisions provided by the proponent.

111. The Submissions Report gave detailed consideration to the submission received from the Boggabri/Baan Baa Landowners, which is a local landowners' group, and also to a later submission from the same group. While the Submissions Report did not address the other two community group submissions by name, it provided full responses to the issues raised by them (see Attachment 1 of the Submissions Report).

112. The Department also received a number of representations from the community following the exhibition period. These representations raised concerns about surface and groundwater impacts, amenity impacts and the impacts on property values.

5.5 Key Issues Raised in Submissions and Agency Advice

113. The frequency with which issues were raised across agency advice and all submissions (i.e. public and special interest groups), whether supporting, objecting or commenting is displayed in **Figure 4**.

114. **Figure 4** highlights the degree to which socio-economic issues dominated submissions. Given that only 1 submission raised negative socio-economic issues, it is apparent that the dominant issue raised across the totality of submissions was the positive socio-economic benefits of the Project, noted in 64 submissions. **Figure 4** also shows the issues identified by the three objecting organisations. These include the Project's potential groundwater impacts, biodiversity impacts, surface water impacts and GHG emissions.

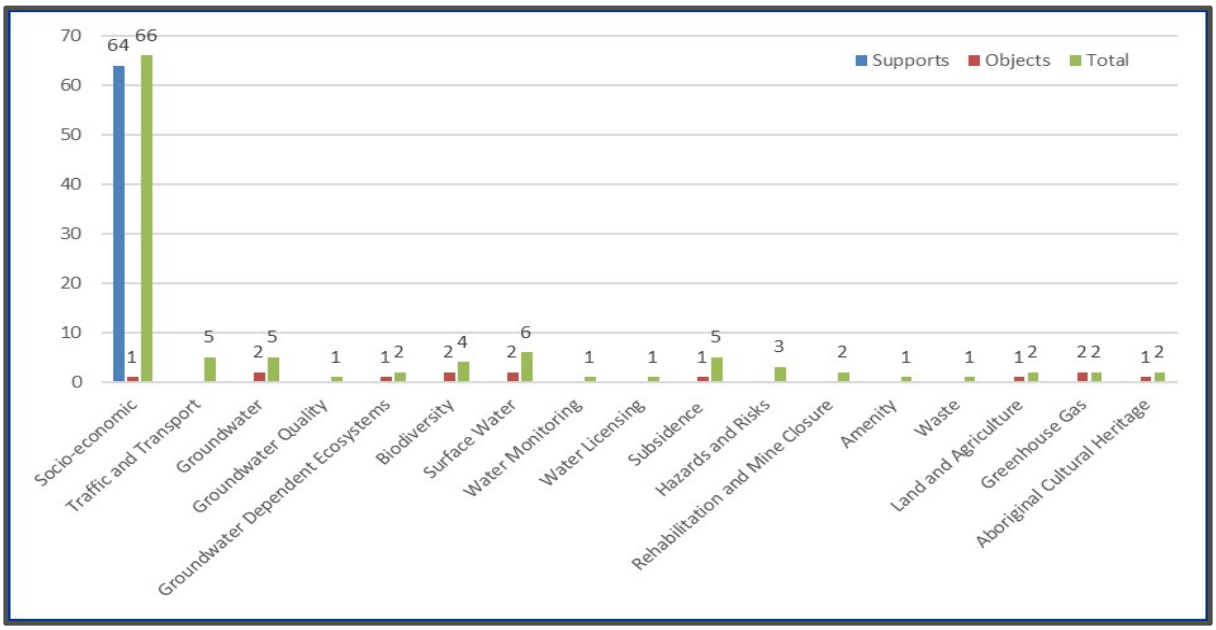


Figure 4 | Frequency of Issues Raised in All Public and Agency Submissions *(Source: Submissions Report)*

5.6 Submissions Report

115. On 22 December 2020, the Department requested that NCOPL prepare a Submissions Report that responded to the issues raised in agency advice and public submissions, along with key assessment issues identified by the Department.

116. On 31 May 2021, NCOPL lodged its Submissions Report with the Department (see **Appendix C**). The Submissions Report noted some minor changes over the Project as exhibited. In particular, NCOPL's refined analysis of the overall 'indicative Surface Development Footprint' led to a proposed reduction of 31 ha in that footprint (from 643.8 ha to 612.8 ha).[1] In addition, relocation of some proposed surface infrastructure would lead to a 2.3 ha reduction in impacts on the threatened flora species Coolabah Bertya. These changes were addressed in much more detail in the accompanying Amendment Report (see **Section 2.4**).

117. The Submissions Report did not contain a revised BDAR. Instead, it reported that NCOPL was undertaking further on-site survey work during April to August 2021 to assess required species credits more accurately for the Glossy-black Cockatoo. A revised BDAR was subsequently submitted in September 2021.

118. The Submissions Report also reported that NCOPL's review of submissions had led to "no change to the mitigation measures presented in [the EIS], except for refining the proposed groundwater monitoring regime to include indicative locations of monitoring bores".

119. Additional community representations from members of the public were received, subsequent to the end of the exhibition period. The community representations raised concerns in regard to groundwater, noise, air quality, surface water and property values. A summary of where the matters raised by the community representations have been addressed is presented in Section 4.2.14 and Table 8 of the Submissions Report.

120. Additional advice on the Submissions Report was sought from agencies and provided to NCOPL for a response. Following discussions with the Department, NCOPL agreed to give additional consideration to the original advices provided by the IESC and DPE - Water. This supplementary information was received from NCOPL dated 21 July 2021 (see **Appendix F**).

5.7 Review by Independent Advisory Panel for Underground Mining

121. On 21 August 2020, the Government established a new independent subsidence advisory panel to provide it with advice regarding new underground coal mining proposals and subsidence-related performance outcomes under mining approvals. This new panel (the Independent Advisory Panel for Underground Mining, or 'Mining Panel') is chaired by Emeritus Professor Jim Galvin.

122. On 16 June 2021, the Department requested the Mining Panel's advice on the Project, with particular consideration of the potential water resource impacts and a focus on groundwater modelling and groundwater resource impacts for neighbouring landholders.

123. The Mining Panel provided its advice to the Department on 20 September 2021. The advice contained a number of conclusions regarding the Project's subsidence impacts and recommendations concerning groundwater and surface water (see **Appendix F**).

[1] NCOPL's final BDAR further reduced this area to 609.5 ha. An additional 70.0 ha was allowed for native vegetation disturbance arising from ponding, surface cracking and electricity transmission line management.

124. NCOPL reviewed the Mining Panel's advice and provided a short response to the Department on 23 September 2021, accepting all of the Panel's conclusions and recommendations. The Department also accepts and supports each of the conclusions and recommendations. The conclusions and recommendations are individually addressed in **Sections 6.2, 6.4** and **6.5**.

6 Assessment

6.1 Introduction

125. The Department considers that the Project is relatively simple to assess compared with many other underground coal mining projects, for the following reasons:

- *Type of project:* A 'brownfields' (i.e. extension) project, rather than a 'greenfields' (i.e. new) project. Many of the key elements of the Project have been subject to previous assessment, and the mine has been operating for over a decade with a range of measures to control or reduce impacts (and no major issues or complaints). The Project does not involve any changes to the proposed rate of coal extraction or processing and very limited changes to the mine's key surface facilities.

- *Environmental context:* The landscape features relatively simple landforms with few significant natural features. The land within the Project area is characterised by a semi-arid climate with ephemeral watercourses. The terrain is gently undulating (generally sloping west to east), and is not deeply incised which can exacerbate subsidence impacts (e.g. as seen in the Southern Coalfield).

- *Surrounding land uses:* The region is characterised by broad acre grazing and dryland cropping, with no irrigated cropping land in the Project area. There are very few community members in close proximity to the Project area, (i.e. only 20 residences within 5 km). The Project is located 25 km away from the nearest town (Narrabri) and 10 km from the nearest village (Baan Baa).

126. However, there are two relatively unique features of the Project, which could lead to associated impacts:
- *Longwall width and length*: The proposed longwalls would be some of the longest (10 km) and widest (400 m) in Australia. This leads to relatively high levels of subsidence, a highly fractured zone above the mine workings, and associated impacts on water resources; and
- *Gas content***:** Narrabri Mine is known as a relatively "gassy" mine[2], which leads to 'fugitive' GHG emissions. To date, the gas emitted from the mine has been very rich in CO_2 and not amenable to flaring i.e.due to the low proportion of methane.

127. The combination of these two features – very long and wide panels, and the 'gassy' nature of the mine – means there is a need for extensive ventilation infrastructure at the surface, which in turn leads to associated impacts on biodiversity.

128. Consequently, the key issues for this assessment are the potential impacts on groundwater, surface water and biodiversity, and GHG emissions.

[2] However, the mines in the Southern Coalfield are generally considered the most 'gassy' in NSW.

6.2 Subsidence Assessment

Introduction

129. Mine subsidence is the movement of the ground following the extraction of coal underground. There are 'conventional subsidence effects' and 'non-conventional subsidence effects', which can lead to 'subsidence impacts' on the both the surface (including natural features like watercourses or built features) and subsurface (including groundwater and interactions with surface water).

130. Given the nature and scale of coal extraction proposed in this Project, there are likely to be subsidence impacts on landscape features, groundwater, surface water and heritage features.

131. The EIS contains a Subsidence Assessment prepared by Ditton Geotechnical Services (DgS), which was peer reviewed by Professor Bruce Hebblewhite [3]. The Subsidence Assessment includes predictions of the 'height of connective fracturing' using methods developed by Ditton and Merrick in 2014 (the 'Geology Model') and a competing model (the 'Tammetta Model').

132. The Mining Panel reviewed the Subsidence Assessment and the peer review report, which endorsed the methodology and predictions of the Subsidence Assessment. While it noted that "*there is a degree of uncertainty associated with all surface subsidence predictions*", it agreed with the findings of the peer review and also stated that it "*agrees with DPIE that [it] does not present any particular difficulties or uncertainties in relation to surface subsidence impacts*".

Subsidence Effects and Impacts

133. 'Conventional subsidence effects' include vertical displacement, tilt, and tensile and compressive strain. When two adjacent points undergo a different amount of vertical displacement, the slope of the ground surface between them changes, which then induces tilt in features located on the surface. Curvature of the ground in an outwards direction results in the ground 'hogging' (i.e. due to tensile strain), and curvature of the ground in an inwards direction results in the ground 'sagging' (i.e. due to compressive strain).

134. 'Non-conventional subsidence effects' include valley closure, 'upsidence' and far-field horizontal movements. These are generally not relevant to this Project as they are mostly associated with shallow depths of cover, steep topography and incised valleys.

135. The key parameters that determine the level of subsidence effects are (i) longwall width, (ii) height of extraction, (iii) depth of cover (i.e. from the surface to the extracted seam), and (iv) chain pillar width (i.e. solid coal pillars remaining between longwall voids). In simple terms, subsidence effects will increase if the longwall width and/or the height of extraction is increased, or depth of cover is decreased.

136. The Project's key subsidence parameters and maximum predicted subsidence effects after the extraction of each of the proposed longwall series are summarised in **Table 4** below.

[3] Bruce Hebblewhite is a principal consultant mining engineer at BK Hebblewhite Consulting and a part time Professor and Chair of Mining Engineering at the University of NSW. He has more than 45 years' experience in mining engineering and related industries.

Table 4 | Maximum Total Conventional Subsidence, Tilt and Curvature

Longwall	Maximum Predicted Conventional Subsidence (mm)	Maximum Predicted Conventional Tilt (mm/m)	Maximum Predicted Conventional Strain (Tensile) (mm/m)	Maximum Predicted Conventional Strain (Compressive) (mm/m)
203	2.80	53	32	34
204	2.80	47	26	28
205	2.80	40	21	22
206	2.80	33	16	17
207	2.80	28	13	14
208	2.80	27	12	13
209	2.80	25	11	12
210	2.79	58	38	40

Natural Landform Features and Biodiversity

137. The surface features overlying the Project's mining domain are relatively simple. The terrain slopes reasonably gently from west to east and is not deeply incised. However, the following landscape features are common in the region and are present to some degree in the Project area:
    - steep rocky slopes (slope gradients 18° to 35° with heights ranging from 6 m to 26 m);
    - rock face features (cliffs between 2 m and 5 m high and > 20 m long); and
    - minor cliffs (cliffs between 5 m and 10 m high and > 20 m long).

138. Subsidence impacts can cause surface fracturing in soils and surface rock outcrops and minor rock falls. Typical crack widths in relatively 'flat' terrain (slopes <18°) are predicted to range from 100 mm to 200 mm, with occasional (<5% probability) cracks up to approximately 350 mm in width in sandy or loamy soils, and approximately 700 mm in clay or rock.

139. Fracturing and rockfalls can adversely affect landscape aesthetics, and cause worker and wildlife safety issues. The Department has previously established a performance measure for the mine to protect these features, which limits the consequences of subsidence to a minor level, as follows:

> Minor environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders, collapse of overhangs, and fracturing) that in total do not impact more than 3% of the total face area of cliffs, 5% of minor cliffs and cliff terraces, 7% of rock face features, and 7% of steep slopes.

140. The part of the Project area which is not already approved for mining (i.e. is outside the current consent area) totals 3,789 hectares (ha). Within this area, there is about 15 ha of steep rocky slope, 0.3 ha of rock face features, and 0.36 ha of minor cliffs.

141. Over the life of the Project, it is predicted that up to 50% of the steep slopes, 16% of the rock face features and 10% of the minor cliffs would be subject to subsidence. This subsidence is predicted to

cause surface cracking and minor rockfalls for between 0.3% to 0.7% of the steep slopes, 0.3% to 4.4% of the rock face features, and 0.6% to 1.4% of the minor cliff faces. There is an increase in the number of these features in the extension area compared to the approved development.

142. The predicted levels of impact are therefore well within the Department's standard performance measure, which has been successfully applied for roughly a decade to protect such features.

143. To ensure that the existing performance measure is met, NCOPL has committed to the following mitigation measures:
- regularly inspect the surface during subsidence development above a given longwall panel and map crack locations and their geometry (widths, lengths, depth, shape), including modern monitoring techniques such as drone surveys above woodland areas;
- repair large surface cracks (i.e. greater than ~50 mm wide) including, ripping or tyning followed by re-seeding, or filling large, deep cracks with free-draining, durable gravel; and
- if necessary, implement adaptive management in mining areas such as leaving a barrier pillar, increasing setback distances from a sensitive area or limit mining to first workings.

144. Based on the subsidence predictions and proposed mitigation measures, the Department considers that potential impacts on cliffs, rock face features and steep slopes can be appropriately minimised and mitigated.

145. The Department has also considered the impacts of subsidence, including surface cracking and ponding, on biodiversity values in **Section 6.5**, with predicted impacts on around 57 ha of native vegetation. This is largely due to surface cracking and shearing of tree roots in areas of lower depth of cover (less than 180m).

Height of Connective Fracturing

146. In recent years, the 'height of connective fracturing' above underground mine workings has emerged as an important issue in assessing subsidence impacts. The fractures created by mining can become conduits for groundwater flow between underground aquifers or to the mine workings, or even lead to permanent diversion of surface water into the mine workings if connective fractures extend to the surface. The accurate prediction of 'height of connective fracturing' and associated 'height of groundwater depressurisation' remains an area of technical development and associated uncertainty.

147. The Subsidence Assessment relied on predictions made using two related methods developed by Ditton and Merrick in 2014, termed the Geology and Geometry Pi-Term Models. The Subsidence Assessment compared the results of these two models (of which it preferred the more conservative Geology Model) with those from a competing model, the Tammetta Model, which is generally considered to be the most conservative model currently used in NSW. The comparisons are summarised in **Table 5** below.

Table 5 | Summary of Subsurface Fracture Model Predictions *(Source: Subsidence Assessment)*

Longwalls	Panel Width (m)	Depth of cover (m)	Depth to A zone (sub-surface fracturing height) (m)	Height of Depressurisation (m)
203 - 210	356.7 - 415.4	180 - 400	22 - 118	447 - 550

148. From **Table 5**, it can be seen that the Geology Model leads to substantially lower predicted maximum heights of connective fracturing than the Tammetta Model's predicted maximum heights of groundwater depressurisation.

149. Under the Geology Model, a narrow constrained zone would be expected to remain in place over the longwalls, varying between ~7 and ~103 m in thickness according to depth of cover. This would either prevent or reduce the permanent loss of surface water to the mine workings. However, under the Tammetta Model, the height of depressurisation is predicted to exceed the depth of cover across the entire Project area. This would lead to the potential for permanent loss of surface water into the mine workings.

150. The Mining Panel considered these varying predictions and essentially concluded that the height of connective fracturing was not a key issue for the Project, given the regional climate, the nature of the overlying surface environment, and the subsurface geology. In that regard, the Panel's report states:

> "In respect of subsidence impacts on the subsurface, even if the height of connected fracturing and complete depressurisation is greater than predicted, it is unlikely to result in a meaningful increase in groundwater inflow to the mine due to the low surface recharge rates (<4 mm/annum) predicted for the outcrop formations above the mine footprint."

151. Nevertheless, the Panel agreed with Professor Hebblewhite's peer review report and proposed that additional piezometric monitoring be conducted above longwalls as they are extracted.

152. The implications of the predictions around height of connective fracturing in relation to impacts on water resources is considered in following sections on Groundwater (**Section 6.3**) and Surface Water (**Section 6.4**).

Summary

153. The proposed longwalls for this Project would be some of the longest (10 km) and widest (400 m) underground panels in Australia. This leads to relatively high levels of subsidence, and a highly fractured zone above the mine workings. However, connective fracturing is generally not a major concern given the semi-arid climate, the nature of the surface environment and the subsurface geology.

6.3 Groundwater

Introduction

154. All underground mines have some level of impact on groundwater resources as the extraction of the coal seam leads to depressurisation and fracturing of the overlying strata, which can affect overlying aquifers.

155. The NSW Government regulates mining-related groundwater issues in two key ways:
- any impacts on 'beneficial' groundwater aquifers must be assessed under the *Aquifer Interference Policy* (AIP)*;* and
- the 'take' of water from groundwater aquifers through groundwater inflows must be licensed under the *Water Management Act 2000* and associated Water Sharing Plans.

156. For this Project, groundwater inflows into the mine workings could cause the following impacts on 'beneficial' groundwater aquifers:
- impacts on regionally important groundwater aquifers; and

- ‘drawdown’ of privately held groundwater bores in the vicinity of the mine.

157. The Project also presents another potential groundwater impact - water quality changes resulting from proposed re-injection of waste brine into the longwall goaf towards the end of mining.

Groundwater Model

158. The EIS contains a Groundwater Assessment for the Project, prepared by Australasian Groundwater and Environmental Consultants (AGE), which was based on a three-dimensional numerical model developed specifically for the Project. The groundwater model builds on four previous groundwater models that have been developed for the mine.

159. The EIS also included a peer review prepared by Brian Barnett of Jacobs[4], which found that the “groundwater assessment and supporting groundwater modelling work … have been carried out in a professional and rigorous manner and meet or exceed current industry standards.”

160. Following exhibition of the EIS, the IESC and DPE - Water expressed a range of concerns about the groundwater modelling and approach to groundwater impact assessment. These were focused on additional data input and data verification. These issues have largely been addressed through the assessment process, including in the Submissions Report and two supplementary responses from NCOPL dated 21 July and 21 September 2021.

161. While the IESC does not have a role in providing any further advice beyond the EIS, DPE - Water has provided two further pieces of advice dated 11 August and 29 October 2021. Its final advice is focused on recommendations for additional work that should be done post-determination, which are discussed in detail below.

162. The Mining Panel held some concerns over the model’s ability to predict (with sufficient certainty) impacts on localised features of interest, as follows:

> “While the groundwater system is finely resolved around features of interest in proximity to the mine, the model is unlikely to provide assurance in relation to impacts on the area of mining on surface water features, stock water bores and groundwater dependent ecosystems, including the springs.”

163. However, these concerns were not such as to prevent the Mining Panel from endorsing the model for assessment purposes, in the following terms:

> “… the ability to predict all local impacts is not essential and … matching spatial and temporal trends is probably sufficient. This has been accepted by the Panel in assessing the model’s applicability as an assessment tool for mining approval.”

164. On that basis, the Department considers that the groundwater model is fit for purpose, appropriately conservative and can be relied upon for the assessment of the Project.

165. Nevertheless, NCOPL has committed to update the Project’s groundwater model two years after commencement of longwall extraction and every five years thereafter. The Mining Panel noted this commitment as being “appropriate subject to no unexpected differences between observed behaviour and modelled behaviour:” However, the Panel also noted:

[4] Brian Barnett is a senior groundwater modeller in Jacobs Group. He has more than 30 years of experience in the groundwater and related industries and was a principal author of the *Australian Groundwater Modelling Guidelines* (2012).

> "If significant impacts on groundwater above the mine are identified, then the Panel recommends reducing the period from 5 years to 3 years for at least the second update to capture the new knowledge acquired. This adaptation requires updating of the groundwater monitoring network to capture above mine impacts more fully, particularly for the first longwalls to be completed after mine extension approval."

166. The Department endorses this proposal and has recommended conditions to give it effect.

Important Aquifers

167. There are two important aquifers which could be impacted by the Project – the 'Namoi Alluvium' and the 'Pilliga Sandstone'. A conceptual geological cross-section in the vicinity of the Project area, showing these aquifers, is shown in **Figure 5**.

168. The AIP establishes rules for 'highly productive groundwater sources', which include the Namoi Alluvium and Pilliga Sandstone. It states that any drawdown of more than 2 m is considered to be more than a 'minimal impact'.

169. The Namoi Alluvium is located more than 6 km east of the Project mining area and is a surficial band of unconsolidated riverine sediments associated with the Namoi River and its tributaries. The Pilliga Sandstone is located adjacent to the western half of the Project area and is dominated by sandstones which are typically porous and permeable. While it is classified as 'highly productive', it is not considered to be an important recharge area for the Great Artesian Basin, due to low rainfall in the region, and this aquifer is not used for irrigation purposes above or near the Project.

170. These two aquifers sit stratigraphically above much 'tighter' strata which contain limited groundwater resources with generally higher salinity. The aquifers in these other geological strata are capable of yielding bore water, but are considered to be 'less productive' aquifers under the AIP. These bores are usually used only for stock watering purposes.

171. In relation to water quantity impacts (i.e. drawdown) on the Namoi Alluvium and Pilliga Sandstone aquifers, the Mining Panel stated that:

> "Importantly the mine area is connected to the [Namoi] alluvium by low hydraulic conductivity units (<0.01 m/d) implying low risk of strong connections between the alluvium and the mine.
>
> Equally important, the mine area is connected to the surface and to the Pilliga Sandstone aquifer by units with very low vertical hydraulic conductivity."

172. The Groundwater Assessment concluded that the Project would meet the AIP's minimal impact requirements for the two highly productive groundwater sources, i.e. Namoi Alluvium and Pilliga Sandstone.

173. In its advice on the Submissions Report, DPE – Water agreed with this conclusion, with particular reference to AGE's statistical analysis of 100 separate groundwater model runs for the Namoi Alluvium. However, DPE – Water considered that the predicted maximum drawdown provided "no margin for error" and recommended "demonstrably reliable early-warning monitoring systems and mitigation measures" to ensure that any impacts above the criterion are avoided. The Department supports this position, which is considered further under ***Monitoring and Management***, below.

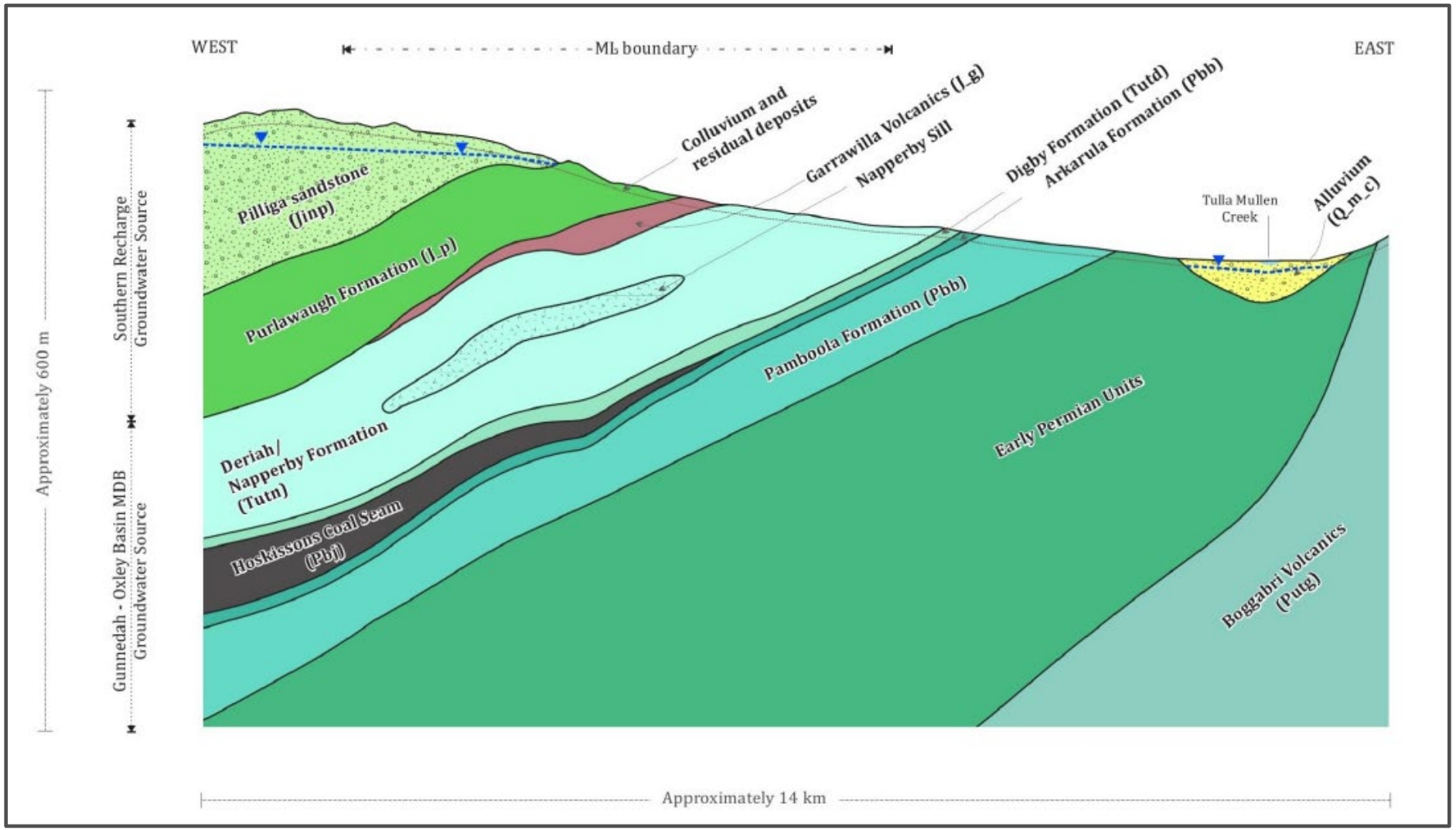


Figure 5 | Conceptual Geological Cross-Section, Showing Key Aquifer Units and Mining Lease boundary *(Source: EIS)*

174. In relation to water quality impacts on the Namoi Alluvium and Pilliga Sandstone aquifers, the IESC and DPE – Water raised concerns about the proposed re-injection of waste brine into the longwall goaf at the end of mining. The IESC sought further assurance that the brine would not migrate upwards from the goaf and potentially flow to the two key regional aquifers. DPE – Water sought clarification over the proposed brine re-injection volumes. These matters were addressed to the satisfaction of DPE – Water through the additional information provided in the Submissions Report.

175. The Mining Panel also carefully considered whether there was any likelihood of re-injected brines migrating from the goaf and reported as follows:

> ".. the flows during groundwater recovery will not transmit the brine and the long-term flow rates through the goaf following recovery will be very low given the very low conductivity of the surrounding rocks and low head gradients. They will likely be countered by density gradients caused by the higher density of the brine. It is therefore reasonable to consider that any brine reinjected into the goaf at the mining depth will effectively be trapped in the mine with little prospect for contaminating any of the surrounding shallow aquifer systems. … It does not seem likely that there will be any significant requirement for rehabilitation of the underground systems to manage groundwater or groundwater quality once mining has been completed."

176. In summary, based on the advice of the Mining Panel and State agencies, the Department considers that the potential water quantity and quality impacts on regionally important groundwater aquifers would not be significant and, importantly, would not exceed the 'minimal harm' test under the AIP.

Private Bores

177. There are more than 2,200 groundwater bores in the broader region, including 1,500 water supply bores. Registered water supply bores are primarily located in the Namoi Alluvium. Outside of this aquifer, groundwater use is much less prevalent and intensive. Privately-owned registered water supply bores in the vicinity of the mine and Project area are predominantly used for stock watering purposes, which reflects the lack of highly productive geological strata and the consequent lack of agricultural and other development to the west.

178. The Groundwater Assessment included the results of a bore census undertaken to confirm the location and use of groundwater bores which might be affected by the Project, which involved visiting the sites of more than 70 bores. However, following public exhibition of the EIS, a local landholders' group (the Boggabri/Baan Baa Landowners) raised strong concerns over the adequacy of this census, particularly to the south of the Project area.

179. As a consequence, NCOPL consulted closely with the members of this group and commissioned AGE to undertake a further round of bore census work ('Round 3'). AGE visited a further 35 bore sites, the great majority of which were located well to the south of the Project area (see **Figure 6**).

180. The initial Groundwater Assessment identified a total of eight privately-owned 'stock and domestic' bores which might be impacted by Project-related drawdowns exceeding the AIP's 'minimal impact' criterion. As a consequence of the more detailed and consultative work conducted in Round 3, the number of impacted 'stock and domestic' bores increased from eight to nine.

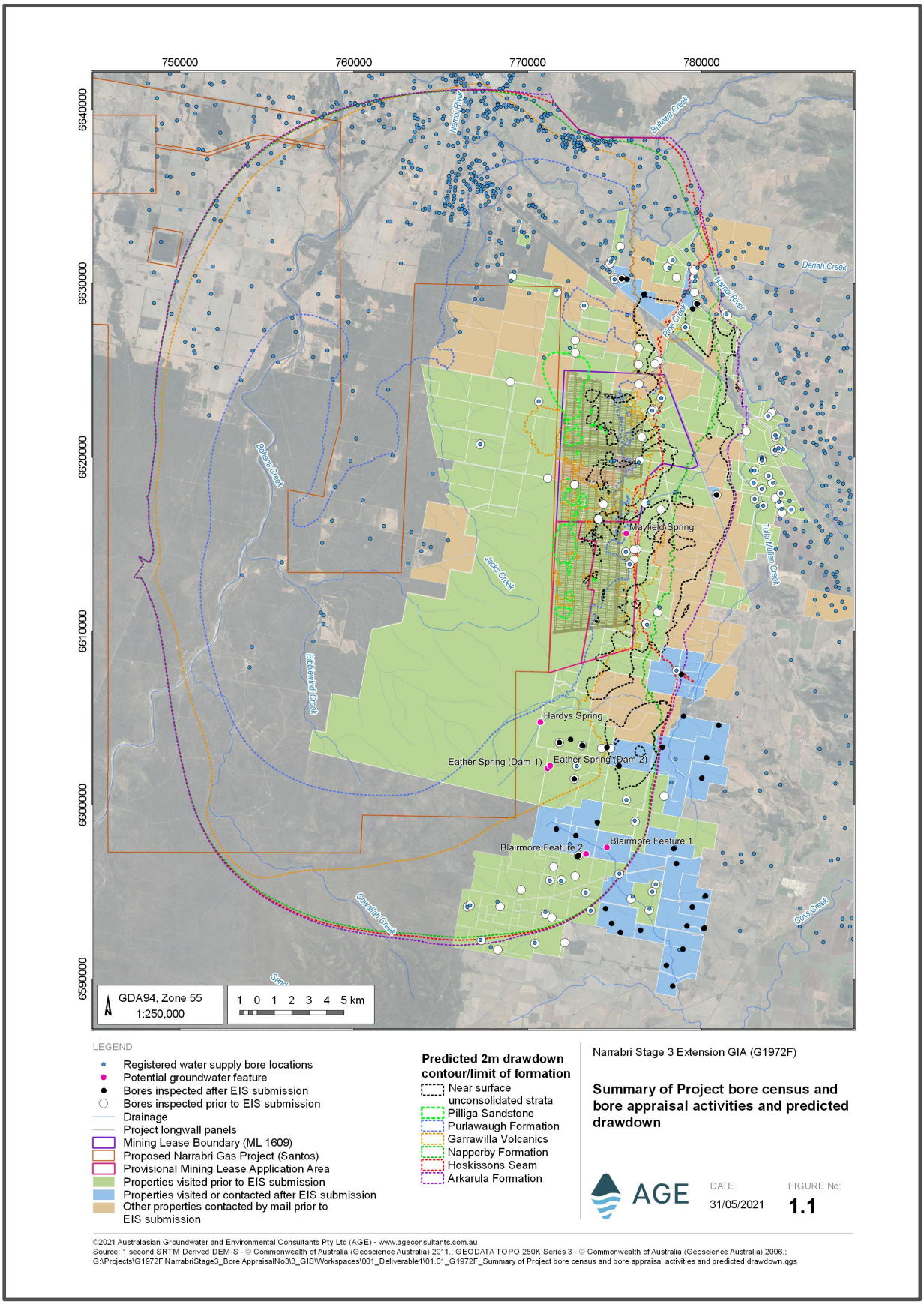


Figure 6 | Final Bore Census and Predicted Drawdown Contours *(Source: Submissions Report)*

181. The extent of likely impact on privately owned bores depends primarily on two factors - how distant they are from the Project and the geological stratum from which the bores draw water.

182. The Mining Panel made limited comment on the potential impacts on groundwater bores, as follows:

> "Most of the other near-surface bores lie outside of the previously mined region and do not present a clear picture of near-surface impacts. There is some evidence in the piezometric data to suggest that near-surface water table impacts are limited to regions close to extracted areas. This could be expected given the low horizontal hydraulic conductivity values for most of the outcrop formations."

183. AGE has predicted that "actual impairment of supply" would occur at only six of these nine bores, since predicted drawdown is a relatively minor proportion of the standing water column in the other three bores. The assessment assumed that where the predicted drawdown was less than 50% of the water column available based on the location of the pump, then there would be reduced likelihood that supply would be affected. Due to the slow rates of anticipated groundwater drawdown, many of these impacts are not expected to occur for decades – in many cases beyond the expected life of the Project. The predicted drawdown across the 9 bores ranges from 2.72 m to 13.11 m.

184. NCOPL has initiated contact with all owners of land containing bores where impacts exceeding the AIP's 2 m criterion are predicted at any time (i.e. even decades into the future). NCOPL has committed to implement make good measures "during the Project's operational phase", through consultation and agreement with the relevant landowners. However, landowners have sought that these arrangements are entered into as soon as possible. It is therefore anticipated that most landowners will take the opportunity for an early resolution of these matters (i.e. within one to two years), rather than waiting many years to finalise their agreement. NCOPL has advised that it has provided copies of draft make good agreements to these landowners and will undertake further consultation.

185. For all private bores predicted to be drawn down by more than 2 m, NCOPL has committed to:
- conduct a groundwater yield test;
- monitor any drawdown as it develops; and
- implement 'make good' measures, which may include:
  - deepening the affected groundwater bore;
  - constructing a new groundwater bore; and/or
  - providing an alternative water supply of suitable quality and quantity.

186. As required under the AIP, NCOPL has also committed to make good measures at any *other* privately owned bore where the AIP's 2 m minimal impact criterion is exceeded (i.e. to other bores than those currently predicted to be impacted).

187. DPE – Water raised no specific concerns regarding impacts on privately-owned bores or the proposed make good measures in its advice regarding the Submissions Report. It also supports NCOPL's decision to go beyond the requirements of the AIP, which technically only require 'make good' provisions once Project-related impacts have actually exceeded 2 m drawdown.

188. Some local landholders (in particular the Baan Baa/Boggabri Landowners) requested that negotiation of make good agreements was completed by NCOPL prior to Project determination. While the Department does not consider this to be necessary, it has instead recommended conditions requiring NCOPL to use its "best endeavours" to finalise within two years of commencing development under the

consent make good agreements with the owners of the nine bores where impacts are predicted to exceed 2 m drawdown.

Groundwater Licensing

189. The Groundwater Assessment provided predictions of total groundwater inflows to the mine across the mine life. These inflows reflect groundwater directly intercepted by the Project, assuming concurrent development of the Narrabri Gas Project.

190. Following Project commencement, predicted inflows would increase relatively rapidly due to construction of underground mine roads to provide access to the new longwall panels. Inflows would peak at 2,406 ML/year (an average of 6.6 ML/d) in 2040 before falling slightly during the last three years of mining. Average inflow during Project life would be about 1,950 ML/year.

191. Neither the IESC, DPE – Water nor the Mining Panel raised significant issues with respect to the groundwater model's predictions of groundwater inflows to the mine.

192. The predicted annual groundwater volumes required to be licensed during the life of the Project and following mine closure are shown in **Table 6**. NCOPL currently holds sufficient WALs in three affected water sources listed in **Table 6**, but not in the other two, being the:

- Gunnedah Oxley Basin MDB Groundwater Source; and
- Lower Namoi Groundwater Source.

193. The EIS reported that, for the Gunnedah Oxley Basin MDB Groundwater Source, WAL entitlements would be transferred to Narrabri Mine from other nearby Whitehaven mines, and that the very limited requirement for the Lower Namoi Groundwater Source would be purchased via the water licence trading market.

Table 6 | Groundwater Licensing Requirements for the Project *(Source: EIS)*

Water Sharing Plan	Water Source (Management Zone)	Entitlement (Shares) Held by NCOPL	Peak Volume Requiring Licensing During Mining (ML/year)^	Peak Volume Requiring Licensing Post-mining (ML/year)^
NSW Murray Darling Basin Porous Rock Groundwater Sources 2020	Gunnedah Oxley Basin	1,221	2,310	2,310
NSW Great Artesian Basin Groundwater Sources 2020	Southern Recharge Zone	248	42	88
Namoi Alluvial Groundwater Sources 2020	Upper Namoi Zone 5	260	10	64
	Lower Namoi	Nil	0	1
Upper Namoi and Lower Namoi Regulated River Water Sources 2016	Upper and Lower Namoi	20 (High Security) 658 (General Security)	44*	193

194. In its initial advice, DPE – Water requested clarification of WAL entitlements in the Gunnedah Oxley Basin MDB Groundwater Source held by Whitehaven at its other mining operations and confirmation that these other mines would not be 'left short' should transfers to the Project take place. NCOPL provided a full list of these entitlements in its Submissions Report. DPE – Water then accepted that the proposed transfer was "viable", based on existing usage at the other mines.

195. NCOPL then provided further information indicating that in 2040 it would have surplus entitlements (across all its operations) in the Gunnedah Oxley Basin MDB Groundwater Source.

196. In its final advice dated 29 October 2021, DPE – Water recommended that, following any consent granted by the Commission, NCOPL prepare a strategy demonstrating that it would hold sufficient water entitlement to account for the Project's operational and post-operational water take, while also demonstrating equivalent capacity across all other Whitehaven mines.

197. The Department considers that predicted groundwater WAL entitlements for the Project have been appropriately modelled and that NCOPL would be able to obtain all necessary entitlements.

Monitoring and Management

198. Both the IESC and DPE – Water considered that the monitoring commitments in the EIS should be expanded, particularly in terms of additional groundwater monitoring above the proposed longwalls and increased regional monitoring in hard rock formations above the Hoskissons Seam.

199. NCOPL partially addressed these requests in its Submissions Report, and then provided substantial additional detail in later correspondence dated 21 July 2021. NCOPL's currently proposed groundwater monitoring regime is set out in detail in that letter's Attachment 4.

200. In summary, the revised groundwater monitoring regime includes:
- continuing the existing groundwater monitoring of water levels and water quality, including continuous automated monitoring from a network of Vibrating Wire Piezometers (VWPs);
- establishing six sets of shallow and deep monitoring bores at indicative locations in the vicinity of Pine, Kurrajong and Tulla Mullen Creeks;
- establishing an additional subsidence calibration borehole (nominally above LW 203 or LW 204); and
- implementing continuous monitoring of TDS, pH and temperature in groundwater inflows.

201. DPE – Water found this revised groundwater monitoring regime to be acceptable.

202. The Mining Panel gave careful consideration to NCOPL's revised groundwater monitoring regime. The Mining Panel recommended that "three multilevel VWP monitoring sites be prepared", rather than the single site then proposed by NCOPL. NCOPL accepted this and the Department has recommended conditions to give it effect through expanded Water Management Plan conditions.

203. Consequently, the Department considers that NCOPL's currently proposed groundwater monitoring regime for the Project is appropriate and sufficiently comprehensive. It would support the regular review and updating of the Project's groundwater model and improve its accuracy. It would therefore support refined predictions of water take from the fractured rock aquifers overlying and surrounding the Project area.

204. The Department also considers that there would be ongoing opportunities to 'fine tune' the groundwater monitoring regime during finalisation of the site's overall Water Management Plan, as well during development of the Water Management Plan component of each Extraction Plan.

Summary

205. The Department considers that the two regionally important aquifers – the Namoi Alluvium and Pilliga Sandstone – would not experience any significant water quantity or quality impacts, and that predicted impacts would not exceed the AIP's 'minimal harm' test.

206. There are nine private groundwater bores that are predicted to experience more than 2 m of drawdown, with six of these predicted to experience impairment of water supply. While some of these impacts may

not occur for decades, NCOPL has initiated contact with all these landowners and committed to implement make good arrangements. The Department has proposed conditions which strongly encourage NCOPL to make these arrangements within two years of commencing the Project.

207. The Department considers that NCOPL would be able to obtain all necessary entitlements for the predicted groundwater take, which reaches a peak of 2.65 gigalitres per year.

6.4 Surface Water

Introduction

208. The potential impacts on surface water that require consideration for this Project are:
- *Surface water losses*: from overland flows and/or stream flows, which could be:
  - 'permanent losses' through connective fracturing into the mine workings; or
  - 'diversions' into the surface fracture network, which may re-emerge downstream or end up in shallow aquifers;
- *Water quality impacts*: which might occur due to:
  - increased sediment loads in watercourses resulting from stream geomorphology changes like erosion or scouring; or
  - uncontrolled discharges or overflows from the brine storage dams.

209. Any surface water 'take' must also be licensed under the *Water Management Act 2000* and associated Water Sharing Plans.

Catchment Context

210. Narrabri Mine is located within the catchments of Kurrajong and Pine Creeks. Pine Creek and its tributaries traverse much of the northern series of longwall panels, before entering the Namoi River. Kurrajong Creek Tributary 1 and its tributaries traverse the southern series of longwall panels before flowing into Kurrajong Creek to the east of the Mine's Pit Top Area.

211. Within the Project area, Pine and Kurrajong Creeks and Kurrajong Creek Tributary 1 and Tulla Mullen Creek Tributary I are all 3rd order streams. East of the Project area, Kurrajong Creek and Tulla Mullen Creek are 4th order and 5th order streams, respectively. The Project area also contains a network of smaller 1st and 2nd order streams which feed the 3rd order streams.

212. The climate is semi-arid, with a long term mean of c. 600 mm annual rainfall. Rainfall is commonly in the form of short storms, which lead to short-term runoff and flows in the drainage channels.

213. All creeks affected by the Project are ephemeral with minimal to no baseflow. These streams are generally not deeply incised and in their lower reaches are characterised by open channels and sandy bed sediments.

Surface Water Model

214. The EIS contains a Surface Water Assessment for the Project, prepared by WRM Water & Environment Pty Ltd (WRM). The Surface Water Assessment was subject to a peer review by Emeritus Professor Tom McMahon, who concluded that the Surface Water Assessment was "completed in a professional and detailed manner, and the conclusions in the Report are appropriately supplemented by suitable modelling studies carried out by the consultant."

215. The Surface Water Assessment did not include any modelling of the surface water environment or the impacts of the Project on surface water flows.

216. The absence of such modelling was of concern to the IESC, which considered that:

> "surface water modelling informed by baseline stream gauging is still required to assess water loss from surface waters due to groundwater drawdown and from cracking and ponding, and potential changes in runoff generation processes due to increased surface depressions, under a range of climatic scenarios."

217. NCOPL's position in response was that: "Given the predicted [streamflow] losses are negligible, a very accurate and reliable stream gauge would be required to predict a change, which is not practical for the local waterways".

218. The Mining Panel accepted NCOPL's position, in the following terms:

> "Due to the ephemeral nature of these creeks and the low expected frequency of surface-seam fracturing, it is unlikely that measurable impacts to these creek flows (losses or changes to flow regime) will occur. Predictive modelling is possible but, considering the absence of surface flow data for model calibration and validation, surface flow modelling would be highly theoretical and unlikely to be accurate enough to usefully predict the potential for flow losses. The Panel therefore agrees with the Applicant's Response to DPIE Water and IESC Submission (2021) that there will be no benefit in undertaking predictive surface flow modelling".

219. The Mining Panel's key conclusions regarding the Surface Water Assessment were that:

> "The surface water assessment for the project is high-level and most of the risk management is deferred to an updated Water Management Plan. There are significant uncertainties and risks, principally related to erosion, uncontrolled discharges, water quality changes and impacts on GDEs, which require attention in that Plan. The semi-arid, ephemeral nature of the project area, with no widespread connection between surface water and groundwater, makes it more difficult and less critical to accurately predict or measure surface water losses from creeks than in more humid and perennial systems. The Applicant is justified in its view that predictive surface water modelling and installation of accurate flow measurements in creeks are not suitable in this case."

Surface Water Losses

220. As the EIS did not include any modelling of surface water flow impacts, NCOPL's predictions of surface water losses were based on its experience of surface fracturing to date.

221. This prediction methodology essentially involved:
- DGS provided detailed estimates of surface crack length, depth and volume for each longwall;
- WRM then assumed, based on advice from NCOPL, that remediation of surface cracks in excess of 50 mm width would be completed within six-months of their initiation and that such cracks would then no longer capture surface runoff;
- WRM considered that all water captured in cracks would flow down-gradient along those cracks until it reached a watercourse transecting the Project area, where it may be able to pond and eventually infiltrate (rather than to continue as an uninterrupted surface flow); and
- WRM considered the frequency of runoff events and assumed that all cracks were filled with water twice during each 6-month period.

222. Based on this methodology, the predicted annual surface water losses are:
- 3.5 ML for first/second order watercourses; and
- 0.7 ML for third order watercourses (i.e. Kurrajong Creek, Kurrajong Creek Tributary 1 and Tulla Mullen Tributary 1).

223. The predicted total of 4.2 ML/year is negligible when compared to WRM's assessed annual runoff from the Project area, being 5,524 ML/year.

224. The Mining Panel gave limited consideration to the scale or significance of surface water losses caused by subsidence fracturing. As explained earlier, the Panel noted that even if "the height of connected fracturing and complete depressurisation is greater than predicted, it is unlikely to result in a meaningful increase in groundwater inflow to the mine due to the low surface recharge rates (<4 mm/annum) predicted for the outcrop formations above the mine footprint."

225. Nevertheless, the Mining Panel also recommended that:

> "Formal records of creek flow conditions should be initiated at selected sites."
>
> "Alternatives to measuring or predicting creek flows should be proposed for purpose of supporting water take licensing."

226. NCOPL has accepted the Mining Panel's recommendations. The Department supports both recommendations and has proposed conditions to give them effect.

Water Quality Impacts

Increased sediment loads

227. In terms of runoff water quality, the key potential impact of the Project is increased sediment loads in watercourses resulting from erosion caused by:
- stream geomorphology changes; or
- construction and use of surface infrastructure (including roads and tracks, drill pads and larger infrastructure such as ventilation shafts and the Southern Mine Water Storage).

228. The Subsidence Assessment assessed potential stream geomorphological impacts, including ponding and potential for erosion, through a detailed digital elevation model.

229. Overall, the Project's impacts on stream geomorphology would be limited due to the relatively gently sloping terrain drained by a series of small, ephemeral 3rd order streams that are not deeply incised and which are fed by 1st and 2nd order tributaries in a semi-arid landscape.

230. The Surface Water Assessment contains plan views and longitudinal profiles for the two key 3rd order watercourses in the Project area – Kurrajong Creek and Tulla Mullen Creek Tributary 1. Erosion and ponding on these watercourses would generally be minor, as the existing slopes are gentle and the expected changes in slope (±1.5º) are small.

231. Both the IESC and DPI – Water expressed concerns over potential erosion, particularly risks associated with changes of slope or fractures in watercourses. The Mining Panel also raised some concern at the limited specific treatment of erosion within the Surface Water Assessment, and recommended:

> "Further monitoring and assessment will be an essential part of the updated Water Management Plan including additional water quality data, details of controls, and erosion and water quality performance measures, indicators and Trigger Action Response Plans (TARPs)."

232. The Department agrees with this position and notes that it is usual practice for erosion, ponding and sedimentation to be primarily controlled through the development and implementation of a series of operational management plans, particularly where the risks are relatively low. The management regime is discussed under ***Monitoring and Management*** below.

Uncontrolled discharges

233. The Project would not change the catchment flowing to the existing Pit Top Area's water management system. The EIS states that wet weather discharges from licensed discharge points would comply with the water quality limits in the existing EPL 12789.

234. The Surface Water Assessment's water balance modelling calculates that the mine's water management system would minimise the risk of uncontrolled releases from the Pit Top Area. It concludes that there is <1% chance of an uncontrolled release of runoff from the Pit Top Area and predicts "no uncontrolled release" of brines from the existing or proposed brine storage dams.

235. Hence, the Surface Water Assessment and EIS conclude that the Project would not adversely affect surface water quality in downstream receiving waters.

236. The EPA expressed no particular concerns about these assessments. Rather, it stated its standard policy position that: "The capacity of the mine water and "Pit Top Area Runoff" management system must be designed to maintain sufficient storage to achieve no managed overflows of wastewater, brine or effluent..." and that all EPL requirements regarding discharges must be met.

237. Nevertheless, the Mining Panel expressed some concern over the reliance of the water balance modelling on the previous 131 years of available rainfall records (as against worst case scenario modelling), and recommended that:

> "Improved modelling of the likelihood of uncontrolled discharges should be included in future updates to the water balance model."

238. NCOPL has accepted the Mining Panel's recommendation. The Department also supports it and has proposed conditions to give it effect.

Climate change effects

239. The Surface Water Assessment gave brief consideration to the potential effects of climate change on the Project's water management requirements. The Surface Water Assessment considered that: "The implications of climate change predictions on water management are unlikely to be significant over the Project life (i.e. to 2044) because they are small relative to high natural climatic variability."

240. The IESC accepted the Surface Water Assessment's assessment of climate change in respect of water management over the Project life, but considered that further consideration was required in respect of potential long-term impacts on Namoi River flows. NCOPL's response drew attention to the fact that the Namoi River's flows are dominated by regulated releases from Keepit Dam, rather than by baseflow from the Namoi Alluvium.

241. No other agency expressed concerns over the potential impacts of climate change on surface water management at the Project.

242. The Department considers that climate change may cause variations in rainfall, temperature, storm and drought frequency. These potential changes may have implications for operational management of the

Project, particularly in managing rehabilitation of disturbed areas and managing storm runoff and dam capacity.

243. However, these are relatively straightforward operational matters that are well within the capacity of NCOPL to address. The development and regular review of operational management plans (see ***Monitoring and Management***, below) and the EPA's licensing requirements represent regular opportunities to 'fine tune' management of these matters.

Surface Water Licensing

244. The Project is located within the Lower Namoi Regulated River Water Source, governed under the *Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2020*, and within the Eulah Creek Water Source, governed under the *Water Sharing Plan for the Namoi and Peel Unregulated Water Sources 2012*.

245. The EIS predicts that the Project would require up to 44 ML/year (during its operational life) and up to 193 ML/year (during post-mining peak drawdown) from the Lower Namoi Regulated River Water Source. NCOPL already holds a General Security entitlement of 658 ML/year as well as 20 ML/year High Security entitlement in this water source. Consequently, NCOPL is predicting that its surface water licensing requirements can be readily met.

246. As discussed earlier, the final advice from DPE – Water recommended that NCOPL ensure that it is able to adequately monitor and account for all groundwater and surface water take.

247. The Mining Panel also made recommendations on this matter, which were accepted by NCOPL, regarding improved monitoring and prediction of surface water take, being:

> "Formal records of creek flow conditions should be initiated at selected sites."
>
> "Alternatives to measuring or predicting creek flows should be proposed for purpose of supporting water take licensing."

248. The Department supports both of the Mining Panel's recommendations and has proposed conditions to give them effect. The Department is satisfied that the Project's surface water licensing requirements are not excessive and, subject to the implementation of the Mining Panel's recommendations, are well capable of being adequately predicted, monitored and accounted for using existing WAL entitlements.

Monitoring and Management

249. The Department has standard conditions for monitoring and managing impacts on surface water resources potentially affected by underground coal mining. These conditions are focused on:
- requiring an overall site Water Management Plan, including a component Soil and Water Management Plan and Surface Water Management Plan;
- setting strict performance measures;
- obtaining approval of Extraction Plans; and
- including within every Extraction Plan a component Water Management Plan, Land Management Plan and TARPs designed to ensure achievement of performance measures.

250. In addition to these standard conditions, the Department is recommending further requirements for the mine's Water Management Plan, including that:
- formal records of creek flow conditions should be initiated at selected sites;

- alternatives to measuring or predicting creek flows should be identified to inform surface water take licensing requirements; and
- improved modelling of the likelihood of uncontrolled discharges should be included in future updates to the mine's water balance modelling.

251. The Department considers that its proposed requirements regarding monitoring, management and remediation of subsidence impacts resulting from the Project are robust, reasonable, comprehensive and appropriate. Both the Mining Panel and the Department consider that detailed, predictive surface water modelling is not required.

252. Any surface water quantity or quality impacts are likely to be very minor, and the Department considers that NCOPL would be able to obtain all necessary entitlements for the predicted surface water take.

Summary

253. The Project is located in a gently sloping landscape with a semi-arid climate. All watercourses affected by the Project are ephemeral. Predicted surface water take is therefore limited - up to 44 ML/year during operations and up to 193 ML/year post-mining.

6.5 Biodiversity

Introduction

254. As a result of the gassy nature of the Hoskissons Seam and the consequent need for mine ventilation and gas extraction for mine safety, the Project requires a comparatively large area of surface disturbance compared to other underground mines in NSW. Some 617 ha of additional native vegetation and habitat for threatened species would be required to be progressively cleared, or else impacted by subsidence.

255. However, the Department notes that, as this is an extension of an existing mine and the existing pit top/ mine infrastructure area would continue to be used, there are efficiencies and benefits compared to a greenfield mining operation.

256. The EIS contains a BDAR prepared by Resource Strategies in accordance with the Biodiversity Assessment Method (BAM), (OEH, 2017) and the SEARs for the Project. The BDAR exhibited with the EIS was substantially revised to address BCS's submission. The final BDAR, submitted on 20 September 2021, is the basis of the following assessment. Both the original BDAR and the final BDAR were peer-reviewed by Dr Colin Driscoll of Hunter Ecology."

Ecological Overview

257. The western portion of the Project area consists of woodland vegetation adjoining an extensive area of native vegetation within Jacks Creek State Forest, Pilliga East State Forest and neighbouring reserves. The eastern portion consists of semi-cleared, relatively flat agricultural land. The Project area is elevated in the west and lower in the east and drained by ephemeral creeks, with rocky outcrops occurring in scattered locations.

258. The Plant Community Types (PCTs) proposed to be cleared are all widely occurring in the region. Thirteen PCTs were identified within the Project area and surrounds, several present in both woodland form and derived native grassland (DNG) form (see **Tables 7** and **8** and **Figure 7**).

259. Flora and fauna baseline surveys were conducted by AMBS Ecology & Heritage (AMBS) over a study area of some 5,426 ha, encompassing all the southern series of longwalls and the surrounding footprint of existing or proposed mining leases.

260. No threatened ecological communities (TECs) listed under the BC Act occur within the Project area. One TEC listed under the EPBC Act occurs in relatively small areas of the Project area, namely the *Poplar Box Grassy Woodland on Alluvial Plains endangered ecological community*. Ten 'species credit species' were found in habitat either within or adjoining the proposed indicative Surface Development Footprint.

261. No threatened species listed under the *Fisheries Management Act 1994* potentially occur in the Project area. However, the *Lowland Darling River aquatic ecological community*, listed as endangered under that Act, includes the Namoi River and all its associated tributaries, such as Kurrajong, Tulla Mullen and Pine Creeks in and adjacent to the Project area.

Surface Infrastructure

262. Clearing is required for the installation of mine ventilation and gas management infrastructure, services corridors and access tracks, exploration and service boreholes, pre-conditioning of resistant strata for mine safety, and water management infrastructure. In particular, the surface infrastructure is required to manage gas from the underground workings to provide a safe working environment., including service boreholes (typically spaced every 300 m) to convey drained gas from underground workings prior to longwall mining to the surface. Gas drainage from the goaf above the longwall panel after mining has occurred is also required, with separate bore holes drilled approximately every 40 m with clearing of access tracks required.

Avoidance and Mitigation

263. NCOPL undertook detailed micro-siting of surface infrastructure to avoid key habitat features. For example, the Department notes that NCOPL's proposed mine plan for LW 204 and LW 205 incorporates a setback from Bulga Hill, a known topographic feature with rocky outcrops which provide good habitat for both Large-eared Pied Bats and Eastern Cave Bats. The proposed setback distances are anticipated to result in negligible subsidence effects at Bulga Hill.

264. In addition, surface infrastructure is proposed to avoid vegetation where possible and NCOPL has committed to ongoing review of the disturbance footprint through detailed design through the Extraction Plan process to further reduce impacts, with any disturbance to be progressively rehabilitated. NCOPL would also continue to maximise the use of UIS pre-mining gas drainage where feasible, which would reduce surface disturbance impacts near creeks and drainage lines with disturbance targeted towards cleared areas and DNG.

265. As described above, the Project was amended to further avoid impacts on woodland, with a reduction of 33 ha woodland, 18 ha of derived native grassland and 0.7 ha on Belah Woodland, a highly cleared PCT in the bioregion.

266. Further, NCOPL would undertake progressive rehabilitation during the Project life of direct clearing of native vegetation and also remediation of indirect subsidence impacts on biodiversity (such as ponding and tree die back from surface cracking). The Department has recommended a condition requiring progressive rehabilitation as soon as reasonably practicable following disturbance. Recent

amendments to the *Mining Regulation 2016* have also introduced standard conditions for mining leases requiring that rehabilitation is to occur as soon as reasonably practicable following disturbance.

Direct Clearing

267. There are a limited number of major surface infrastructure items required for the Project - principally the two new ventilation complexes and the Southern Mine Water Storage. The great majority of clearing would instead result from surface disturbance associated with progressive development of the Project's longwalls over the 23-year mine life, including disturbance associated with gas management infrastructure; exploration, service and pre-conditioning boreholes; and services corridors and access tracks.

268. However, the precise location and disturbance footprint would be determined by detailed mine planning during operations, and through the submission of Extraction Plans. Accordingly, although the EIS has assessed the impacts based on the 'indicative Surface Development Footprint', NCOPL is seeking some flexibility in the actual Surface Development Footprint.

269. The company would track actual native vegetation/habitat clearance against the indicative Surface Development Footprint and biodiversity credits. Any proposed native vegetation/habitat clearance outside of the indicative Surface Development Footprint or beyond the biodiversity credit allowance would trigger a review of the proposed activity, the relevant Project approval documentation and the impact on biodiversity values.

270. The final BDAR reports that the total amount of *direct* clearing required for the Project is around 1,226 ha. This total includes 616.4 ha of previously approved surface disturbance associated with the Stage 2 approval.[5] Therefore, the final area of *additional* surface disturbance requiring assessment and approval under the Project is around. 609.5 ha[6], with around 547 ha classified as native vegetation (comprising around 422 ha of woodland and c. 125 ha of derived native grassland). The PCTs affected are shown in **Figure 7** and listed in **Table 7**.

271. The BDAR split this clearing into six phases based on progression of the longwalls, including clearing associated with land clearance for development, predicted subsidence ponding and partial clearing for electricity transmission line safety. The surface disturbance associated with longwall operations would be followed by progressive mine rehabilitation to reconnect habitat (see **Section 6.10**).

Indirect Impacts

272. The BDAR also considered *indirect* impacts due to mine subsidence, which may lead to surface cracking, ponding and erosion. The other key cause of indirect impacts would be slashing and related activities required for management of the new electricity transmission line corridor. All other potential causes of indirect impacts, as well as 'prescribed biodiversity impacts' listed under the BC Act were also considered.

[5] The approved disturbance area for Stage 2 is 750 ha and the current Stage 2 layout is c. 666.8 ha. Of this, c. 616.4 ha would be cleared for the Project. 210.5 ha of native vegetation clearing is approved under Stage 2, based on 2009 vegetation mapping. The current footprint indicates that only c. 200 ha would be cleared.

[6] In the original BDAR, this figure was reported as 643.8 ha. Following Departmental requests to carefully consider the extent of clearing required for the Project, NCOPL's Amendment Report and the final BDAR reduced this area to 609.5 ha.

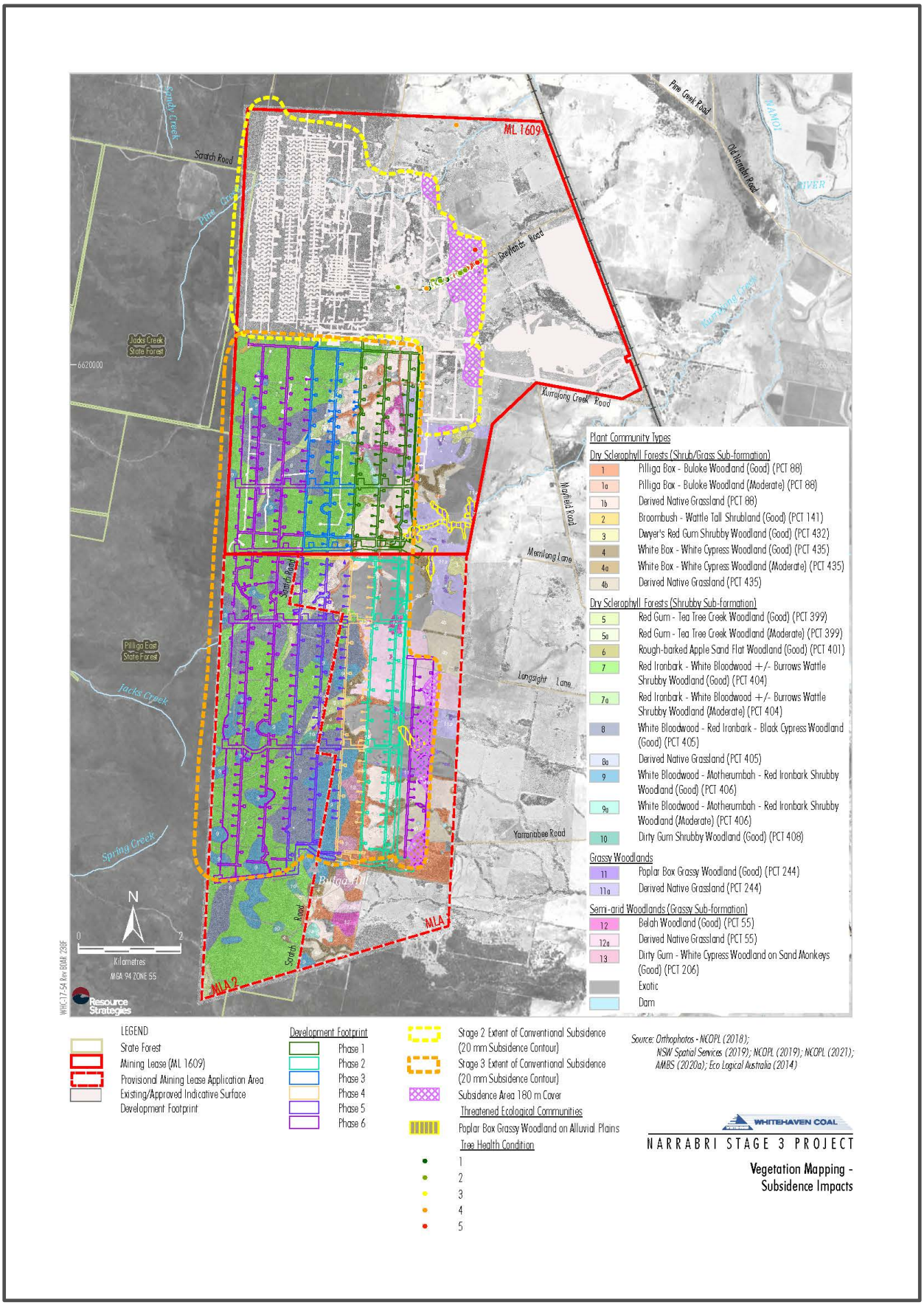


Figure 7 | Vegetation Mapping and Project Indicative Surface Disturbance Footprint *(Source: Revised BDAR)*

Table 7 | PCTs Impacted by the Project and Ecosystem Credit Requirements *(Source: BDAR)*

Vegetation Community	Veg Zone	PCT Code	Ha Affected	Ecosystem Credits Required
Pilliga Box – Buloke Woodland *(Good)*	1	88	49.2	1,118
(Moderate)	1a		0.2	3
(Derived Native Grassland)	1b		70.5	817
Broombush – Wattle Tall Shrubland *(Good)*	2	141	0.5	8
Dwyer's Red Gum Shrubby Woodland *(Good)*	3	432	0	0
White Box – White Cypress Woodland *(Good)*	4	435	28.2	513
(Moderate)	4a		0	0
(Derived Native Grassland)	4b		22.6	45
Red Gum – Tea Tree Creek Woodland *(Good)*	5	399	11.9	319
(Moderate)	5a		0.9	13
Rough-barked Apple Sand Flat Woodland *(Good)*	6	401	4.3	111
Red Ironbark – White Bloodwood +/- Burrows Wattle Shrubby Woodland *(Good)*	7	404	192.5	5,193
(Moderate)	7a		2.0	29
White Bloodwood – Red Ironbark – Black Cypress Woodland *(Good)*	8	405	95.8	2,116
Derived Native Grassland	8a		0.7	9
Bloodwood – Motherumbah – Red Ironbark Shrubby Woodland *(Good)*	9	406	35.5	834
	9a		0.9	18
Dirty Gum Shrubby Woodland *(Good)*	10	408	0.1	3
Poplar Box Grassy Woodland *(Good)*	11	244	18.5	364
Derived Native Grassland	11a		24.2	79
Belah Woodland *(Good)*	12	55	7.6	239
Derived Native Grassland	12a		49.0	568
Dirty Gum – White Cypress Woodland on Sand Monkeys *(Good)*	13	206	1.6	48
Totals			**616.7**	**12,447**

Note: Blue shading indicates PCTs which may be facultative GDEs in the study area.

273. The overall area of native vegetation requiring offsetting as a result of indirect impacts was assessed in the BDAR as totalling 70 ha; with 53.5 ha predicted to be impacted by surface cracking, 12.9 ha impacted by electricity transmission line management and 3.6 ha predicted to be impacted by ponding.

Ecosystem Credit Requirements

274. **Table 7** also sets out the BDAR's assessment of the Project's ecosystem credit requirements arising from both direct clearing and indirect impacts, for each PCT and in total. In correspondence dated 14 October 2021, BCS indicated that it was "satisfied with the approach taken" to address the concerns expressed in its original advice. It recommended that the upper quantum for all credit requirements is included in consent conditions.

Species Credit Requirements

Terrestrial Species

275. Ten 'species credit species' were found in habitat either within or adjoining the proposed indicative Surface Development Footprint. **Table 8** sets out the BDAR's assessment of the Project's species credit requirements. In correspondence dated 14 October 2021, BCS indicated that it was "satisfied with the approach taken" to address the concerns expressed in its original advice. It recommended that the upper quantum of all credit requirements (including species credits) is included in consent conditions.

Table 8 | Threatened Species Impacts from Direct Clearing *(Source: BDAR)*

Species	BC Act status	Development Phases Affected	Ha of Habitat Affected*	Species Credits Required
Coolabah Bertya	V	3, 6	15,345 plants	46,035
Spiny Peppercress	V	1 to 6	57	1,731
Tylophora linearis	V	1 to 6	422	13,607
Pale-headed Snake	V	1 to 6	475.2	14,452
Glossy Black-Cockatoo	V	2 to 6	418.5	13,322
Koala	V	1 to 6	490.2	14,796
Eastern Pygmy-possum	V	1 to 6	390.8	12,950
Squirrel Glider	V	1 to 6	295.8	8,050
Large-eared Pied Bat	V	2, 4 to 6	230.1	11,140
Eastern Cave Bat	V	2, 4 to 6	141.1	6,034
Total	NA	NA	*	142,117

Notes: * The species habitats overlap (i.e. the habitats are not mutually exclusive).

Aquatic Species

276. No threatened species listed under the *Fisheries Management Act 1994* potentially occur within the ephemeral creeks (Kurrajong Creek and Pine Creek) or unnamed drainage lines which are located within the Project area. Kurrajong Creek and Pine Creek do not provide any permanent habitat for aquatic biota as they only flow occasionally and have no significant long-term pools.

277. The *Lowland Darling River aquatic ecological community*, listed as endangered under that Act, includes the Namoi River and all associated tributaries, such as Kurrajong Creek, Tulla Mullen Creek and Pine Creek. Despite each of these tributaries falling within the coverage of the listing, they provide no permanent habitat for aquatic species. As such, the Project has no significant impact on aquatic ecology or aquatic species and no offsets are required.

Stygofauna

278. The Groundwater Assessment considered whether stygofauna could be impacted by the Project and concluded that they were very unlikely to be present in the dry sandy beds of ephemeral streams within the Project area. However, stygofauna are well-known in the permanent aquifer environment of the Namoi Alluvium and are also expected to be present in significant extensions of the alluvium in the lower parts of key tributaries, such as Tulla Mullen Creek. The Groundwater Assessment concluded that the risks of impact on stygofauna would be very low.

279. The IESC considered that NCOPL should do more assessment of Project-related risks to stygofauna. As a result, NCOPL retained Dr Peter Hancock to assess the information presented in the EIS relating to potential impacts to stygofauna. Dr Hancock's assessment, included in the Submissions Report, concluded that:
- predicted drawdown at Tulla Mullen Creek and in the Namoi alluvium would have a negligible effect on stygofauna communities;
- it is very unlikely that re-injected brines would impact on stygofauna communities; and
- it is not considered necessary that additional stygofauna samples be collected from Tulla Mullen Creek, nor from bores near Hardy, Eather and Mayfield Springs.

280. The Mining Panel considered that: "Underground GDEs including Stygofauna presence appear to be adequately covered by the proponent."

281. The Department is satisfied with the NCOPL's assessment of risks to stygofauna. It considers that such risks are very low and that no specific conditions are required to manage them.

Biodiversity Offset Strategy

282. The BDAR contains a Biodiversity Offset Strategy (BOS) which outlines how NCOPL would offset the Project's impacts on biodiversity in accordance with the NSW Biodiversity Offsets Scheme (Offsets Scheme), established under the BC Act and its regulations.

283. The offset rules provide that a development's impacts can be offset by one or more of the following options:
- retirement of the required number and class of like-for-like biodiversity credits;
- retirement of the required biodiversity credits in accordance with the variation rules;
- undertaking mine site ecological rehabilitation of the impacted site;
- funding of a biodiversity conservation action; or
- payment of an amount into the Biodiversity Conservation Fund determined in accordance with the BAM Credit Calculator.

284. NCOPL has advised that it may make use of each of the options permitted by the offset rules, with the exception of funding a biodiversity conservation action. The BDAR indicates that NCOPL may choose to establish Biodiversity Stewardship Sites on land owned by Whitehaven. As outlined above, NCOPL

also proposes to stage the retirement of credits over 6 phases (see **Table 8**), prior to impacts on biodiversity values occurring for each phase.

285. BCS has indicated its satisfaction with the BDAR and accepted NCOPL's proposal for staged retirement of credits, noting that it "commends NCOPL for producing an iterative development layout which will result in the reduction of biodiversity impacts as compared to the exhibited EIS, especially to Serious and Irreversible Impact (SAII) entities." BCS also recommended that: "The upper quantum of credits for each stage be included in the consent conditions."

286. The Department also accepts the BDAR and NCOPL's proposal for staged retirement of ecosystem and species credits. It has proposed conditions requiring that all credits are retired in accordance with the Offsets Scheme and according to a schedule specified in the consent which would prevent NCOPL commencing clearing within any of the six phases of development unless the credits associated with that phase had already been retired.

287. Subject to these conditions, the Department considers that NCOPL can satisfy its offset requirements.

Mine Site Ecological Rehabilitation

288. Under the Offsets Scheme, SSD mining projects can use 'mine site ecological rehabilitation' to meet offset requirements. Such 'mine site ecological rehabilitation' goes beyond standard rehabilitation required by the *Mining Act 1992*, aiming to re-create a functioning native ecosystem (i.e. habitat) at the site of disturbance.

289. Mine site ecological rehabilitation may only contribute a portion of the overall offset requirements. Land-based offset areas are also required in a greater quantity than the area to be cleared. Mine site ecological rehabilitation generates fewer credits than land-based offset areas. If the mine site ecological rehabilitation is not achieved, the credit requirement must instead be met by another of the Scheme's offset options.

290. At the time of preparing both the exhibited and final BDARs, BCS's draft *Ancillary Rules for use of Mine Site Ecological Rehabilitation as an Offset* had not been finalised. Therefore, BCS's advice expressed a preference that the exhibited BDAR be amended to remove references to the draft Ancillary Rules. Accordingly, NCOPL removed references to mine site ecological rehabilitation calculations from the final BDAR. However, it noted that BCS "is supportive of" NCOPL potentially undertaking mine site rehabilitation for the Project when these rules, which govern calculation of offset equivalences, are finalised.

Proposed Biodiversity Credit Reduction

291. NCOPL sought a reduction in biodiversity credits for the Project to reflect its commitment to no longer disturb 14.1 ha of native vegetation that it obtained approval to clear as part of its Stage 2 consent. BCS did not accept this approach and as a result, NCOPL removed this proposal from the final BDAR but continued it as part of the development application (i.e. it was seen as a matter for the consent authority to consider, rather than BCS, whose role is restricted to assessing the BDAR).

292. In its final advice, BCS proposed that NCOPL's proposal to 'net off' the impacts associated with the impact reduction area be dealt with "via a commensurate decrease to the area NCOPL is required to conduct mine site rehabilitation and secure under a long-term security mechanism for Stage 2 in the project consent, rather than a reduction in credits calculated for Stage 3." BCS also proposed that the

reduction be calculated on a 1:1 ratio, i.e. that NCOPL's existing requirement to rehabilitate around 2,833 ha of the Stage 1 and Stage 2 mining areas be reduced by 14 ha to 2,819 ha.

293. The Department agrees with BCS. However, it considers that the appropriate ratio for this reduction is 2.6:1, given that the offset requirement was first established on this ratio. The Department has therefore proposed conditions to reduce the requirement to offset the existing mine from around 2,833 ha by 37 ha to 2,796 ha. It is also noted that NCOPL would still be required to undertake rehabilitation in accordance with requirements under the *Mining Act 1992* and rehabilitation objectives, however it would not need to be included in a formal offset area following rehabilitation.

Biodiversity Matters of National Environmental Significance

Threatened Species and Communities

294. The BDAR contains detailed assessments of the potential impact of the Project on EPBC-listed threatened species, as summarised in **Table 9**, below.

295. NCOPL's referral of the Project to the Commonwealth under the EPBC Act considered that *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* was present within the Project area. However, more detailed surveys by AMBS confirmed that this Commonwealth-listed TEC was not present. The AMBS surveys also confirmed that the *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia* is not present in the Project area. Superb Parrot and Regent Honeyeater have also not been recorded in or adjacent to the Project area. Consequently, the BDAR gave no detailed consideration to these threatened species and communities, beyond considering impacts on foraging habitat potentially subject to occasional use by the two avian species.

Commonwealth Offset Requirements

296. Most of the threatened species and communities listed under the EPBC Act which were identified during AMBS's surveys require offsetting under the Commonwealth's *EPBC Act Environmental Offsets Policy* (DSEWPAC, 2012). The exceptions are the White-throated Needletail and the Swift Parrot. AMBS's calculations of the required offsets are shown in **Table 9**.

297. The Commonwealth Minister for the Environment will consider the Department's assessment report prior to making a final decision under the EPBC Act on whether to approve the actions proposed by the Project and appropriate quanta for applicable Commonwealth environmental offsets.

Table 9 | Threatened Communities and Species Impacts (EPBC Act) *(Source: BDAR)*

Species	EPBC Act Status	Development Phases Affected	Species Credits Required
Coolabah Bertya	V	3, 6	46,035
Spiny Peppercress	V	1 to 6	1,731
Tylophora linearis	E	1 to 6	13,607
Koala	V	1 to 6	14,796

Species	EPBC Act Status	Development Phases Affected	Species Credits Required
Large-eared Pied Bat	V	2, 4 to 6	11,140
Corben's Long-eared Bat	V	Ecosystem credits based on woodland forms of PCTs 88, 141, 435, 399, 401, 404, 405, 406, 408, 244, 55 and 206	
Pilliga Mouse	V	Ecosystem credits based on woodland forms of PCTs 88, 141, 399, 401, 404, 405, 406, 408 and 244	
Painted Honeyeater	V	Ecosystem credits based on woodland forms of PCTs 88, 435, 399, 401, 404, 405, 406, 408, 244, 55 and 206	
Regent Honeyeater	CE	Ecosystem credits based on woodland forms of PCTs 88, 141,435, 399, 401, 404, 405, 406, 408, 244, 55 and 206	
Swift Parrot	CE	Ecosystem credits based on woodland forms of PCTs 88, 435, 399, 401, 404, 405, 406 and 408	
Superb Parrot	V	Ecosystem credits based on woodland forms of PCTs 88, 435, 399, 401, 404, 405, 408, 244, 55 and 206	
Poplar Box Woodland on Alluvial Plains EEC (PCT 244)	E	1, 2, 6	144

Notes: V = Vulnerable; E = Endangered; Critically Endangered
Species shaded grey are judged by the BDAR and by BCS as not being significantly impacted by the Project. However, impacts on potential occasional use of foraging habitat are offset by ecosystem credits.

Groundwater Dependent Ecosystems

298. GDEs are ecosystems that require permanent or intermittent access to groundwater to meet all or some of the water required to maintain their biota, ecosystem processes and ecosystem services.

High Priority Riverine GDEs

299. Water Sharing Plans (WSPs) made under the *Water Management Act 2000* may prescribe what are known as 'high priority GDEs'. Near the mine, there are a number of newly mapped 'high priority GDEs', comprising a number of riverine environments associated with river channel, riverbank and floodplain vegetation of the Namoi River and tributaries. Except for a few very small features, none of these 'high priority GDEs' (which had been mapped remotely) are located within the Project area. AMBS also considered that, following ground truthing, most of these small features within the Project area were "not likely" to actually be GDEs.

300. To meet the *Water Management Act 2000*'s 'no more than minimal harm' test for high priority GDEs, the AIP permits no more than a 10% cumulative variation in the water table at 40 m distance from the GDE, while allowing for typical 'post-water sharing plan' climatic variation.

301. Areas of mapped riverine 'high priority GDEs' that could potentially be affected by the Project were reviewed in the BDAR. AMBS considered that these were all likely to be 'facultative GDEs',[7] or else

[7] A 'facultative' GDE uses groundwater in some locations but not in others, particularly where an alternative source of water (e.g. stream flows, over-bank flows and flood flows) is available to maintain ecological function.

were located in areas where the groundwater table is in excess of 20 m below ground level (mbgl) (i.e. very unlikely to be GDEs at all).

302. The Groundwater Assessment concluded that the Project would result in groundwater table drawdown that would occur gradually, with maximum drawdown predicted to occur post mining, and subsequent recovery taking many decades. The Groundwater Assessment also considered that the magnitude of predicted water table drawdown at 'high priority GDEs' would be significantly less than the estimated seasonal water table.

303. The BDAR considers that groundwater drawdown is generally low at the facultative GDEs, however there could be drawdown exceeding 10 m below a small portion, resulting in larger trees potentially not being able to access groundwater in drought conditions. However, the BDAR considers that this is "not likely" to result in widespread loss of the larger trees, or prevent the long-term viability of GDEs.

304. On this basis, NCOPL made no commitments regarding ecosystem credits for the areas of mapped riverine 'high priority GDEs' located *outside* of the Project area, notwithstanding modelled exceedances of the AIP's Level 1 ('minimal impact') criteria of 2 m drawdown or 10% drawdown in the case of this type of GDE.

305. DPE – Water noted these exceedances, particularly at two locations, being about 7.4 ha in the Namoi Alluvial Groundwater Source and about 153.5 ha in the Gunnedah-Oxley Basin MDB Groundwater Source. NCOPL made commitments to continued and extended monitoring of groundwater levels and quality of nearby aquifers to distinguish natural groundwater level fluctuations (e.g. response to rainfall) from groundwater level impacts due to mining. The results of the groundwater monitoring program would be used to progressively to refine the groundwater model, which would in turn be used for the periodic review and validation of predicted groundwater impacts, including groundwater table drawdown at GDEs.

306. The IAPUM noted that:

> "… GDEs located at distance from the mine area are not likely to be affected significantly by mining, while those close to the mine area are more likely to be affected. As noted in the modelling report, it is not clear to what extent the GDEs that have been identified are dependent on the regional groundwater system or whether they are dependent on local shallow groundwater storage in surficial deposits only. Irrespective of this lack of information, the uncertainty in the groundwater modelling means that there is a requirement for monitoring to demonstrate that the low potential for impacts on the major GDEs is valid."

307. e.g.The IAPUM considers that there is a need for ongoing and specific monitoring of 'high priority GDEs' located close to the Project boundary to ensure that the Project does not cause impacts in excess of those predicted. The Department particularly notes the nearby mapped features on the Namoi River floodplain and on Tulla Mullen and Little Sandy Creeks. The Department considers that these features should be listed for regular and ongoing monitoring and has proposed conditions to this effect. If predicted impacts on GDEs are exceeded, then offsetting may be required,

Other Riverine GDEs

308. In addition to the 'high priority GDEs', AMBS also assessed the potential for other vegetation within the Project area to use groundwater. In consequence, it identified several other likely facultative GDEs (herein termed 'other riverine GDEs'). The PCTs identified within the Project area by AMBS as other

riverine GDEs (see **Table 6**) include PCT 55 Belah Woodland (Good), PCT 244 Poplar Box Grassy Woodland (Good); and PCT 399 Red Gum – Tea Tree Creek Woodland.

309. The BDAR considered that these PCTs are "likely" to be facultative GDEs for the larger trees to access the groundwater. It also considered that some areas of PCT 55 and PCT 399 occur where groundwater is too deep for trees to access.

310. No agency has expressed concerns regarding the quantum of the proposed offsets or the need to include an allowance for GDEs. However, the concerns expressed by DPE – Water and the IAPUM regarding the necessity for monitoring to demonstrate that the EIS's predictions are achieved is as relevant for on-site GDEs as it is for the 'high priority GDEs' located outside the Project area.

311. The Department therefore proposes a specific monitoring program for GDEs, both within the Project area and nearby. It has proposed conditions to this effect.

Springs

312. There are three known permanent, semi-perennial or intermittent groundwater springs located in the vicinity of the Project area – Mayfield, Hardys and Eather Springs.

313. Hardys Spring and Eather Spring are both listed as 'high priority' springs. Hardys Spring is located close to Sandy Creek, about 3 km south of the southwestern extremity of the Project area, and Eather Spring is located a further 3 km south on a tributary of Little Sandy Creek. Anecdotally, neither the Hardys Spring nor Eather Spring has flowed for over 10 years.

314. Mayfield Spring is located within the Project area, on a tributary of Kurrajong Creek but some hundreds of metres east of LW 203. The feature is being actively used for livestock watering and has been modified for this purpose. The Mayfield Spring is not mapped on the GDE Atlas (BoM, 2018) or listed as a 'high priority GDE'.

315. The Groundwater Assessment predicts very limited mining-related groundwater drawdown at each of these springs. Drawdowns of < 0.5 m, <0.2 m and <0.1 m are predicted for Hardys, Mayfield and Eather Springs (respectively) with maximum drawdown to be reached in around 240 years for the first two and in over 600 years for Eather Springs. NCOPL proposed further monitoring at each of these sites to observe any changes to surface conditions and flow rates and to confirm groundwater dependency.

316. The Mining Panel considered the three springs and recommended that monitoring should be undertaken at all three springs to establish any impacts as a result of drawdown due to mining, particularly for the Mayfield Spring which is in closest to the mine.

317. The Department agrees with the Mining Panel and has recommended conditions requiring ongoing monitoring of the three spring sites, including reliable establishment of the water tables at each location.

Monitoring and Management

318. The Department has recommended conditions for avoiding, mitigating and offsetting the Project's impacts on biodiversity values. These include:
    - setting performance measures for subsidence impacts on biodiversity values;
    - staged biodiversity offset requirements to be retired prior to impacts on biodiversity values occurring before each phase of Project development;
    - opportunity to further refine the development footprint through detailed mine planning during the Extraction Plan process, to reduce impacts and offset liability prior to commencing each phase;

- implementation of a Biodiversity Management Plan to manage and minimise impacts to biodiversity values;
- monitoring GDEs; and
- progressive rehabilitation to self-sustaining native woodland vegetation.

Summary

319. The Department considers that the impacts on biodiversity values from direct clearing and indirect impacts could be suitably avoided, mitigated and/or offset. While there is extensive clearing in total, both clearing and rehabilitation would be undertaken progressively over the life of the Project, with impacts required to be offset prior to commencing each development phase. The Department has recommended conditions to manage and regulate these impacts.

6.6 Greenhouse Gas Emissions

Introduction

320. All coal seams contain some level of gas as a consequence of how the coal is formed. These gases escape (i.e. become 'fugitive') during both open-cut and underground mining operations. However, underground mines are typically deeper than surface (open cut) mines and generally produce higher quality coal that results in higher emissions per unit of coal. Fugitive emissions from coal mining are a significant component of GHG emissions and account for approximately 9-10% of NSW GHG emissions. The Project would have a large GHG emissions footprint, due to both its overall scale (201.5 Mt) and the relatively 'gassy' nature of the seams.

321. GHG emissions were identified as a matter of concern by the special interest group objectors, particularly the Lock the Gate Alliance which noted that the Project would be #50 in Australia's top 100 Scope 1 GHG emitters[8].

322. GHG emissions are divided into three categories:
- Scope 1: emissions released to the atmosphere as a direct result of an activity;
- Scope 2: emissions released to the atmosphere from the indirect consumption of energy; and
- Scope 3: indirect emissions (other than Scope 2 emissions) generated in the wider economy, which occur as a consequence of the activities of a facility, but from sources not controlled by that facility.

NCOPL's GHG Emissions Assessment

323. The EIS contains a detailed Air Quality and Greenhouse Gas Assessment, prepared by Jacobs Group, which includes an assessment of the Project's predicted GHG emissions.

324. The Amendment Report (see **Appendix D**) also contained updated material regarding GHG emissions, as follows:
- Greenhouse Gas Emission Forecast (GGEF), (Palaris);
- Amended Greenhouse Gas Calculations (Jacobs Group); and
- Abatement Technology Assessment (Palaris).

325. Based on the information provided in this updated material, on 22 September 2021 the Department made a formal request for further information regarding the current use of GHG emission mitigation

[8] GHG emissions are not reported by location (e.g. a mine) but by entity (in this case, Whitehaven). With an average of 1.36 Mt CO_2-e pa, the Project is estimated to elevate Whitehaven's position amongst Australia's top 100 Scope 1 emitters from #44 to approximately #33, based on the Clean Energy Regulator's 2018-19 figures.

technologies in Australian underground coal mines and current and prospective technologies that could be used to mitigate GHG emissions at the Project. NCOPL provided a response on 15 October 2021.

Policy Context

326. The impacts of coal mining on climate change have become an increasingly more important issue for the assessment of coal mining projects in recent years. Importantly, clause 14 of the Mining SEPP expressly requires the consent authority to consider:

> "whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following … (c) that greenhouse gas emissions are minimised to the greatest extent practicable", and
>
> "an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions."

327. The policy settings relating to climate change and GHG emissions at an international, national and state level are rapidly changing.

328. The assessment of GHG emissions for this Project has been made more difficult due to a range of very recent policy changes at all levels, including international (i.e. Glasgow Climate Pact – November), Commonwealth (i.e. Australia's Long-Term Emissions Reduction Plan – October), and State (i.e. NSW Net Zero Plan Stage 1: 2020–30 Implementation Update – September). All of these changes have occurred after the exhibition of the EIS and lodgment of the Submissions Report.

329. There is now a large set of climate change policies (as set out in **Section 3.2** above) that are relevant to the regulation of GHG emissions. Across these documents, there appears to be a number of relatively clear policy positions that are relevant in the NSW context, including:
- a target of 'net zero' emissions by 2050;
- a reduction of approximately 50% emissions by 2030 (against a 2005 baseline);
- a push to generally 'ratchet' down emissions; and
- a push to reduce fugitive emissions from coal mining.

330. However, there are still a range of uncertainties about the specific application of the various policies to individual SSD applications under the EP&A Act, including:
- *Impacts*: there is no clear methodology to assess the relative scale (or associated consequences) of emissions in a consistent manner, nor are there any definitions of different levels of emissions (e.g. low, moderate or high);
- *Standards*: there are no performance criteria or limits provided (e.g. maximum annual or total emissions) for any development types (e.g. coal mines, power stations, or industrial facilities), nor is there any clear timeline to measure any ratcheting down (e.g. a plan for staged reductions in fugitive emissions);
- *Mitigation measures*: there is no clear guidance on how to assess potential mitigation or abatement measures (e.g. what measures are considered 'reasonable and feasible' or 'best practice'), both for current and future activities; and
- *Offsets*: there is no guidance on whether offsets should be required for a particular development (e.g. trigger levels based on predicted unabated emissions), nor any methodology to calculate the quantum or type of offsets that may be warranted.

331. In light of these policy changes and uncertainties, the Department established an interagency working group in October 2021 to discuss climate change issues. The working group meetings to date have included representatives from the:
    - Department (both policy and assessment staff);
    - Environment Energy and Science (EES, including staff from Climate Change Policy, Climate and Science, Climate Change Modelling); and
    - Environment Protection Authority (EPA).[9]

332. It has become clear from these meetings that there are multiple agencies with roles and responsibilities in policy-making and regulation of GHG emissions.

333. Importantly, the development consent process is not the only opportunity to regulate emissions from a coal mine. This is particularly relevant as mining development consents are typically long-term approvals that cannot subsequently be changed unless the applicant seeks a modification.

334. In contrast, for example, the EPA has powers under the *Protection of the Environment Operations Act 1997* to unilaterally amend an EPL, although EPLs do not currently set limits on GHG emissions. At the Commonwealth level, the Clean Energy Regulator administers the Safeguard Mechanism and it could reduce a project's emissions 'baseline' to take into account updates in relation to global warming potentials or default emissions intensity value.

335. In the absence of specific policy on impacts, standards, mitigation or offsets, the Department has assessed the Project's GHG emissions in a holistic way with reference and comparison to other recent project consents.

336. While recent policy changes and updates appear to emphasise and reiterate the need for action on greenhouse gas emissions at a broad scale, there is no clear policy guidance requiring drastic changes to the approach that has been adopted in recent coal mine assessments. Consequently, the Department has focused on incremental improvements that build on those recent assessments and are targeted at the specific characteristics of the Project and its emissions.

Recent GHG Emissions Assessments

337. The Department completed an assessment of six underground coal mining project applications in NSW over the past five years. Four were approved and two refused. **Table 10** below provides a summary of the Scope 1 fugitive emissions for these projects, and conditions (or recommended conditions).

338. The table shows that the emissions intensity of the Project is lower than many other underground coal mines around the State, particularly those in the southern coal field where the mines are consistently dominated by high methane content. However, the total resource to be extracted is significantly greater than these mines. Further, because the gas and methane content across much of the Project area is very low, abatement options are much more limited than for other mines. This is discussed further below.

[9] The Commonwealth Department of Agriculture, Water and the Environment (DAWE) and Clean Energy Regulator also attended one meeting to discuss their roles.

Table 10 | Recent coal mining projects assessed

Project	Total Coal Resource (Mt ROM)	Total Fugitive Emissions (Mt CO_2-e)	Average *In Situ* Gas Content (m^3/t)	Emissions Intensity (t CO_2-e/t ROM)	Comments/ Conditions
Narrabri Stage 3	201.5	31.41 (no flaring) 31.19 (with flaring)	2.5 – 5	0.155 (abated) 0.156 (unabated)[10]	Only 10-40% methane Vented except where methane concentrations high enough to flare
Dendrobium Extension (Refused)	71.6	18.3 (no flaring) 13.2 (with flaring)	10.3	0.19 (abated) 0.24 (unabated)[11]	Flaring would reduce total fugitive emissions by 28% over the project life Gas would be flared or, if methane content too low, vented
Tahmoor South	~33.0	19.31	Not available	0.57 (abated) 0.79 (unabated)[12]	Consistently dominated by methane Methane would be preferentially sent to a third party power generation plant to be beneficially used or flared if that option is not available. Conditions include operating conditions to improve energy efficiency and reduce Scope 1 and 2 emissions, implement GHG abatement measures, Air Quality and Greenhouse Gas Management Plan, including best practice management to minimise Scop1 and 2 emissions, and setting of limits on GHG emissions, monitoring and reporting and offsetting exceedances of emissions.
Russell Vale Underground Expansion	3.7	1.4	Not available	0.38[13] (unabated)	Conditions include operating conditions to improve energy efficiency and reduce Scope 1 and 2 emissions, Air Quality and Greenhouse Gas Management Plan, including best practice management to minimise Scop1 and 2 emissions, and setting of limits on total project life GHG emissions.
Wallarah 2	150.9	6.70 (with flaring)	5.5 - 11	0.044[14] (abated)	65% of total gas content would be captured for flaring. This would result in a reduction of approximately 8 Mt CO_2-e or 54% of Scope 1 emissions over the project life. Conditions include operating conditions

[10] Source: Calculated from the Project's Amended Greenhouse Gas Calculations (*Jacobs*)
[11] Source: Calculated from the Dendrobium EIS's AQGGA, Table 8-3.
[12] Source: Calculated from the Tahmoor South Response to Request for Information No. 2.
[13] Source: Calculated from the Russell Vale Revised Preferred Project Report & Response to Second PAC Review, Table 3.1
[14] Source: Calculated from the Wallarah 2 EIS's AQGGA, Table C.3

Project	Total Coal Resource (Mt ROM)	Total Fugitive Emissions (Mt CO_2-e)	Average *In Situ* Gas Content (m^3/t)	Emissions Intensity (t CO_2-e/t ROM)	Comments/ Conditions
					to minimise emissions, implement a methane gas capture and flaring system where reasonable and feasible, Air Quality and Greenhouse Gas Management Plan, including capture of methane and feasibility study for the beneficial reuse of methane.
Hume Coal Mine (Refused)	50	0.034	0-0.50	0.0007 (unabated)	Shallow underground mine – low gas content. Hume proposed to offset all fugitive GHG emissions through tree planting on Hume Coal owned land.
Maxwell Project	148	9.9	Not available	0.067 (unabated)[15]	Gas would be flared where methane content is high enough. Option for a small gas-powered plant may be used to generate power from gas drained in the underground workings, subject to the presence of sufficient methane content. Conditions include operating conditions to improve energy efficiency and reduce Scope 1 and 2 emissions, implement GHG abatement measures, Air Quality and Greenhouse Gas Management Plan, including best practice management to minimise Scope 1 and 2 emissions, and centralised gas management plan to maximise the beneficial use of methane.

Scope 1 GHG Emissions

339. Scope 1 emissions are emissions released to the atmosphere as a direct result of an activity. All coal seams contain gases as a consequence of how the coal is formed. These gases escape (i.e. become 'fugitive') during both open-cut and underground mining operations. However, underground mines are typically deeper than open cut) mines. Consequently, less of the seam gases has escaped to the surface by natural means, and remain in place to be liberated during and following the mining process. This generally results in higher GHG emissions per unit of coal produced in underground mines[16].

340. Across the life of the Project, total Scope 1 GHG emissions are estimated to be in the order of 31.19 Mt[17] carbon dioxide equivalent (CO_2-e), averaging 1.36 Mt CO_2-e per year. Most of these emissions

[15] Source: Calculated from the Maxwell Underground Mine EIS's AQGGA, Table 9-4.
[16] While 'fugitive emissions' refers to all gases that escape from all aspects of the coal mining process (i.e. including from stockpiling, handling of coal, transport etc), the vast majority of fugitive emissions arise from gases escaping from coal seams during the mining process.
[17] The Amendment Report updated the Scope 1 GHG emissions calculations based on further analysis of gas content within the Project area and gas density assumptions.

(about 85.7%) are from fugitive emissions from the extraction of coal, including gas venting and gas drainage.

341. Coal seam gas is largely composed of varying proportions of methane (CH_4) and carbon dioxide (CO_2). The gas in some mines is very rich in methane, in others it is almost entirely CO_2. The coal seam gas at the Narrabri Mine has to date been very rich in CO_2. However, there is a substantial increase in the methane percentage of the gas in the proposed Stage 3 mining area compared to underground mining completed to date in the northern panels of the Stage 2 mining area (i.e. 30-40% of the gas methane across the southern and western parts of the Project area, compared with 5-25% in the northern series. The area of the seam containing these higher percentages of methane comprises approximately a third of the entire Project area and covers 6 of the 7 longwalls (see **Figure 8**). However, it must be noted that a significant proportion of the higher methane concentration combined with a higher gas content area is within the already approved Stage 2 footprint.

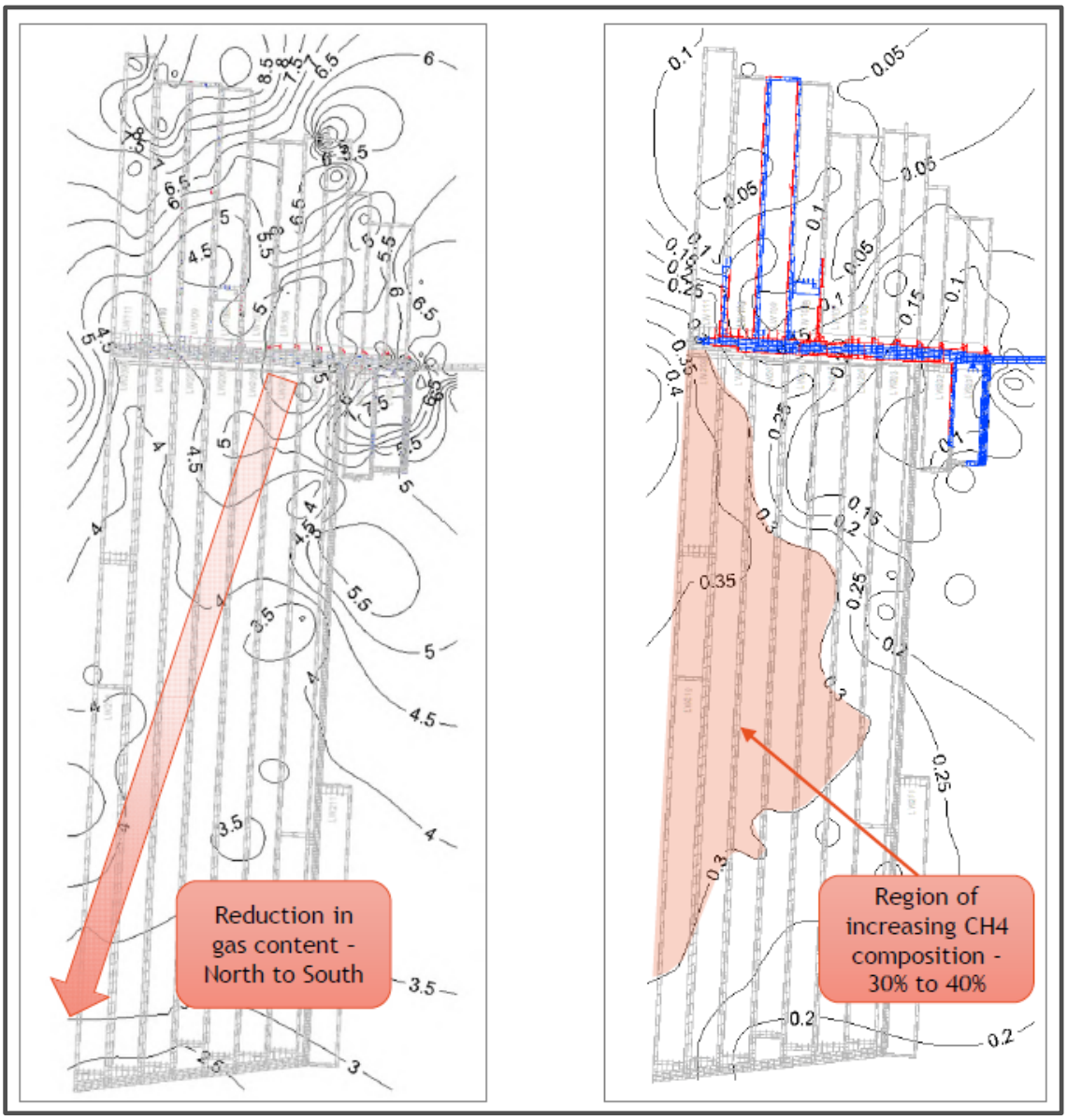


Figure 8 | Overall seam gas content (m^3/t) and methane concentration (%) in seam gas across the Project area *(Source: GGEF)*

342. This has a major effect on overall GHG emissions in terms of CO_2-e because methane has a far greater global warming potential (around 28 times[18] higher) than CO_2. Consequently, the Project's fugitive emissions would be roughly three times higher than historical levels at the mine, which have been around ~0.4-0.5 Mt CO_2-e per year.

343. The highest annual emissions occur in approximately years 12 to 19 of the Project (varying from 1.67 to 1.94 Mt CO_2-e), which is when longwall extraction would be occurring in the part of the coal seam with the highest methane concentration (see **Figure 8**).

344. Given the extent of the area containing high methane concentrations, only very substantial mine design changes would be effective in reducing overall fugitive emissions.

Mitigation of Scope 1 GHG Emissions

NCOPL's Proposed Fugitive Emissions Management

345. There are conventionally two ways to manage fugitive emissions from underground mines. One is simply to vent the gases directly to the atmosphere and the other is to flare the gas.

346. The benefit of gas flaring is that combustion oxidises the methane component to water and CO_2. As noted above, CO_2 has a significantly lower global warming potential (i.e. 28 times less) than methane and consequently flaring greatly reduces the carbon footprint of the mine.

347. However, flaring may not be technically possible if the proportion of methane in the gas is too low, and flaring may pose a safety risk if methane occurs in the presence of significant quantities of oxygen due to the risk of spontaneous combustion.

348. The high CO_2 content in the gas from the existing Narrabri Mine has meant that it has not been amenable to flaring, and the gas has simply been vented. The EIS identified that there may be "some future opportunities for reducing fugitive emissions through flaring of drained mine gas which was sufficiently rich in methane", but made no commitments in this regard.

349. However, in response to requests by the Department, NCOPL gave further consideration to opportunities for reducing fugitive emissions by flaring. The GGEF considered four separate sources of mine gas contributing to the overall total of 31.41 Mt CO_2-e,[19] being:
- pre-mining drainage of the coal seam prior to longwall extraction and/or roadway development using underground UIS or SIS drilling (2.3%);
- un-managed drainage from the gate roads (i.e. from the walls of first workings) during longwall development (30%);
- un-managed drainage during longwall extraction (53.9%); and
- post-mining goaf gas drainage (13.8%).

350. The GGEF took the position that flaring of the un-managed drainage sources of methane emissions is not technically possible. This is because methane from these sources is greatly diluted by mine ventilation air (MVA)[20].

[18] The emissions factor used for calculating methane in the AQGGA is based on a global warming potential of 25. This was consistent with the *National greenhouse and Energy Reporting Regulations 2008* prior to July 1 2020.
[19] It should be noted that about 12.81 Mt CO_2-e of this total would result from mining already approved under the Stage 2 consent.
[20] Mines use large-scale ventilation systems to move fresh air into the mine and flush out methane and other combustible or noxious gases.

351. Under NSW mine safety legislation, the methane percentage in MVA must be kept "as low as reasonably practicable" and "not greater than 2% by volume". Any area of the mine where methane exceeds 1.25% by volume must be managed as a "hazardous zone". Any exceedance of the 2% limit is a "high potential incident". As a consequence of these safety limits, methane levels in the MVA are kept as low as possible, which prevents its combustion through conventional technologies.

352. In the case of post-mining goaf gas drainage, the methane percentage is higher, but the mine gas is still diluted by MVA which is introduced to the goaf behind the longwall equipment, providing oxygen to the gas mixture in the goaf.

353. NCOPL presented evidence demonstrating that methane concentrations of between 4% and 15% are explosive in the presence of >12% oxygen (i.e. a gas mixture which is greater than 60% MVA). The EIS reported that, historically, oxygen content in the post-mining goaf gas drainage at Narrabri Mine has varied between 10% and 15%.

354. Additionally, in Australian mines using flaring, the oxygen trip level on a flare would typically be set at 6% to maintain adequate levels of safety. Therefore, the GGEF considered it "unlikely" that post mining gas streams from the goaf could be flared due to mine safety constraints.

355. On this basis, the GGEF only assessed potential flaring of pre-mining drainage gas, which contributes just 2.3% of the overall GHG emissions attributable to fugitive emissions.

356. The GGEF also assumed that pre-mining gas drainage in the Project area would only achieve the same final gas pressure levels as are currently obtained in the northern series (i.e. 3.5 m^3/t). That is, not all available seam gas could be drained, but only that which exceeds this lower limit. The remaining seam gas would be drained and vented during the development, extraction and post-mining phases.

357. Overall, the GGEF applied a series of conservative positions to calculate the potential reductions in fugitive emissions from the Project that could be achieved through flaring of methane in mine gases. In summary, these were that:
- only the pre-mining gas drainage stream (2.3% of fugitive emissions) could be safely flared;
- this gas could only be flared where:
  - methane concentrations >30%; and
  - seam gas pressures exceed 3.5 m3/t; and
- pre-mining gas drainage would only remove seam gas above 3.5 m^3/t, with this residual to remain in situ until mining liberates it into the MVA.

358. Based on this, the GGEF considered that only 2.3% of the seam gas in the Project area was technically *amenable* to flaring, and that less than one third of this gas (0.7%) was technically *achievable* to flaring. This means that 0.2 Mt of the 31.41 Mt CO_2-e resulting from fugitive emissions (i.e. 0.7%) could be mitigated through flaring of mine gases. NCOPL committed to flaring this proportion of fugitive emissions in its Amendment Report.

Comparison to Recent Projects

359. The Department notes that the applicants for both the Tahmoor South Coal Project (SSD-8445) and the Dendrobium Extension Project (SSD-8194) made commitments to flare post-mining goaf gas in addition to flaring pre-mining drainage gas. However, the seams in which these two mines operate have higher gas levels and this gas is principally methane.

360. Dendrobium's EIS applied a number of assumptions, including that 33% of its total 18.3 Mt CO_2-e fugitive emissions could be recovered via drainage operations and that 97% of this gas was methane. Further, average gas content was reported as 10.3 m^3/t. On that basis, the Dendrobium EIS calculated that flaring would reduce pre-mining and post-mining goaf gas drainage emissions by 84% and reduce total fugitive emissions by 28%. It is noted, however, that flaring mine gas with an *average* gas content higher than the *maximum* found in the Project area and including 97% methane, as against the Project area's 10 – 40%, is a much more straightforward activity. That is, there is no direct comparison between Narrabri and Dendrobium.

361. Tahmoor South's mine gas situation is similar to Dendrobium in that its final Greenhouse Gas Assessment calculated that, of that project's total predicted fugitive emissions of 26.09 Mt CO_2-e, some 7.38 Mt CO_2-e could be abated through flaring of pre-mining and post-mining goaf gas (i.e. 28.3%, almost exactly the same as for Dendrobium).

362. The Scope 1 emissions intensity for these three projects is compared in **Table 11**. The key conclusions from **Table 11** are that the Project's:
- proposed total coal production is much higher than either Dendrobium or Tahmoor;
- predicted total fugitive emissions are of the same order of magnitude as Dendrobium and Tahmoor; and
- ROM coal has a much lower emissions intensity than either Dendrobium or Tahmoor, as it has lower in-seam gas pressure and its seam gas composition is dominated by CO_2.

Table 11 | Predicted Scope 1 emissions intensity for three recent underground coal mining projects

Project	Total Coal Resource (Mt ROM)	Max'm Annual Production (Mtpa)	Total Fugitive Emissions (Mt CO_2-e)	Average *In Situ* Gas Content (m^3/t)	Emissions Intensity (t CO_2-e/t ROM)	Comments
Narrabri Stage 3	201.5	11.0	31.19	2.5 – 5	0.155 (abated) 0.156 (unabated)[21]	Only 10-40% methane
Dendrobium Extension	71.6	5.2	18.3	10.3	0.19 (abated) 0.24 (unabated)[22]	Consistently dominated by methane
Tahmoor South	~33.0	4.0	26.09	Not available	0.57 (abated) 0.79 (unabated)[23]	Consistently dominated by methane

Additional Mitigation Considerations

363. The Department was not satisfied with NCOPL's assessments of mitigation options in both the EIS and Amendment Report and requested further consideration of GHG abatement opportunities.

364. In response, NCOPL commissioned Palaris to review the viability of alternative GHG abatement measures (other than flaring of pre-drainage gas). This included Ventilation Air Methane (VAM)

[21] Source: Calculated from the Project's Amended Greenhouse Gas Calculations (*Jacobs*)
[22] Source: Calculated from the Dendrobium EIS's AQGGA, Table 8-3.
[23] Source: Calculated from the Tahmoor South Response to Request for Information No. 2.

abatement technologies (which typically involves the destruction or capture of methane with or without beneficial use for power generation); and methane gas enrichment technologies (that increase the proportion of methane in the flaring stream).

365. In the case of VAM technologies, NCOPL's preliminary conclusions were that a reduction of up to approximately 9.6% of total Scope 1 emissions could be achieved. However, the capital outlay (approximately $190 million for the two units required for this level of abatement) and high operating costs (approximately $9 million per unit per year) would make such proposals unviable.

366. NCOPL also considered the possibility of beneficial use of methane for power generation where the methane content in the pre-mining drainage gas is high enough (>25%). However, as this would only be the case in some parts of the Project area, NCOPL concluded that the establishment costs of a power station could not be recouped.

367. A number of gas separation and enrichment technologies exist and are widely used in the oil and gas and landfill industries. None of these technologies are currently used in the Australian underground coal mining industry. However, Palaris identified that Membrane Separation Technolog[24] may be compatible with Narrabri Mine's surface gas plant infrastructure. NCOPL has indicated its intention to continue to review that option.

368. In response to the Department's concerns, NCOPL also offered to prepare, fund and implement a Research Program encouraging research into improving abatement of the Scope 1 emissions by:
- enriching methane content in gas streams to be burnt by flares (i.e. by concentrating methane in waste streams, probably via stripping other gases, principally oxygen and/or nitrogen);
- flaring or power generation of gas with low methane content (<30% methane);
- using the methane content within mine ventilation air (known as 'VAM') at relatively low methane contents (0.2% to 0.5% methane);
- capturing carbon dioxide for beneficial re-use or sequestration; and
- other potential abatement options that may be identified.

369. In summary, the Department acknowledges that gas separation and enrichment technologies are not currently used in coal mines in Australia and are extremely expensive. However, the Department also considers that these technologies (or other related options) are likely to improve and reduce in cost over the relatively long life of the Project.

370. Given there are clear policy drivers to 'ratchet down' GHG emissions and reduce fugitive emissions over the coming decades, these emerging technologies and abatement options should therefore be considered for application in current and future long life underground coal mining operations.

Performance Measures, Independent Reviews and Offsets

371. The Department has given careful consideration to the full range of opportunities that might exist (either now or in the future) to address fugitive emissions.

372. In the absence of any clear policy guidance on performance criteria or offsets, the Department has paid particular attention to the most recent underground coal mine approval with high fugitive emissions – the Tahmoor South Coal Project.

[24] Membrane Separation Technology involves injecting gas into a series of hollow membrane fibre tubes specifically designed to contain certain gas molecules and allow others to pass through.

373. The Commission imposed conditions in that consent with the purpose of reducing the predicted Scope 1 emissions of that project. The focal point of these conditions is to require that project's operator to provide an 'offset' for any Scope 1 and Scope 2 GHG emissions which exceed the corresponding forecasts given to the Commission during its process of determination. The type of offset is not specified, but must be to the satisfaction of the Planning Secretary. Tahmoor South is the first NSW coal mine to be subject to conditions of this type.

374. The Department has adopted a similar approach in the recommended conditions for the Project. i.e. NCOPL would be required to offset any Scope 1 and Scope 2 GHG emissions that exceed the predictions.

375. However, the Department is proposing to take the Tahmoor approach one step further – rather than establishing fixed emissions limits, the Department has recommended 'baseline' performance measures (i.e. worst-case), which may then be improved (i.e. ratcheted down) subject to the outcomes of a regular independent review regime.

376. In relation to the baseline performance measures, the Department notes that the actual emissions may exceed (or fall short of) predictions on an annual basis for reasons other than inadequacies in the prediction process. For example, the greatest influence on actual emissions is likely to be the rate of longwall advance, which may be significantly slowed by in-seam geological difficulties or conversely sped up as a result of what is known as 'good mining conditions'.

377. For these reasons, the Department considers that any limits on fugitive emissions should relate to the rate of coal extraction rather than simply to annual predictions of emissions, and should allow for some deviation in emission rates from predicted emissions.

378. The Department has therefore recommended baseline performance measures for Scope 1 fugitive emissions based on the rate of CO_2-e emissions per tonne of ROM coal extracted as follows:
- < 0.215 t CO_2-e emitted per t of ROM coal per calendar year;
- < 0.205 t CO_2-e emitted per t of ROM coal per calendar year (5-year rolling average); and
- < 0.155 t CO_2-e emitted per t of ROM coal over the life of the Project.

379. Importantly, the Department has also recommended a condition requiring NCOPL to prepare a three yearly Fugitive Emissions Minimisation Plan that includes an updated assessment of options to flare and/or generate electricity from methane, including a review of abatement technologies deployed in Australia and around the world; detailed studies of membrane separation technologies; and a three-year action plan to investigate and implement best practice measures to minimise fugitive emissions.

380. The Fugitive Emissions Minimisation Plan must propose lower emissions intensity performance measures based on the outcomes of this review.

381. Further, the Fugitive Emissions Minimisation Plan must be prepared in consultation with CAS, the EPA and the Mining Panel, whose function has specifically been expanded to include the provision of advice on GHG emissions.

382. In addition, the Department has included conditions requiring Extraction Plans to include details on proposed gas management including pre-mining drainage, goaf gas management and MVA, including measures to capture, concentrate, flare and generate electricity from methane. The Mining Panel would also provide advice on relevant parts of Extraction Plans, including GHG emissions.

Scope 2 GHG Emissions

383. Scope 2 emissions are limited to emissions associated with generation of electricity purchased for the operation of the Project. Both the EIS and the Amendment Report assessed Scope 2 emissions over the life of the Project as totalling 2.79 Mt CO2-e, or an average of about 0.12 Mt CO_2-e per annum.

384. The current strategy employed by NCOPL to reduce Scope 2 emissions at the Narrabri Mine is to select energy efficient plant and equipment and to maintain that plant and equipment so as to minimise fuel consumption and associated emissions.

385. In response to the Department's request to consider further options for reducing its carbon footprint, NCOPL has also committed to investigating the use of solar powered equipment (e.g. pumps and gas drainage mobile extraction units).

386. NCOPL has also advised that since submitting the Amendment Report, it has commenced receiving carbon neutral energy for all its electricity supply. Under this scheme, eligible carbon offset units are purchased and retired to offset the emissions associated with the generation and delivery of electricity.

387. Although Scope 2 emissions are not a significant proportion of the Project's overall GHG emissions, the Department considers that additional measures should be considered to reduce these emissions, including the option of purchasing 'green energy' (i.e.. electricity provided by renewables) from the grid.

388. NCOPL has recently advised (see **Appendix F**) that it has commenced receiving carbon neutral energy for all its electricity supply, and would offset all emissions associated with the generation and delivery of electricity.

389. Accordingly, the Department has included a requirement in the conditions of consent to source green energy and/or offset as proposed, to the greatest extent practicable.

Scope 3 GHG Emissions

390. Scope 3 emissions are a range of indirect or 'consequential' emissions (either upstream or downstream from the entity in question, i.e. the Project). The EIS identified Scope 3 emissions from the Project as comprising:
    - transport of product coal by rail to port;
    - a very limited allowance for associated diesel emissions and purchased electricity;
    - transport of product coal by ship to market;
    - combustion of thermal coal in power generators by end users; and
    - combustion of PCI by end users.

391. Both the EIS and the Amendment Report assessed Scope 3 emissions over the life of the Project as totaling 455.62 Mt CO_2-e, or an average of about 19.81 Mt CO_2-e per annum. This figure is 13.3 times the Project's predicted direct (i.e. Scope 1 + Scope 2) emissions. Around 98% of Scope 3 emissions would result from the burning of product coal. The remainder primarily reflects transport of product coal by either rail or ship.

392. The Department acknowledges that the mining of coal and its combustion is a major contributor to anthropogenic climate change, which has the potential to impact future generations. However, the Department considers that the key areas for active management of GHG emissions within the development assessment and approval process for new projects in NSW are reductions in direct (i.e.

Scope 1) emissions and improved energy efficiency (i.e. reduction and efficiency in the use of fuels and bought-in electricity, leading to minimised Scope 2 emissions).

393. In terms of orthodox GHG emissions accounting, only Scope 1 and Scope 2 GHG emissions are within the control of an entity, and therefore only they are able to be directly controlled or otherwise managed by a consent authority. It is a fundamental principle of accounting to avoid double counting, and it must be noted that one entity's Scope 3 emissions are another entity's Scope 1 emissions. More straightforwardly, GHG emissions associated with burning coal to produce energy are accounted for at the international powerplants where that combustion takes place.

Monitoring and Management

394. The recommended conditions include a number of performance measures, monitoring and reporting requirements in respect of GHG emissions management. These include:
    - compliance with Scope 1 fugitive emissions performance measures based on emissions intensity per tonne ROM coal production;
    - overall emissions intensity benchmarked against representative industry sector and predictions in the EIS, and the fugitive performance targets;
    - investigations and measures undertaken to reduce GHG emissions, including actions identified in the Fugitive Emissions Minimisation Plan to minimise fugitive emissions and the estimated reduction in CO_2-e as a result of any measures implemented, with independent review by the Mining Panel following consultation with key government agencies;
    - preparation of a Gas Extraction Management Plan as a sub-plan of each Extraction Plan as the mine progresses;
    - regular reporting through the Annual Review process with specific requirements for reporting GHG emission performance, along with end of panel reporting and 3-yearly update and reporting through the Fugitive Emissions Minimisation Plan.

395. These annual review reports, would also be available to the Mining Panel and would inform the updates to the Fugitive Emissions Minimisation Plan.

396. This monitoring and reporting is in addition to the requirements under NGERS including reporting against baseline targets set in the Commonwealth's Safeguard Mechanism.

Summary

397. The Project would lead to significant Scope 1 GHG emissions, which are dominated by the fugitive emissions associated with the mining of coal. The Department considers that it is important that direct GHG emissions over the life of the Project, particularly fugitive emissions, are minimised.

398. However, the Project EIS and Amendment Report contain very limited proposals to capture and flare methane which is liberated from seam gases by the mining process. While the opportunities to minimise fugitive emissions are limited at this stage, the Department is proposing to establish a mechanism to independently review emissions and potentially 'ratchet down' over time.

399. Consequently, the Department has proposed a comprehensive suite of conditions that limit fugitive emissions to no greater than predicted in the EIS, while also ensuring that new technologies and other options to further mitigate Scope 1 and Scope 2 GHG emissions would be regularly reviewed and implemented where feasible. The Department considers that these conditions would maximise the mitigation of GHG emissions over the life of the Project.

6.7 Economic Costs and Benefits

Introduction

400. The EIS includes an Economic Assessment, undertaken by AnalytEcon Pty Ltd in accordance with the Government's *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (the Guidelines). Consistent with the Guidelines, the assessment includes a cost benefit analysis to evaluate the net benefit/cost of the Project to NSW, and a local effects analysis to assess the net effects in the wider SA3 region (i.e. Moree and Narrabri LGAs) and the Project's local region (i.e. Narrabri and Gunnedah LGAs).

401. Employment in both the SA3 Region and the local region is dominated by agriculture. However, mining is the second largest employer within the local region (9.9% in the 2016 Census). From an employment perspective, agriculture and mining are both of much greater local importance (at both regional economic scales) than in the overall NSW economy. It is also worthy of note that unemployment rates in the Narrabri and Gunnedah LGAs have been higher than for both Regional NSW and NSW as a whole for much of the last five years.

402. The Economic Assessment was based on key inputs provided by NCOPL regarding the Project life (2022 to 2044) and anticipated coal production (192.1 Mt). In contrast, the existing Narrabri Mine (the 'Reference Case') would lead to production of 87.4 Mt of coal over the shorter period 2022 to 2034.

403. MEG considers that the Project's benefits represent an appropriate return to NSW, and an effective use of the State's resources.

404. Submissions from the general community (61) and special interest groups (2) focused on the positive socio-economic benefits of the Project, particularly employment opportunities, and one special interest group drew attention to what it considered were negative socio-economic impacts.

Economic Benefits and Impacts

405. The cost benefit analysis indicates that the Project would have an estimated net benefit of $599 million (NPV) to the NSW economy. The benefits include royalties of $259 million (NPV), NSW residents' share of Commonwealth company tax of $177 million (NPV), and NSW shareholders' share of the net producer surplus of $163 million (NPV). The majority of direct benefits would flow to State and local Governments, rather than as a producer surplus to shareholders resident in NSW.

406. The cost benefit analysis does not include any allowance for economic benefits to NSW suppliers of services to the Project, based on what the Economic Assessment identified as limitations in reliable data on NSW ownership of businesses and whether the goods and services that such companies provided are actually sourced from NSW.

407. However, the assessment considers these benefits are likely to be significant and estimates that NCOPL would incur operating expenditures between 2022 and 2044 of around $4.1 billion (NPV), as against around 3.0 billion (NPV) terms for the Reference Case, a difference of around $1.1 billion (NPV). Around 71% of NCOPL's operating expenditures are currently directed towards NSW suppliers. If that share remains the same during the Project, then an additional $775 million (NPV) would go to NSW suppliers. Assuming a profit margin of 10%, then the additional surplus for NSW suppliers would be around $78 million (NPV).

408. The cost benefit analysis does not contain a tabulation of estimated indirect costs associated with the Project's environmental and social externalities. However, each of these costs were considered and appropriate allowances included. These indirect costs include for example subsidence remediation works; purchasing water licences and undertaking works required to 'make good' groundwater drawdown impacts on groundwater bores; implementing a biodiversity offset strategy (estimated at $38.6 million in 2020 AUD); costs associated with mitigating GHG emissions; and other environmental management and mitigation costs.

409. The Project's operational workforce is based on its projected peak, which is 520 FTE personnel. However, the Economic Assessment projects that NCOPL would employ an *average* of 370 FTE personnel between 2022 and 2044, a little higher than the Reference Case, which is estimated to have an average operational workforce of 357 FTE between 2022 and 2034. That is, the Project would on average provide employment for an additional 13 FTE over the period 2022 – 2034, and then an additional 370 FTE during the period 2034 – 2044. Therefore, the additional employment benefits of the Project are concentrated in the second half of the Project life.

410. The cost benefit analysis included a sensitivity analysis which considered the estimated net benefits of the Project to be robust. The sensitivity analysis found that the estimated net benefits of the Project generally remained strongly positive under a variety of circumstances.

Costing of GHG Emissions

411. The only external environmental cost which was not internalised into NCOPL's calculation of Project operating costs is the cost of direct (i.e. Scope 1 and Scope 2) GHG emissions, which were separately accounted for in the cost benefit analysis. The Economic Assessment applied a figure drawn from the Air Quality and Greenhouse Gas Assessment of 26.7 Mt CO_2-e total direct (i.e. both Scope 1 and Scope 2) GHG emissions for the Project[25]. After removing the 8.1 Mt CO_2-e of direct GHG emissions associated with the Reference Case, the Economic Assessment considered that the Project would lead to an additional 18.6 Mt CO_2-e.

412. The Economic Assessment then quoted from the Guidelines' Technical Note 9, which advises developers to: *"Estimate the economic impact of GHG emission output to NSW only"*, but does not provide further information about how to interpret or apply this position. On the basis of this quote, the assessment performed a calculation (based on proportion of the NSW GSP as a percentage of World Gross Domestic Product) to reduce the direct GHG emissions attributable to NSW to 0.06 Mt CO_2-e, with a corresponding environmental cost of just $0.86 million (NPV).

413. The Commission recently considered a similar calculation (based on NSW population, rather than NSW GSP) for the Mangoola Coal Continued Operations Project (SSD 8642). The Commission's Final Report for that project noted that the cost of climate impacts was multiplied by the ratio of NSW population to global population. The Commission further noted that it did not agree with the methodology used because it is not consistent with international rules, which accounts for emissions where they are generated and emitted and by the emitting entity. As such, the Commission disregarded the findings and confirmed its view that Scope 1 and 2 emissions should be attributed to NSW, the Project, and fully costed in the economic analysis.

414. Further, in the case of the Maxwell Underground Project, the Scope 1 and 2 costs were attributed to Australia, which is the signatory to the Paris Agreement and responsible for undertaking climate actions

[25] It should be noted that the GGEF increased this figure to nearly 34 Mt CO_2-e.

through its NDC, with apportionment of GHG emission costs based on the population of NSW to Australia (around 32%).

415. The apportionment of the full GHG emission costs (including the increase in direct emissions identified in the GGEF) would substantially decrease the Economic Assessment's estimates of a direct benefit to NSW of $599 million (NPV).

Local Effects Analysis

416. The local effects analysis assesses the costs and benefits of the Project for residents of the Australian Bureau of Statistics' Moree-Narrabri SA3 region. As noted above, it also considers a smaller (but more applicable) localised Project area, corresponding to the Narrabri and Gunnedah LGAs.

417. The analysis estimates that the Project, relative to the Reference Case for the local operation workforce, would lead to an increase in disposable income of $55 million (NPV) for the local region and $30 million (NPV) for the SA3 Region.

418. NCOPL's analysis of current operating expenditures at the Narrabri Mine suggests that 70.9% are directed at NSW suppliers, and that 6% are directed at suppliers in the local region. Applying these ratios to anticipated Project operating expenditure leads to estimates that the Project, relative to the Reference Case, would lead to additional operating expenditures of $65 million (NPV) in the local region and $43 million (NPV) in the SA3 Region.

419. Local rates paid by NCOPL to NSC also represent a direct benefit to the local region. The Project would lead to local rate payments of $3.9 million (NPV), $1.8 million (NPV) higher than the Reference Case. The analysis also lists a variety of local community contributions which have been made by NCOPL or Whitehaven to local community interests over recent years.

420. VPA payments to Narrabri and Gunnedah Councils (which would be additional to council rates) were not considered in the local effects analysis. NCOPL's proposed VPA payments are discussed in **Section 6.8**, below.

421. The Project would employ an average operational workforce of 370 FTE workers between 2022 and 2044, which would translate to the Project employing an annual average of 99 FTE workers in the local region, or an annual average of 51 in the SA3 Region.

422. The Project would lead to additional disposable income for its employees, as follows:
- $317 million (NPV) for the 218 workers expected to live in the local region and $161 million (NPV) for the 111 workers expected to live in the SA3 region;
- relative to the Reference Case and considering the difference between mining wages and the average local wage, net incremental income accruing to the Project operational workforce was estimated at $55 million for the local region and $30 million for the SA3 Region; and
- if flow-on (i.e. multiplier) effects are also taken into account (while accounting for income foregone from agricultural activities), then total local income effects were estimated at $117 million (NPV) for the local region and $54 million (NPV) for the SA3 Region.

423. The EA did not include a sensitivity analysis for the local effects analysis.

Summary

424. While full accounting of Scope 1 and Scope 2 GHG emission costs to NSW and Australia would significantly decrease the Project's estimated net benefits, a significant net economic benefit would still

accrue to the NSW Government, primarily from coal royalty payments. A significant benefit would also arise for the NSW community from the NSW share of Commonwealth income taxes. Shareholders of Whitehaven and other entities which are resident in NSW would also share in the profits made by undertaking the Project, by way of dividends.

425. Significant local benefits would also arise, firstly through the early creation of an additional (on average)13 high paying FTE jobs but (much more significantly) the extension of 370 such FTE jobs from 2034 – 2044, which would lead to significant local expenditure on other goods and services.

6.8 Social Costs and Benefits

Introduction

426. The EIS includes a Social Impact Assessment, undertaken by CDM Smith, in accordance with the Department's 2017 *Social Impact Assessment Guideline for State significant mining, petroleum production and extractive industry development*. The assessment considered the potential impacts of the Project on employment, population, community infrastructure demand and current social values.

427. Given that the Narrabri Mine has been operating for over 11 years, its associated employment, expenditure and community sponsorship form part of the existing social baseline for both the local and wider region. The Narrabri and Gunnedah LGAs include the communities likely to be both positively and negatively impacted by the Project and are together considered to be the primary region of social influence.

428. The assessment included consultation with representatives of local Aboriginal communities and also considered potential cumulative impacts, primarily from the Narrabri Gas Project.

Community Attitudes

429. The potential social impacts of the Project were not a significant feature of community and special interest group submissions. There were no community and special interest group objections to the Project relating to noise impacts, traffic impacts, visual impacts and air quality impacts other than GHG emissions (see **Figure 4**). In addition, no agency expressed concerns relating to negative social impacts arising from the Project.

430. CDM Smith undertook a local community survey within the area of social influence, so as to enable a range of community members to participate in consultation and to obtain information for the social baseline. The surveys identified that the mining industry is a major contributor to the local economy. The most commonly identified benefits of the Project were ongoing jobs and training for local residents. The benefits of NCOPL's existing community investment initiatives were also noted.

431. Consultation also identified that the community considered the rural and agricultural character of the area as an integral part of their 'sense of place'.[26]

432. The surveys also identified that there is community concern regarding the effects of mining on environmental and social values, in particular potential impacts on:
- surface water and groundwater (both water supply and water quality);
- community cohesion, as a result of change to the communities' sense of place and inequalities brought about by higher paying jobs in the mining and CSG industries;

[26] The relationship between people and place, including characteristics that make a place special to people and contribute to a sense of belonging.

- GHG emissions and climate change;
- Aboriginal cultural heritage, including a belief that mining is not compatible with the protection of Aboriginal cultural heritage values;
- community infrastructure and services, such as health services; and
- housing affordability and availability, particularly for low-income households.

433. Consultation also indicated that noise, dust, visual amenity and odour are of key concern to the local community in the vicinity of the Narrabri Mine.

434. Other key concerns raised by nearby landholders relate to stress and anxiety from concerns around reduced property values (due to proximity to the Narrabri Mine), in addition to uncertainty regarding future mine plans and the possibility of future property acquisition.

Population Impacts

435. According to NSW Government projections, the population of the Narrabri LGA is expected to continue to slowly decline between 2016 and 2041, at an average annual rate of 0.3%. The population of the Gunnedah LGA is expected to very slowly increase between 2016 and 2036, at an average annual rate of close to zero.

436. The Project would involve no change to the maximum operational workforce at the Narrabri Mine (up to 520 FTE). Up to 20 additional workers would be required during construction of the Project over multiple short periods. The additional development workforce would be unlikely to result in any significant change to population.

437. However, as an extension of the existing operation, the Project may attract current non-local employees to move to the area of social influence, potentially resulting in low population growth (up to 40 people including employees and their families). The Project may, therefore, contribute in a small way to population stabilisation in the Narrabri and Gunnedah LGAs.

Community Services, Housing and Related Impacts

438. The Narrabri Mine has been operating since 2010 and the Project does not involve a significant increase in personnel requirements. As such, it is considered straightforward that the Project would not have a major impact on the demand for community health, education and related services or on the demand for local housing and other community infrastructure.

439. By continuing to provide a substantial number of employment opportunities between the period 2031 and 2044, which would also support retention of other employment, it is likely that the Project would support continued provision of important services for the broader community, particularly in the health and education sectors.

Sense of Place

440. Community consultation identified that the communities in the area of social influence (particularly Narrabri township) regarded agriculture, rural characteristics, community cohesion and economic diversity as key elements of their sense of place.

441. Notwithstanding that these factors represent the dominant characteristics in the local communities' sense of place, the Department considers that the Project would simply represent a confirmation of change in the local character, which has been taking place for many years. In this respect, the Department notes that the:

- Narrabri Mine was approved in 2007 and has been extracting coal since 2010;
- Narrabri Mine is approved to extract coal until 2031 and (in the absence of approval for the Project) is expected to continue to operate until that date at least;
- Project is therefore (in essence) seeking approval to extract coal between 2031 and 2044;
- Project does not involve a change in the intensity of existing mining operations or emissions and proposes minimal increases in the existing workforce; and
- there are a number of other coal mines located at distances of 22 - 45 km east and southeast of the Project area, the nearest of which is Maules Creek Coal Mine.

VPA and Developer Contributions

442. NCOPL entered into a Planning Agreement with NSC when Stage 2 of the Narrabri Mine was approved. The value of this VPA was $1.5 million, based on payments of $750,000 in both 2010 and 2011. At the same time, NCOPL provided a contribution of $100,000 to GSC, comprising five annual payments of $20,000 from 2010. No payments from these planning agreements remain outstanding.

443. Both NSC and GSC separately requested NCOPL to enter into a VPA with them. As a result, in late July 2021, NCOPL wrote to both Councils (see Appendix F) offering each a VPA, with the contribution to each Council to be based on application of the following methodology:
- primary residence of the Narrabri Mine's workforce (30.3% of employees and contractors residing in the Narrabri Shire and 28.8% residing in the Gunnedah Shire);
- vehicle movements from the mine (60% turning north toward Narrabri and 40% turning south towards Gunnedah);
- location of the Project (entirely within Narrabri Shire); and
- the total to be shared between both Councils to be 1% of the Project's CIV, which was $403.67 million.

444. Based on this formula, NCOPL offered NSC $2,603,976 (current dollars) to be provided in 10 annual instalments, subject to CPI increases. However, it also proposed that these payments commence in 2032, in recognition of the approved life of the Stage 2 project, for which a developer contribution had already been made. Based on the same formula and the same terms, NCOPL offered GSC $1,432,720.

445. In correspondence dated 3 September 2021 and 1 October 2021 (see Appendix E), respectively, GSC and NSC rejected NCOPL's offers on the basis that:
- in the case of NSC, it rejected NCOPL's methodology and considered that the entire amount (i.e. 1% of CIV) should go to NSC because the Project is wholly located in its LGA; and
- in the case of GSC, it accepted NCOPL's methodology but considered that the total to be shared between the Councils should be increased to 1.764% of CIV, since that was the figure used by Whitehaven for its recent Vickery Extension Project, which is located primarily in Gunnedah Shire but also crosses the LGA boundary into Narrabri Shire.

446. While NCOPL has continued to meet regularly with representatives of both NSC and GSC, it considered it appropriate to delay formally replying to this correspondence, or making any other VPA offers, until the NSW local government elections are held on 4 December 2021 and the new councillors are in place for both Councils.

447. Consequently, it has not been possible for the VPAs to be finalised before the Department completes its assessment and presents its report to the Commission for determination. Therefore, the VPAs are

matters which must be finalised by NCOPL and the two Councils during the Commission's public hearing and determination processes, or by way of conditions, or both.

448. The EIS reports that NCOPL would continue to provide funding contributions to local community programs and groups during the life of the Project. However, the extent, regularity and destinations of these contributions are not specified.

449. NCOPL's and Whitehaven's FY19 contributions (in the form of sponsorships and donations) in the region were $150,800 in the Narrabri LGA and $530,900 in total across the region where Whitehaven operates. Whitehaven staff also donated an additional $47,651 via payroll donations in FY18. Over the period FY15 to FY19, Whitehaven made several higher-value, longer-term donations to the region including $560,000 to the Westpac rescue helicopter.

Monitoring and Management

450. It is the Department's usual practice to recommend the preparation and implementation of a Social Impact Management Plan for coal mining projects that have a significant social impact, particularly in the case of new 'greenfields' mine proposals.

451. However, given that the Project represents an extension of an existing underground mine that has been operating for over a decade and that the surrounding district has a very limited population, the Department considers that the need for ongoing community consultation and awareness would be adequately met by standard conditions requiring that NCOPL provide for:

- continued operation of the Narrabri Mine's existing Community Consultative Committee (CCC), in accordance with the Department's *Community Consultative Committee Guidelines: State Significant Projects* (2019);
- appropriate notification to landowners regarding voluntary acquisition and mitigation rights;
- appropriate notification to landowners and tenants regarding exceedances of air quality or noise criteria; and
- extensive access to Project information via NCOPL's website, including:
    - regular reporting on environmental performance in accordance with reporting requirements in plans or programs approved under the consent;
    - a complaints register, updated monthly;
    - Annual Reviews of the development; and
    - minutes of the CCC's meetings.

Summary

452. There would be up to 20 additional contractor construction personnel at various times during the Project's operation. The impact of the Project on the demand for local services would be very limited. The additional social costs of the Project are very low and are greatly outweighed by the social benefits associated with permanent and construction-related employment.

453. The Department considers that the EIS has assessed the social costs and benefits of the Project in significant and sufficient detail. NCOPL would implement a variety of mitigation and adaptive management measures to limit, manage and monitor the social impacts of the Project.

6.9 Heritage

Aboriginal Heritage

454. An Aboriginal Cultural Heritage Assessment (ACHA) was undertaken for the Project by Whincop Archaeology Pty Ltd (Whincop). A total of 11 Aboriginal stakeholders registered an interest in the Project (the RAPs) and were consulted in relation to the ACHA process.

455. Following review of desktop investigations and more recent surveys results, a total of 60 Aboriginal cultural heritage sites were identified within the Project area, comprising 36 surface artefact scatters, 22 isolated artefacts, and two grinding groove sites. Five of the sites (including four artefact scatters and one set of grinding grooves) were assessed as being of moderate scientific or archaeological significance. The remaining 55 sites were assessed as being of low scientific significance.

456. Whincop also undertook a 'cultural values assessment' for the Project. During the field surveys, archaeologists also encouraged RAPs to provide any relevant cultural information or values. No specific spiritual, traditional, historical or contemporary associations and attachments were identified by RAPs for the Project area. However, RAPs hold the view that all Aboriginal objects and sites are important due to their interconnectivity with the natural landscape and their testimony to ancestors' presence in the landscape.

Surface Disturbance

457. Whincop assessed the potential impacts from surface development for the Project on Aboriginal cultural heritage sites. The design of the indicative Surface Disturbance Footprint would avoid all known Aboriginal cultural heritage sites. Therefore, none of the 60 known Aboriginal cultural heritage sites would be directly impacted by the Project.

Subsidence Impacts

458. Because of NCOPL's surface disturbance avoidance strategies, the principal risk from the Project to Aboriginal cultural heritage sites is subsidence. However, mine subsidence is generally considered to carry negligible risks for Aboriginal heritage sites located on soil and similar 'flexible' surfaces. That is, the 36 artefact scatters and 22 isolated artefact sites are not considered to be at risk of impacts from subsidence-induced ground movements. Consequently, it is the two grinding groove sites which require more detailed consideration.

459. One of these (Longsight GG1, located above LW 210) comprises two deteriorated grinding grooves located on sandstone boulders within a drainage line, and was assessed in the ACHA as being of low scientific significance. The subsidence assessment notes that the two boulders are disconnected from bedrock (i.e. they 'float' on the surface) and are therefore unlikely to be impacted by subsidence, since loose boulders ('floaters') are unlikely to crack.

460. However, the other site (Mayfield GG1, which was assessed as being of moderate scientific significance and is located above LW 205) is thought to be located on sandstone bedrock and, therefore, was assessed in the subsidence assessment as having a 'possible to likely' potential for cracking.

461. Mayfield GG1 is a small site containing at least 48 grinding grooves, ranging in condition from deteriorated to good and grouped in six clusters on several small sandstone slabs in and adjacent to a small drainage line (see **Figure 9**). The ACHA states that its inspections could not determine whether some or all of these sandstone slabs are floaters or connected to bedrock. The ACHA proposes further

investigation of possible connection to bedrock in consultation with a qualified archaeologist and the RAPs.

462. The Department inspected the Mayfield GG1 site and concurs with the ACHA that it is not certain whether some or all of the six clusters are located on outcrop or on floaters. It therefore endorses the proposed additional investigations. However, it considers that it is "more likely than not" that at least some of the clusters are located on bedrock, given the exposures of bedrock in the adjacent drainage line.

463. Due to high predicted tilt, the subsidence assessment predicts the potential for cracking at the site as being "possible to likely' and the erosion potential as being "possible". However, the Department notes that the erosion potential would be greatly mitigated by the existing slopes at the site. The increased tilt (towards the centre of the longwall trough) is into an uphill slope. If anything, erosive potential on this slope may therefore decrease.

Figure 9 | ACHA inspection of Mayfield GG1 site *(Source: ACHA)*
NB. The drainage line runs from lower right to middle left, across the larger exposed rocks

464. The Department also notes that the sandstone outcrops and possible floaters at this site shows signs of vertical discontinuities (i.e. soil and erosion between them, probably based on jointing, see **Figure 9**). In addition, the area of probable outcrop is quite small in the overall landscape. For these reasons, it is reasonable to postulate that the outcrops are underlain and surrounded by less resistant materials. If such is the case, then subsidence movements are more likely to be absorbed by these softer materials rather than to be transferred and fully impact the surface outcrops. In other words, it is possible that these outcrops would act like floaters, even if they are in fact bedrock, because of the extent of regolith formation in the area.

465. The Department also notes that researchers Regal and Reeves published a review in 2017 of 206 Aboriginal cultural heritage sites in the Southern Coalfield subject to mining subsidence since 1990.[27] All of these sites were in solid rock (i.e. sandstone rock shelters and grinding groove sites). While 22 of the sites showed potential mining-related cracking (10.7%), all of these sites were rock shelters. That is, none of the impacted sites were grinding grooves.

466. The EIS does not propose any substantial protective (i.e. avoidance) measures for this site. However, any such measures would come at a very significant cost. The only protective measure likely to reduce the risk of potential impacts would be to leave a portion of LW 205 unmined. Such a 'coal barrier pillar' would have to be at least 100 (more likely 200) metres in length to avoid significant subsidence-related strains developing at the site. A 200 m barrier panel would leave some 457,500 t of ROM coal in place, which would have led to some 450,200 t of product coal, (worth, according to the EA, some $49.34 million). There would also be significant additional costs associated with a 'longwall changeout' and additional first workings development required for a 'take-off road' and an 'installation road', which would also extend into many millions of dollars.

467. Instead, the EIS proposes that management of Aboriginal cultural heritage sites at risk of subsidence impacts would be essentially 'reactive'. These mitigation measures have been developed in consultation with the RAPs. The EIS proposes that:

- where subsidence-related impacts such as surface cracking are identified within the boundary of an existing site of moderate (or high) scientific significance, or where remediation works are required to address subsidence impacts, the site would be inspected by a qualified archaeologist to determine the nature and extent of impacts, and whether mitigation is required or feasible, and
- mitigation measures may include further monitoring, surface collection or open area salvage excavation (if feasible). Any proposed mitigation measures would be outlined in the revised Narrabri Mine Aboriginal Cultural Heritage Management Plan (ACHMP).

468. The Department considers that these measures are reasonable, particularly given what its view of a 'limited likelihood of significant impacts' at the site, the assessed moderate scientific value of Mayfield GG1, and the very high costs of the only feasible avoidance strategy.

469. Heritage NSW, the agency responsible for regulating Aboriginal heritage and its protection, did not have any significant concerns over the ACHA. It accepted the ACHA's findings and considered that the Project would have "a minimal impact" on Aboriginal cultural heritage. The Department agrees and considers that the Project's overall impacts on Aboriginal cultural heritage are unlikely to be significant or widespread.

470. The Department considers that Aboriginal cultural heritage would be appropriately managed under its standard conditions of consent for underground coal mines. These include requirements to prepare and implement an ACHMP for the Project as well as a Heritage Management Plan (addressing both Aboriginal and historic heritage) as a component of each Extraction Plan. Proposed conditions require NCOPL to consult with Heritage NSW and the RAPs during preparation of each of these plans.

Historic Heritage

471. The EIS included a Historical Heritage Assessment (HHA), which was undertaken for the Project by Niche Environment and Heritage (Niche) in accordance with applicable guidelines and included a

[27] Regal, R and Reeves, J. 2017. 'Overview of the monitoring of sandstone overhangs for the effects of mining subsidence in the Southern Coalfields.' In Mine Subsidence Technological Society, 10th Triennial Conference Proceedings, Mine Subsidence: Adaptive Innovation for Managing Challenges.

review of heritage registers for listed historical heritage items located in the vicinity of the Project. The review found no items of State heritage significance within or close to the Project area. There were also no items of local heritage significance (i.e. items listed in the Narrabri LEP) within or close to the Project area.

472. Niche also conducted site inspections of the Project area (both by vehicle and targeted on-foot surveys) to identify any items of potential heritage significance. These surveys found that the area has no identifiable heritage values, with no areas of significance or archaeological potential identified.

473. Further, the HHA considers that, as the ground surface has been significantly disturbed by previous agricultural practices, it is unlikely that any remains of historical value could be exposed or impacted during Project activities.

474. The EIS therefore concludes that the Project would have no direct or indirect impact on any items or areas of heritage significance and would not affect the heritage values of the Narrabri region. The Department accepts this assessment.

475. The EIS includes commitments by NCOPL to stop work, appropriately investigate, and manage heritage values in the "unlikely event that historical archaeological relics were to be discovered during surface disturbance activities." The Department considers that this commitment is sufficient and that no other conditions to manage historic heritage are necessary.

Monitoring and Management

476. The Department has recommended conditions to manage and mitigate impacts on heritage values including:
- performance measures to ensure no impacts above those predicted in the assessment documents;
- protocol for managing unknown finds during site activities; and
- preparation and implementation of an ACHMP, prepared in consultation with Heritage NSW and RAPs;

Summary

477. The Project would avoid direct impacts on known Aboriginal heritage sites through avoidance principles, however there is potential for two grinding groove sites to be impacted due to cracking from subsidence effects, with one of the sites having moderate scientific significance. NCOPL proposes to monitor impacts and undertake any necessary remediation in consultation with RAPs.

6.10 Other issues

478. Apart from the key issues considered in detail above, there are a number of other issues that were raised in the EIS or in submissions. The Department's consideration of these other issues summarised in **Table 12** below.

Table 12 | Other Issues

Issue	Findings	Recommended Conditions
Noise	There are relatively few residential receivers in the vicinity of the Project, with around 20 rural property residences located within 5 km of the Project boundary. The closest receivers are located eastwards of the Pit Top Area and primarily east of the Kamilaroi Highway. The Project involves limited additional construction and no changes in the scale or nature of surface operations. The Mine's Pit Top Area and the associated activities would remain essentially unchanged. However, two additional large ventilation shafts would need to be constructed and operated, as would the Southern Mine Water Storage. In addition, the existing noise footprint associated with drilling activities and other minor surface works above the underground mine would move to the south. **Operational Noise** The EIS included a noise assessment undertaken in accordance with the *Noise Policy for Industry 2017* (NPfI). The noise assessment considered noise from the continued use of the existing surface facilities and new facilities for a range of representative mining scenarios. As required under the NPfI, the EIS included an assessment of feasible and reasonable noise mitigation measures for the Project, particularly in relation to reducing potential noise impacts at the receivers located closest to the new ventilation complexes. These steps included applying the use of directional fans at the downcast ventilation shafts to minimise noise emissions towards residential receivers. Following application of all feasible and reasonable noise mitigation measures, the noise assessment indicates that, under adverse meteorological conditions, the Project would meet the project trigger noise levels (PNTLs) established in accordance with the NPfI at all nearby residential receivers, bar four. Once receiver (identified in the EIS as 601a) is subject to significant exceedances and would therefore be entitled under the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) to both voluntary acquisition and also voluntary noise mitigation measures (including architectural treatments). NCOPL has recently advised that it has now acquired this property. Marginal or moderate exceedances are predicted in the night period or both the evening and night periods for two receivers (670a and 675a). However, NCOPL has advised it has entered into private agreements with the owners of both these	The Department recommends that contemporary noise impact assessment criteria are included in any consent granted for the Project and has drafted conditions to this effect.

Issue	Findings	Recommended Conditions

residences such that they would accept these exceedances.

The fourth receiver (687a), would experience noise levels 0-2 dBA above the PNTL during the night-time period. Exceedances of the PNTL by 1-2 dB(A) are deemed to be 'negligible' under the NPfI and most people cannot readily discern such differences in noise levels.

The noise assessment also included consideration of cumulative noise impacts and sleep disturbance impacts. Cumulative noise impacts (from the Project together with the Narrabri Gas Project) would be minimal. One receiver (670a) is predicted to experience exceedances of the LAeq (15 min) sleep disturbance criterion.

Construction Noise

Surface construction activities would generally be undertaken between 7.00 am to 6.00 pm Monday to Sunday, although some construction works (e.g. ventilation shaft drilling, other surface drilling and underground development) would take place on a 24 hour per day basis.

Noise associated with these activities was considered as part of operational noise under the NPfI and would be managed under the proposed operational noise limits.

Road Noise

Given that all coal from the Project would be transported by rail, the main contributors to Project-related road noise are the arrival and departure of workers during shift changes and deliveries to the site. The noise assessment focused on the Kamilaroi Highway as the road most likely to be affected by noise generated by the Project's road transport movements.

The road traffic noise levels resulting from total (i.e. Project and non-Project) traffic movements were predicted to comply with relevant criteria set out in the *Road Noise Policy* at all privately-owned receivers on the Kamilaroi Highway for all Project years.

Rail Noise

The Werris Creek Mungindi Railway is used to carry all product coal from Narrabri Mine to the Port of Newcastle for export. The existing consent permits transport of product coal only via rail. The Project is not seeking to change this method of transport.

Product coal would continue to be loaded onto trains at any time, 24 hours per day, seven days per week. Consistent with existing operations, an average of four trains would be loaded each day, with a maximum of eight trains each day during peak coal transport periods.

Issue	Findings	Recommended Conditions
	The noise assessment includes a contemporary assessment of potential noise impacts from rail traffic generation, conducted in accordance with the *Rail Infrastructure Noise Guideline* (RING). The Project would result in no change to peak or average daily train movements. In accordance with the RING, there would accordingly be no Project-related rail noise increase on the Werris Creek Mungindi Railway. **Conclusion** The EPA considered that the methodology and conclusions in the noise assessment were adequate. The Department is similarly satisfied. The Department notes that the current Narrabri Mine has relatively low levels of noise emissions and that the Project is not anticipated to lead to any significant increase in these emissions. Accordingly, the Department considers that standard noise management conditions would be sufficient to manage the noise from the Project.	
Air Quality	The EIS includes an assessment of particulate matter (i.e. dust) emissions and other potential air quality impacts from the Project, undertaken in accordance with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. Potential sources of dust emissions from the Project include the Pit Top Area (primarily from the handling of ROM coal and product coal, and wind erosion from these stockpiles); upcast ventilation shafts; construction of the ventilation complexes and Southern Mine Water Storage; roads and tracks, drilling and related activities; and ongoing and final rehabilitation. The air quality modelling predicts that the Project would not cause (or contribute to) any exceedance of any particulate matter criterion at any privately-owned receiver, including 24-hour average PM10, 24-hour average PM2.5, annual average PM10, annual average PM2.5, annual average total suspended particulates (TSP), or monthly and annual average dust deposition criteria. Apart from the temporary and localised impacts associated with construction, the most significant air quality impacts additional to the existing mine's emissions are those resulting from the new upcast ventilation shafts. This is because the Project does not propose any changes to the existing mine's rates of ROM coal production and transport. Thus, while modelling of future impacts is valuable, the best data on which to assess the expected air quality impacts of the Project are the existing background and mine monitoring data. Dust deposition, TSP, PM10 and PM2.5 data are collected from a number of air quality monitors in the vicinity of the Project and wider area, including monitors operated by NCOPL, other Whitehaven mines, BCS and EPA.	The Department recommends that a comprehensive suite of contemporary air quality management conditions is included in any consent given to the Project. These would: • ensure that no offensive odours are emitted from the site; • apply contemporary air quality criteria (including new PM2.5 criteria); • apply a broad suite of preventative air quality and GHG emission operating conditions; and • require preparation and implementation of a detailed

Issue	Findings	Recommended Conditions
	PM10 concentrations are measured by two high volume air samplers located near the Pit Top Area. Since 2014, the only exceedances of the 50 µg/m³ 24-hour average criterion recorded at these sites were in 2018 and 2019 and were associated with either regional dust storms or bushfire events, associated with the significant drought prevailing across eastern Australia during those two years. The annual average PM10 concentrations at the two samplers increased during those years to between 18 µg/m³ and 25 µg/m³ from between 7 µg/m³ to 10 µg/m³ in the previous years (as against the current standard of 25 µg/m³). NCOPL operates 11 dust deposition gauges in the vicinity of the Narrabri Mine. During the 2014 to 2019 period, there were no exceedances of the relevant criterion of 4 g/m^2/month. Key dust mitigation measures that would be undertaken for the Project include spraying the surfaces of ROM and product coal stockpiles and unsealed haul roads, and enclosing the CHPP and coal conveyors where applicable. **Odours and Other Emissions** Unpleasant odours may sometimes occur at underground coal mines, for example from upcast ventilation shafts located relatively close to residences. However, such odours are very unlikely to be problematic at the Project since the ventilation shafts are located a substantial distance from any sensitive receptor. In 2019, Narrabri Mine recorded four complaints relating to odour from the Pit Top Area, which was found to result from algal growth and anerobic conditions within some of the brine storage ponds. This situation has been corrected by management action to minimise the anaerobic zones in the dams through circulation of water via pumps; and limit algal food sources for odour-generating bacteria by dosing the dams with algaecide. **Spontaneous Combustion** Some coals and coaly wastes are prone to relatively rapid oxidisation in the presence of atmospheric oxygen, which may lead to self-heating and eventually to spontaneous combustion (‘sponcom’), where the affected material ignites. Sponcom leads to emission of noxious gases (including carbon dioxide, carbon monoxide, sulphur dioxide, hydrogen sulphide, nitrogen oxides and a range of volatile organic compounds) and potentially to unpleasant or offensive odours and also fire hazards. The coal and coal waste at Narrabri Mine does not have a high risk of spontaneous combustion, but a number of sponcom events have occurred in the past. In addition, there is a need for ongoing monitoring for evidence of self-heating in the goaf area, behind the longwall, largely for mine safety reasons. Consequently, the Department recommends that any consent granted for the Project include a requirement to prepare	Air Quality and Greenhouse Gas Management Plan.

Issue	Findings	Recommended Conditions
	and implement a Spontaneous Combustion Management Plan. **Conclusion** The Department is satisfied that the Narrabri Mine emits relatively low levels of particulate matter and other air pollutants and that the Project is unlikely to lead to any significant increase in these emissions.	
Traffic and Transport	The Kamilaroi Highway provides road access to the Narrabri Mine's Pit Top Area and the Project area. The Mine Access Road turns west from the Highway, and crosses both Kurrajong Creek Road and the Werris Creek - Mungindi Railway (at LX534) before reaching the Pit Top Area. The Project would not change this general arrangement. A Road Transport Assessment, conducted in accordance with the *Guide to Traffic Generating Developments* (Roads and Traffic Authority, 2002), concluded that: • the levels of service experienced by drivers on the Kamilaroi Highway would remain good and drivers would experience little or no delay to their travel as a result of other vehicles; • the Project would not exacerbate existing road safety issues with the operation of the road network; and • no specific measures or upgrades are required to mitigate the impacts of the development on the capacity, safety and efficiency of the road network as a result of the changed road traffic conditions associated with the Project. The Mine Access Road and its intersection with the Kamilaroi Highway were constructed following approval of Stage 1 of the Narrabri Mine, in November 2007. No upgrades of the intersection were required as part of the Stage 2 approval. However, in respect of the current Project, TfNSW advised that approval should be made contingent on further upgrade of the intersection, for road safety reasons. The essential reason for this is that the number of employed staff and contractors at the mine have increased very significantly since the Stage 1 approval in 2007 (from a peak operational workforce of 113 employees to around 520 personnel as at the date of the EIS, plus up to 60 personnel for new bord and pillar mining operations). TfNSW considers that, in both the southbound right-hand-turning storage lane and the northbound left-hand-turning storage lane, there is insufficient space to ensure that through traffic on the Highway is not presented with a safety hazard by stored vehicles extending into the through lanes, or vehicles rapidly decelerating to join the line of stored vehicles. TfNSW and the Department both accept that this road safety risk is likely to occur only occasionally – i.e. when peak mine-related traffic coincides with closure of the level crossing. This can occur during shift changeover times, if long, slow coal trains are either arriving or departing during those peak traffic periods. This risk, even if occasional, is nonetheless	The Department has proposed conditions for the Project which require that NCOPL: • amend its Traffic Management Plan to include measures ensuring that mine shift changeovers do not (so far as is practicable) conflict with use of the Kurrajong Creek Road railway level crossing by arriving and departing coal trains; • amend its Drivers' Code of Conduct to include procedures to ensure that drivers implement safe driving practices at the Kurrajong Creek Road railway level crossing and the intersection of the Mine Access Road with the Kamilaroi Highway; • upgrade the intersection of the Kamilaroi Highway and the Mine Access Road, or an

Issue	Findings	Recommended Conditions
	significant. The Department also notes that the current Project seeks to set road safety requirements until 2044. On this basis, both TfNSW and the Department consider that the risk must be removed by satisfactory improvements to the intersection of the Mine Access Road and Kamilaroi Highway. These improvements would probably take the form of increased length to both the southbound right-hand turning storage lane and the northbound left-hand turning storage lane, although other solutions or alternative measures may also be acceptable. NCOPL has accepted the agencies' position and has agreed to make a "proportionate contribution" to upgrade the intersection. TfNSW and the Department also considered this matter during assessment of NCOPL's Stage 2 Mod 7 application, which was recently determined by a Departmental delegate of the Minister. TfNSW agreed that the additional workforce associated with Mod 7 (i.e. 60 FTE) should be bussed to Narrabri Mine until the upgrades to the intersection were finalised. The Department has recommended a range of transport conditions, including a requirement for NCOPL to upgrade the intersection of the Mine Access Road and Kamilaroi Highway to the satisfaction of TfNSW. **Rail Transport Impacts** Currently, all product coal from Narrabri Mine is transported via the Werris Creek - Mungindi Railway to the Port of Newcastle. Existing conditions of consent prevent the transport of coal by road. The Project does not seek to change this situation and also would not increase the number of coal train movements, either per day or per annum. The Australian Rail Track Corporation (ARTC) has indicated that there is sufficient rail capacity to accommodate the Project until 2044. NCOPL would also continue to work with ARTC on access arrangements to the Hunter Valley coal rail network during the Project life. The Project would not change existing impacts relating to transport of product coal by rail. The Department recommends conditions of consent which would require that coal is only transported from the site by rail. It considers that no other conditions of consent are required.	approved alternative measure, to the satisfaction of TfNSW and the Secretary, as soon as is reasonable and feasible following the commencement of the development. • maintain the Mine Access Road's intersections with Kamilaroi Highway and Kurrajong Creek Road; and • enter into an agreement with NSC to fund the maintenance of Greylands and Scratch Roads.
Rehabilitation and Mine Closure	Narrabri Mine already has conditions of consent and conditions on its mining lease which require and regulate rehabilitation. The Stage 2 consent for the mine requires development and implementation of a Rehabilitation Management Plan and a Mine Closure Plan. The Project would not require significant changes to the final landform design currently approved under these plans and the Mine's mining lease. The conceptual final landform for the Project would continue to generally approximate the pre-mining landscape with the exception of the REA and the relatively benign surface impacts from subsidence in the	The Department recommends the imposition of standard rehabilitation conditions.

Issue	Findings	Recommended Conditions
	underground mining area. The conceptual post-mining land use of the Project would continue to comprise a combination of native vegetation, pasture and forestry land uses. Project infrastructure may be retained for alternate post-mining uses, if agreed with relevant regulatory authorities and landowners. The rehabilitation goal for the overall mining area is to reinstate the cover and connectivity of native woodland and re-establish agricultural land to a land capability comparable to the pre-disturbance environment. The EIS has a figure displaying conceptual final rehabilitation domains for the Project, including the indicative Mine Site Ecological Rehabilitation Area. A detailed description of rehabilitation and mine closure is provided in Attachment 5 of the EIS. The Department notes there is a comprehensive regulatory regime for mine site rehabilitation under the *Mining Act 1992*, and the mining leases would incorporate enforceable rehabilitation objectives and requirements for NCOPL to pay a rehabilitation bond for the full cost of rehabilitating the site in accordance with the mining leases and the development consent. In addition, the Department has recommended the standard conditions of consent that establish a comprehensive set of rehabilitation objectives, require progressive rehabilitation of site disturbance (i.e. as soon as reasonably practicable following disturbance), and require both a Rehabilitation Strategy and a Rehabilitation Management Plan.	
Impacts to Built Features	Subsidence caused by mining could potentially impact built features within and near the Project area. However, the Department considers that the standard conditions of consent for underground coal mines would be adequate to protect both publicly-owned and privately-owned infrastructure. The standard conditions include performance measures that require: • built features to always be kept safe; • serviceability to be maintained wherever practicable; • loss of serviceability to be fully compensated; and • damage to be fully repaired or else replaced or fully compensated The standard conditions would also require that NCOPL prepare an Extraction Plan (or Plans) for the Project and, following approval by the Department, implement these plans. As a component of each Extraction Plan, a Built Features Management Plan would consider potential impacts to all built features, including dwellings and farm dams. The plan would be developed in consultation with any affected owners.	The Department recommends standard conditions. No additional specific conditions are required.
Visual Impacts	The EIS assessed the potential visual impacts of the Project by evaluating the level of visual modification in the context	The Department recommends

Issue	Findings	Recommended Conditions
	of the visual sensitivity of surrounding areas. As the Project primarily involves continued use of the existing Pit Top Area (with minor upgrades and extensions), the extent to which viewers may have become accustomed to existing visual modifications was also considered. The existing amenity bund adjacent to the Pit Top Area would continue to be maintained for the life of the Project. Surface infrastructure would be progressively decommissioned and rehabilitated and returned to land uses compatible with the surrounding land uses (e.g. agriculture or native vegetation). If gas flaring is required, then flares would be constructed via the enclosed flare method and internally insulated to reduce luminosity. Measures to mitigate potential impacts from night-lighting (including sky glow) would also be applied. No agency expressed concerns relating to predicted or potential visual impacts. The Department considers that the visual impacts of the Project are very low.	standard conditions. No additional specific conditions are required.

7 Evaluation

479. The Department has assessed NCOPL's development application, EIS, Submissions Report, Amendment Report and other information provided and has carefully considered:
    - submissions received from members of the community and special interest groups;
    - advice received from State and local Government agencies; and
    - advice provided by the IESC and the Mining Panel.

480. The Department has also considered the objectives of the EP&A Act, including the ESD principles, and relevant considerations under section 4.15(1) of the EP&A Act. The Department has given particular consideration to the EIS's Section 7, which seeks to evaluate the Project's merits against applicable statutory and strategic planning requirements.

481. Based on this assessment, the Department considers that NCOPL has designed the Project in a manner that achieves an appropriate balance between maximising the recovery of recognised coal resources of State significance and minimising its potential environmental and social impacts.

482. The Department considers the site to be well-suited for the Project. The site is an existing underground coal mine with existing surface facilities, including rail loading facilities. The Project represents an extension of the existing mine.

483. Many of the key elements of the Project have been subject to previous assessment, and the mine has been operating for over a decade with a range of measures to control or reduce impacts (and no major issues or complaints). The Project does not involve any changes to the proposed rate of coal extraction or processing, and very limited changes to the mine's key surface facilities.

484. The landscape features relatively simple landforms with few significant natural features. The land within the Project area is characterised by a semi-arid climate with ephemeral watercourses. The terrain is gently undulating (generally sloping west to east), and is not deeply incised which can exacerbate subsidence impacts (e.g. as seen in the Southern Coalfield).

485. However, the longwall panels would be some of the longest (10 km) and widest (400 m) in Australia. This leads to relatively high levels of subsidence, a highly fractured zone above the mine workings, and associated impacts on water resources. The Narrabri Mine is also a relatively 'gassy' mine, which leads to fugitive GHG emissions andi.e. a need for extensive ventilation infrastructure at the surface, leading in turn to associated impacts on biodiversity.

486. Consequently, the key issues for this assessment are the potential impacts on groundwater, surface water and biodiversity, and GHG emissions.

487. In regards groundwater resources, the Department considers that the two regionally important aquifers – the Namoi Alluvium and Pilliga Sandstone – would not experience any significant water quantity or quality impacts, and that such impacts would not exceed the AIP's 'minimal harm' test.

488. However, nine private groundwater bores are predicted to experience more than 2 m of drawdown. While some of these impacts may not occur for decades, NCOPL has already initiated contact with landowners and committed to make good "during the Project's operational phase". The Department has proposed conditions which strongly encourage these agreements to be completed within two years of commencing development under any consent granted for the Project.

489. The Department also considers that NCOPL would be able to obtain all necessary entitlements for the predicted groundwater take, which reaches a peak of 2.65 gigalitres per year.

490. In regards to surface water resources, the Department considers that the risks of soil erosion, ponding and sedimentation are well understood at Narrabri Mine and are able to be satisfactorily managed for the Project. The Department recommends application of its standard conditions to manage, mitigate and remediate these impacts.

491. The EIS predicts that the Project would require up to 44 ML/year (during its operational life) and up to 193 ML/year (during post-mining peak drawdown) in surface water entitlements from the *Lower Namoi Regulated River Water Source*. The Department considers that the Project's surface water licensing requirements are not excessive and are well capable of being adequately predicted, monitored and accounted for by NCOPL using its existing entitlements.

492. All recommendations of the Mining Panel regarding mine subsidence and potential impacts on groundwater and surface water resources have been accepted by NCOPL. The Department has proposed conditions to give these recommendations effect.

493. In regards to biodiversity, as a result of the large Project area and the gassy nature of the mine, with the consequent need for mine ventilation and gas extraction for mine safety, the Project requires a comparatively large area of surface disturbance to facilitate underground mining compared to other underground mines in NSW.

494. Some 617 ha of additional native vegetation and habitat for threatened species would be required to be progressively cleared or impacted by subsidence. However, the Department notes that, as this is an extension of an existing mine and the existing Pit Top Area would continue to be used, there are efficiencies and benefits compared to a greenfield mining operation.

495. The Project was amended to reduce impacts on native vegetation, with reductions of 33 ha of woodland, 18 ha of derived native grassland and 0.7 ha of Belah Woodland. NCOPL has committed to ongoing review of the disturbance footprint through detailed design to further reduce impacts through the Extraction Plan process, with any disturbance to be progressively rehabilitated. NCOPL would also continue to maximise the use of UIS pre-mining gas drainage where feasible, which would reduce surface disturbance.

496. The Department considers that the impacts on biodiversity values from direct and indirect impacts could be suitably avoided, mitigated and/or offset. While there is extensive clearing required, this would be undertaken progressively over the life of the Project, with impacts required to be offset prior to commencing each phase of the Project. The Department has recommended conditions to manage and regulate these impacts. Rehabilitation would also be undertaken progressively.

497. In regards to GHG emissions, the Project would lead to significant Scope 1 GHG emissions, which are dominated by the fugitive emissions associated with the mining of coal. It is appropriate that direct GHG emissions over the life of the Project, particularly fugitive emissions, are minimised.

498. The Department has given careful consideration to the full range of opportunities that might exist (either now or in the future) to address fugitive emissions. The Department has generally adopted the Commission's approach to GHG emissions in the recent Tahmoor South Project, but also proposed to take it one step further by establishing a mechanism to independently review emissions and potentially 'ratchet down' over time. To support this process, the role of NSW's existing independent Mining Panel would be specifically expanded to include the provision of advice on GHG emissions.

499. Consequently, the Department has recommended the following comprehensive suite of conditions to manage, mitigate and offset GHG emissions:
    - preparation and implementation of a Fugitive Emissions Minimisation Plan (to be updated and reviewed every 3 years), in consultation with the independent Mining Panel and key NSW government agencies, to ensure that GHG emission abatement technology continues to be comprehensively investigated and adopted;
    - setting performance measures for Scope 1 fugitive emissions intensity based on peak, 5 year rolling average and Project life targets, with offsetting requirements where the performance targets are not met, and ongoing review of the performance targets based on implementation of best practice as determined through the Fugitive Emissions Minimisation Plan;
    - requiring implementation of energy efficiency measures and acquisition of green energy to reduce Scope 2 emissions;
    - preparation and implementation of comprehensive Gas Extraction Plans as a component of each Extraction Plan; and
    - regular reporting through Annual Reviews, End of Panel Reports and the three yearly review of the Fugitive Emissions Minimisation Plan.

500. The Department considers that these conditions would maximise the mitigation of GHG emissions over the life of the Project.

501. The Department has assessed the impacts of the Project on several other issues including rehabilitation and mine closure, traffic and amenity impacts (including noise, dust and visual/lighting impacts). The Department considers that, following implementation of reasonable and feasible mitigation measures, the residual impacts of the Project can be suitably managed and/or offset.

502. The Department recognises that the Project would provide major economic and social benefits for the region and its surrounding region and to NSW, including:
    - direct capital investment of $404 million (NPV) in the Project;
    - continuation of an existing c. 520 jobs at the Narrabri Mine, together with c. 20 new construction jobs during Project development phases;
    - estimated net benefit to NSW of $599 million (NPV), as reduced by alternative consideration of GHG Scope 1 and 2 cost apportionment;
    - direct revenue for the NSW State Government, including more than $259 million in royalties and $177 million in company tax; and
    - estimated increase in disposable income of $317 million (NPV) for the 218 workers expected to live in the Project Region.

503. The Department has carefully weighed the environmental impacts of the Project against the significance of the Project's identified coal resources and the socio-economic benefits associated with continued operation of the Narrabri Mine for a further 13 years (from 2031 until 2044). On balance, the Department believes that the Project's benefits significantly outweigh its residual costs, and that it is in the public interest and is approvable, subject to the recommended conditions.

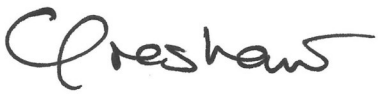
504. The Department has recommended a comprehensive and precautionary suite of conditions to ensure that the Project complies with acceptable criteria and standards, that the impacts are consistent with those predicted by NCOPL in its documentation, and that residual impacts are effectively minimised, managed and compensated.

505. The recommended suite of conditions was provided to key NSW Government agencies and their comments taken into account. The Department considers that the conditions reflect current best practice for the regulation of underground coal mining projects in rural NSW.

506. This assessment report is hereby presented to the Commission to determine the application. Recommended conditions of approval are included (see **Appendix H)**.

19/01/2022

Stephen O'Donoghue
Director
Resource Assessments



19/01/2022

Clay Preshaw
Executive Director
Energy, Resources and Industry Assessments

Appendices

Appendix A – Environmental Impact Statement

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731 under 'EIS'

Appendix B – Public Submissions

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731 under 'Submissions'

Appendix C –Submissions Report

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731 under 'Response to Submissions'

Appendix D – Amended Development Application

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731 under 'Amendments'

Appendix E – Agency Advice

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731 under 'Agency Advice'.

Agency	Advice
Department of Planning and Environment	
Biodiversity Conservation and Science Directorate (BCS)	• BCS – Advice on EIS • BCS – Advice on Submissions and Amendment Reports – 16 June 21 • BCS – Advice on Submissions and Amendment Reports – 14 Oct 21
Water Group (DPE – Water)	• DPE Water – Advice on EIS • DPE Water – Supplementary Advice on EIS • DPE Water – Advice on Submissions and Amendment Reports • DPE Water – Supplementary Advice on Submissions and Amendment Reports
Crown Lands	• Crown Lands – Advice on EIS • Crown Lands – Advice on Submissions and Amendment Reports
Heritage NSW	• Heritage NSW – Advice on EIS • Heritage NSW – Advice on Submissions and Amendment Reports

Agency	Advice
Climate and Atmospheric Science (CAS) Branch within Environment Energy and Science Division`	• CAS – Advice on EIS, Submissions and Amendment Reports and Additional Information
Environment Protection Authority	• EPA – Advice on EIS • EPA – Advice on Submissions and Amendment Reports
Department of Regional NSW	
Mining, Exploration and Geoscience	• MEG – Advice on EIS • MEG – Advice on Submissions and Amendment Reports
NSW Resources Regulator	• Resources Regulator – Advice on EIS • Resources Regulator – Advice on Submissions and Amendment Reports
Department of Primary Industries	
NSW Agriculture	• DPI Agriculture – Advice on EIS • DPI Agriculture – Advice on Submissions and Amendment Reports
NSW Fisheries	• DPI Fisheries – Advice on EIS
Forestry Corporation of NSW	• Forestry NSW – Advice on EIS • Forestry NSW – Advice on Submissions and Amendment Reports
Transport for NSW	• TfNSW – Advice on EIS • TfNSW – Advice on Submissions and Amendment Reports • TfNSW – Advice on Additional Information
NSW Rural Fire Service	• RFS – Advice on EIS • RFS – Advice on Submissions and Amendment Reports
Subsidence Advisory NSW	• SA NSW – Advice on EIS • SA NSW – Advice on Submissions and Amendment Reports
Independent Experts Scientific Committee	• IESC – Advice on EIS
Local Councils	
Narrabri Shire Council	• Narrabri Shire Council – Advice on EIS • Narrabri Shire Council – Advice on Submissions and Amendment Reports • Narrabri Shire Council – Advice on Draft VPA
Gunnedah Shire Council	• Gunnedah Shire Council – Advice on EIS

Agency	Advice
	• Gunnedah Shire Council – Advice on Submissions and Amendment Reports • Gunnedah Shire Council – Advice on Draft VPA

Appendix F – Additional Information

See the Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731 under 'Additional Information'.

Subject Matter	Date
RFI – Amended BDAR & Impact Reduction Report	7 June 2021
NCOPL Response to RFI – Amended BDAR	16 September 2021
NCOPL Response to RFI – Impact Reduction Report	September 2021
NCOPL Response to RFI – BCS Advice	29 October 2021
RFI – Greenhouse Gas Emissions	22 September 2021
NCOPL Response to RFI – Greenhouse Gas Emissions	15 October 2021
NCOPL Response to RFI – Greenhouse Gas Emissions	7 December 2021
RFI – Mining Panel Advice	September 2021
NCOPL Response to RFI – Mining Panel Advice	23 September 2021
NCOPL Response to DPE Water – Submission & Amendment Reports Advice	20 September 2021
NCOPL Response to TfNSW – Supplementary Advice	22 July 2021
NCOPL Response to Forestry NSW – Supplementary Advice	2 September 2021
NCOPL VPA Offer to Narrabri Shire Council	28 July 2021
NCOPL VPA Offer to Gunnedah Shire Council	28 July 2021
Request to the Independent Planning Commission for a Public Hearing	19 November 2021

Appendix G – Statutory Considerations

The Department's assessment of the Project has given consideration to all applicable statutory requirements (see **Section 4**). Some of the key statutory requirements are addressed in further detail below.

G1 Ecological Sustainable Development (ESD)

The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*, as follows:

> *"ecological 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 ESD and its related principles and programs. The Department has also had regard to the manner in which ESD and its principles and programs are addressed in the EIS, particularly in its Section 7.4.3. A summary of the Department's consideration follows.

Precautionary Principle

The ESD precautionary principle requires that: *"if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation".*

The Department has assessed whether the Project threatens serious or irreversible environmental damage. The Department has carefully considered the material provided by NCOPL in its EIS, Submissions Report, Amendment Report and other documents and has consulted closely with key Government agencies and the Mining Panel to obtain their input and advice on various aspects of the Project.

The EIS contains a substantial number of specialist environmental impact assessments and also an Environmental Risk Assessment and a Preliminary Hazards Analysis. The Project would result in a number of environmental impacts, with the key impacts being impacts on groundwater resources and biodiversity values.

The Project incorporates a number of design measures to avoid or minimise such impacts. It also incorporates a number of other measures to mitigate, remediate or offset these and other impacts.

These measures include a range of management measures and offsets to compensate for residual impacts on biodiversity values, including the retirement of ecosystem credits for twelve PCTs and ten threatened fauna species affected by direct clearing and subsidence.

The Department's assessment has been guided by:

a. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

b. an assessment of the risk-weighted consequences of various options.

It considers that there is sufficient scientific certainty regarding environmental impacts and residual risks to enable determination of the application.

The Project would be required to be operated in accordance with a strict and comprehensive suite of conditions of consent, as well as all necessary licences and approvals related to the take, management and discharge of water (i.e. WALs, an EPL, etc). The conditions take a precautionary approach in order to avoid, mitigate, remediate or offset significant environmental consequences.

The Department considers that the recommended performance measures and other conditions of consent would provide appropriate protection for water resource and environmental values and minimise the potential for any serious or irreversible environmental damage.

Intergenerational Equity

The ESD principle of intergenerational equity requires that: *"the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations".*

The Department considers that the Project does not conflict with the principle of intergenerational equity. That is, the health, diversity and productivity of the environment would be maintained or enhanced. The required environmental offsets (i.e. ecosystem and species credits to be retired) are a key factor in this consideration, as is the proposed rehabilitation of the landscape during and following the active phases of the Project life.

The recommended performance measures and other conditions of consent would provide an appropriate degree of protection for the health, diversity and productivity of the environment and not constrain the ability of future generations to use or enjoy the Project area in a similar way as in the present and recent past.

The Department acknowledges that the mining of coal and its combustion is a major contributor to anthropogenic climate change, which has the potential to impact future generations. The Department considers that the Project's direct GHG emissions (i.e. Scope 1 and Scope 2) are significant but would constitute a very small contribution towards climate change at both the national and global scale. The Project contains proposals by which its direct GHG emissions from fugitive emissions of drained mine gas may be mitigated through flaring, which through combustion turns methane into CO_2, with its substantially reduced greenhouse intensity.

Consequently, the Department has recommended conditions that adopt, and build on, the approach taken in recent coal mining approvals, including:

- preparation and implementation of a Fugitive Emissions Minimisation Plan (to be updated and reviewed every 3 years), in consultation with the Mining Panel and key NSW government agencies, to ensure that GHG emission abatement technology continues to be comprehensively investigated and adopted;
- setting performance measures for Scope 1 fugitive emissions intensity based on peak, 5 year rolling average and Project life targets, with offsetting requirements where the performance targets are not met, and ongoing review of the performance targets based on implementation of best practice as determined through the Fugitive Emissions Minimisation Plan;
- requiring implementation of energy efficiency measures and acquisition of green energy to reduce Scope 2 emissions;

- preparation and implementation of comprehensive Gas Extraction Plans as a component of each Extraction Plan; and
- regular reporting through Annual Reviews, End of Panel Reports and the three yearly review of the Fugitive Emissions Minimisation Plan.

Scope 3 GHG emissions for the Project are significant. However, they would constitute a very small contribution towards climate change at the global scale. The accounting of these Scope 3 GHG emissions would be undertaken by the entities and nations where the Project's product coal is combusted. The Department considers that the Project's Scope 3 GHG emissions do not contravene the principle of intergenerational equity insofar as it is established and applied by NSW legislation and the applicable policy framework.

Conservation of Biological Diversity and Ecological Integrity

The ESD principle of conservation of biological diversity and ecological integrity requires that: *"conservation of biological diversity and ecological integrity should be a fundamental consideration"* in decision making processes, such as the development consent process and the environmental impact assessment process which supports it.

The Project's potential impacts on biodiversity have been a key consideration in the Department's assessment of the Project. As set out in **Section 6.5**, the Department considers that these impacts can be mitigated and/or offset to achieve beneficial long-term biodiversity outcomes in the region. NCOPL has committed to provide an appropriate offset package, comprising retirement of the required ecosystem and fauna species credits for its biodiversity impacts.

Further, it should be noted that underground coal mining, including related subsidence impacts, does not have the extensive impacts on biodiversity that open cut mining has. The areas of direct clearing are limited in comparison. Subsidence impacts on the landscape and biodiversity are also limited. The Project contains offsets for these impacts and appropriate remediation measures.

Improved Valuation, Pricing and Incentive Mechanisms

The ESD principle of improved valuation, pricing and incentive mechanisms requires that: *"environmental factors should be included in the valuation of assets and services"* in decision making processes, including by such means as the 'polluter pays' principle, full life cycle costing and cost-effective pursuit of environmental goals.

The EP&A Act establishes and supports a framework for detailed environmental impact assessment of all development applications which includes comprehensive inclusion of environmental factors. The Department's assessment of the Project has sought to comprehensively consider environmental factors.

The environmental costs of the Project have been addressed in detail and quantified to the degree possible in the cost benefit analysis prepared as part of the EA for the Project. The direct environmental effects of the Project would be internalised through the adoption and funding of the mitigation measures proposed by NCOPL or otherwise required by conditions to mitigate, remediate or offset them.

The Department's assessment has applied the 'polluter pays' principle, insofar as NCOPL would be required to pay to offset its biodiversity impacts and remediate its potential significant environmental impacts.

Many of the proposed conditions of consent are 'outcomes focused', i.e. they apply either performance measures to avoid impact or else require particular outcomes ('environmental goals'), such as remediation or further offsetting. They do not seek to codify which mechanisms must be applied by NCOPL in order to achieve these environmental goals. Consequently, they allow NCOPL to identify and pursue cost-effective solutions, including via the market-based mechanisms inherent in the State's biodiversity offsetting policies.

G2 Environmental Planning Instruments

Under section 4.15(1) of the EP&A Act, the consent authority is required to consider, amongst other things, the provisions of the relevant EPIs, including any exhibited draft EPIs.[28] The Department notes NCOPL's consideration of these instruments in its EIS (see the EIS's Attachment 7) and has undertaken its own consideration of the Project against the applicable provisions of relevant EPIs.

SEPP (Mining, Petroleum Production and Extractive Industry) 2007

Permissibility

Clause 7(1)(a) of the Mining SEPP identifies that underground mining is permissible with consent on any land. 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'.

Clause 7(1) of the Mining SEPP has the effect that the entirety of the Project is permissible with consent, notwithstanding provisions in the Narrabri LEP which would otherwise have the effect of making underground mining prohibited development (see **Section 4.2**).

Matters for Consideration

Part 3 of the Mining SEPP lists a number of matters that a consent authority must consider before determining an application for consent for development for the purposes of mining. These matters were considered in NCOPL's EIS (see Section A7.2.2 of Attachment 7). The Department has considered these matters in its assessment of the Project (throughout **Section 6**, as applicable) and has included a brief outline of key considerations below.

Non-Discretionary Development Standards (clause 12AB)

Clause 12AB identifies non-discretionary development standards for the purposes of section 4.15(2) of the EP&A Act in relation to the carrying out of development for the purposes of mining. Table A7-1 in the EIS's Attachment 7 sets out NCOPL's consideration of the applicable standards and whether or not the Project meets them. The Department agrees with this assessment.

Compatibility with Other Land Uses (clause 12)

The Department's assessment has considered the potential impacts of the Project on other land uses in the area; including land use for forestry purposes, agricultural purposes, rural dwellings, conservation purposes and the Narrabri Gas Project. This consideration has been undertaken in consideration of the public benefits of the Project and measures to avoid, mitigate and minimise any land use incompatibility.

The Department considers that, subject to the proposed groundwater bore 'make good' provisions, biodiversity offsetting measures and rehabilitation requirements, the Project is compatible with these

[28] Note that due to the effect of clause 11 of the SRD SEPP, development control plans do not apply to SSD.

land uses. That is, the Project would have limited residual impacts on the capacity of other land users in the locality to undertake their activities, both during the Project and following its rehabilitation.

The Department has also considered potential noise impacts at nearby private residences. The Department considers that, subject to the proposed requirements for voluntary acquisition and/or voluntary noise mitigation, the Project is not incompatible with residential use of these dwellings.

Overall, the Department considers that, subject to appropriate conditions, the Project could be managed to minimise any potential land use conflicts and meet the aims, objectives and provisions of clause 12.

Voluntary Land Acquisition and Mitigation Policy (clause 12A)

The Department's assessment has considered the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) in **Section 6.10**. This assessment concluded that, under the VLAMP, a single receiver would receive voluntary acquisition rights and this receiver (along with two further receivers) would receive voluntary noise mitigation rights. NCOPL has since purchased the property that would otherwise have received voluntary acquisition rights.

Natural Resource Management and Environmental Management (clause 14)

Clause 14(1) requires that, before granting consent for development for the purposes of mining, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure that impacts on significant surface water and groundwater resources, threatened species and biodiversity are avoided or minimised to the greatest extent practicable and that GHG emissions are minimised to the greatest extent practicable. These matters are comprehensively addressed in **Sections 6.3 to 6.6** and in **Section 6.10**.

The Department has recommended a detailed suite of conditions to ensure that the Project is undertaken in an environmentally responsible, including conditions in relation to water resources, threatened species and biodiversity and GHG emissions.

Resource Recovery (clause 15)

The Department has considered the recovery of coal resources in its assessment of the Project. It considers that the Project can be carried out in an efficient manner that optimises coal resource recovery while giving appropriate recognition to and protection for the significant environmental and other values that may be affected.

The Department has also recommended conditions requiring NCOPL to implement reasonable and feasible measures to minimise waste and maximise the salvage and re-use of resources within the disturbance area (including water, soil and vegetative resources).

Transport (clause 16)

The key purpose of this clause relevant to the Project is to limit the transport of coal on public roads. Following loading at a rail loop at the Pit Top Area, all product coal would be transported via the Werris Creek - Mungindi Railway to the Port of Newcastle for export. No coal would be transported on public roads.

There is further consideration of the Project's traffic-related impacts in **Section 6.10**.

Rehabilitation (clause 17)

Clause 17 outlines requirements relating to consideration of whether any consent granted should be subject to conditions aimed at ensuring rehabilitation of land disturbed by mining and, in particular, whether conditions should require preparation of a rehabilitation management plan, appropriate treatment of waste, remediation of soil contamination and the avoidance of public safety risks.

The Department is recommending a comprehensive suite of conditions relating to rehabilitation of land disturbed by the Project. Requirements for rehabilitation and the proposed conditions are described in **Section 6.10**.

SEPP (Infrastructure) 2007 (the Infrastructure SEPP)

The Infrastructure SEPP requires the consent authority to notify relevant public authorities about development that may affect public infrastructure or land, including electricity transmission and distribution networks, gas pipeline corridors, railways and rail corridors. The Department notified affected State agencies, infrastructure owner/operators and the two affected councils and received advice from FCNSW, TfNSW and the two affected councils.

The EIS has considered the Infrastructure SEPP (see section A7.2.6), particularly in respect of potential damage to infrastructure from subsidence. NCOPL consulted with ARTC, TfNSW, FCNSW and Essential Energy during preparation of its EIS and has committed to continue to consult with these infrastructure owners at all relevant times during the life of the Project.

SEPP (State and Regional Development) 2011 (the SRD SEPP)

The Project is declared to be SSD under section 4.36 of the EP&A Act as it triggers the criteria in clause 5(a) of Schedule 1 of the SRD SEPP, because it is development for the purposes of coal mining. No scale limitations apply in respect of this declaration. That is, any coal mining, of any scale and proposed anywhere in the State, is SSD.

In accordance with section 4.5 of the EP&A Act, the Minister for Planning and Public Spaces is the consent authority for the Project, as less than 50 public submissions in the nature of objections were received following public exhibition. However, the Commission may determine the application as the Minister's delegate under an Instrument of Delegation signed by the then Minister for Planning on 28 September 2011.

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 with the 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 contamination of land, water and air and contained a PHA (see the EIS's Appendix P).

The Department considers that the Project is consistent with the aims, objectives and requirements of SEPP 33.

SEPP (Koala Habitat Protection) 2020

At the time when the EIS was finalised, the *SEPP (Koala Habitat Protection) 2019* (the 2019 SEPP) had application. However, this SEPP was replaced on 30 November 2020 by the *SEPP (Koala Habitat Protection) 2020* (the 2020 SEPP), which in turn was amended and largely replaced by the *SEPP (Koala Habitat Protection) 2021* (the 2021 SEPP).

However, clause 17 of the 2021 SEPP provides that *'a development application made, but not finally determined, before the commencement of this Policy in relation to land to which this Policy applies must be determined as if this Policy had not commenced.'* Consequently, the provisions of the unamended 2020 SEPP apply to the Project.

This SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. Part 2 of the SEPP contains provisions establishing development control within Koala habitat. However, these provisions to not apply to SSD or in other circumstances where the Minister or the Commission is the consent authority, since they only limit decisions by "councils".

The EIS's assessment of potential impacts on Koalas was against the provisions of the 2019 SEPP. Both the 2019 SEPP and the 2020 SEPP had general application within the Narrabri LGA. However, neither SEPP had (or has) application within the State forest portion of the Project area.

The EIS contains an assessment of Koala habitat which found that the Project area outside of the Pilliga East State Forest (approximately 235.1 ha) qualifies as 'core koala habitat', i.e. *"an area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population"*.

The Project's potential impacts on Koalas and core Koala habitat were fully considered in the BDAR, which was found to be satisfactory by BCS (see **Section 6.5**). The BDAR concluded that the Project is unlikely to lead to a decline in the viability of the local Koala population and proposed offsets for the anticipated impacts on Koalas. The required species credits have been included within the recommended conditions of consent.

The Department considers that the Project is consistent with the aims, objectives and requirements of *SEPP (Koala Habitat Protection) 2020*.

SEPP No. 55 – Remediation of Land (SEPP 55)

SEPP 55 relates to the remediation of contaminated land. Before granting consent for a development application that involves a "change of use", the consent authority must consider a "preliminary investigation" of whether the land involved includes "contaminated land". Land subject to the existing consent 08_0144 does not fall within this requirement, as it involves no "change of use".

Ground Doctor Pty Ltd completed a Land Contamination Assessment of the area within MLAs 1 and 2, including a preliminary investigation in accordance with the *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land* (DUAP and EPA, 1998). On the basis of the preliminary investigation, Ground Doctor concluded that the land within MLAs 1 and 2 is suitable for the Project.

The Department is satisfied that the Project area does not have a significant risk of existing contamination given its historical and current land uses, and that the development is generally consistent with the aims, objectives and provisions of SEPP 55.

Narrabri Local Environment Plan 2012

The Department has considered the permissibility of the proposed development under the Narrabri LEP. While this LEP contains certain prohibitions which would otherwise impact the permissibility of the Project, these prohibitions are overcome due to the overriding permissibility provisions found in clause 7(1) of the Mining SEPP (see **Section 4.2** and above).

Appendix H – Recommended Instrument of Consent

See Department's website at: https://www.planningportal.nsw.gov.au/major-projects/project/10731

Appendix I – Commonwealth Assessment

I1 Introduction

In accordance with the current Bilateral Agreement between the Commonwealth and NSW Governments, the Department provides the following additional information required by the Commonwealth Minister in order to decide whether or not to approve a proposed action (i.e. the Project) under the EPBC Act[29] (see also **Section 4.8**). This information has been prepared based on the Department's assessment of:

- NCOPL's EIS;
- advice received from the IESC, State agencies and local councils;
- submissions received from special interest groups and the general community;
- NCOPL's Submissions Report and other information provided in response to the Department's requests;
- NCOPL's Amendment Report and Final BDAR; and
- advice received from the Mining Panel.

It has given particular consideration to the advice provided by BCS regarding biodiversity and NCOPL's final BDAR, as well as to specific advice from BCS regarding the proposed action's potential impacts on biodiversity MNES (see **Section I2** and **Appendix E**). It has also given particular consideration to the advice provided by the IESC and the Mining Panel regarding the Project's potential impacts on water resource MNES (see **Appendices E and F**).

This Appendix is supplementary to, and should be read in conjunction with, the main body of the Department's assessment report, particularly **Sections 6.3 to 6.5**, which include consideration of:

- impacts to water resources;
- licensing, managing and monitoring measures relating to water resources;
- impacts to listed threatened species and communities (including for MNES); and
- avoidance, mitigation and offsetting measures for threatened species and communities.

I2 Impacts on EPBC Listed Species and Communities

The proposed action was determined by the former DoEE (now the Commonwealth Department of Agriculture, Water and Environment) to be a controlled action for the controlling provision of listed threatened communities and species (sections 18 and 18A of the EPBC Act). DoEE considered that the proposed action was likely to have a significant impact on the following listed threatened communities and species:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Threatened Ecological Community (Box Gum Woodland);
- Koala (*Phascolarctos cinereus*);
- Pilliga Mouse (Pseudomys pilligaensis);
- Corben's Long-eared Bat *(Nyctophilus corbeni)*;
- Coolabah Bertya *(Bertya opponens)*; and
- Tylophora linearis.

DoEE also requested further assessment for three further threatened species, namely:

[29] All acronyms and abbreviations used in this Appendix are explained in this report's Glossary.

- Superb Parrot (*Polytelis swainsonii*);
- Regent Honeyeater *(Anthochaera phrygia)*; and
- Large-eared Pied Bat *(Chalinolobus dwyeri)*.

Section 6.5 describes the biodiversity assessment undertaken for the Project and the resulting BDAR. Flora and fauna baseline surveys for the BDAR were conducted by AMBS Ecology & Heritage (AMBS) over a study area of some 5,426 ha. The final area of *additional* surface disturbance for the Project which requires assessment and approval is c. 609.5 ha.[30] Of this 609.5 ha, c. 546.7 ha is classified as native vegetation (comprising c. 421.6 ha of woodland and c. 125.1 ha of DNG).

Three threatened flora species listed under the EPBC Act were recorded by AMBS in the Project area or immediate surrounds, namely:

- Coolabah Bertya (*Bertya opponens*);
- Spiny Peppercress (*Lepidium aschersonii*); and
- Tylophora linearis.

Seven threatened fauna species listed under the EPBC Act were recorded by AMBS in the Project area or immediate surrounds, namely:

- White-throated Needletail (*Hirundapus caudacutus*);
- Swift Parrot (*Lathamus discolor*);
- Painted Honeyeater (*Grantiella picta*);
- Koala (*Phascolarctos cinereus*);
- Corben's Long-eared Bat (Nyctophilus corbeni);
- Large-eared Pied Bat (Chalinolobus dwyeri); and
- Pilliga Mouse (Pseudomys pilligaensis).

One TEC listed under the EPBC Act was recorded by AMBS during its surveys, namely:

- Poplar Box Woodland on Alluvial Plains Endangered Ecological Community (PCT 244).

The surveys did not identify Box Gum Woodland within the areas of anticipated surface disturbance for the Project. The BDAR also considered that the Project would not lead to significant impacts on the following species:

- White-throated Needletail (*Hirundapus caudacutus*);
- Superb Parrot (*Polytelis swainsonii*);
- Regent Honeyeater (*Anthochaera phrygia*); and
- Swift Parrot (*Lathamus discolor*).

The Project's impacts on threatened species and communities listed under the EPBC Act are summarised under ***Biodiversity Matters of National Environmental Significance*** in **Section 6.5**. BCS has undertaken a detailed review of the impacts of the proposed action on threatened communities and species listed under the EPBC Act, in accordance with templates provided by DAWE.

Table I1 provides a detailed review of whether the assessment documentation (i.e. the EIS, Submissions Report, Amendment Report and BDAR) includes all relevant required information. It also includes:

- summaries of proposed impact avoidance, minimisation, mitigation and management measures;

[30] In the original BDAR, this figure was reported as 643.8 ha. Following Departmental requests to carefully consider the extent of clearing required for the Project, NCOPL's Amendment Report and the final BDAR reduced this area to 609.5 ha.

- confirmation of the threatened species and communities listed under the EPBC Act that occur in the Project area and its vicinity, or in the vicinity (i.e. on land to which impacts may extend);
- for each listed threatened species and/or community, summaries of the:
  - nature and consequences of impacts (i.e. direct and indirect);
  - duration of impact;
  - quantum of impact;
  - consequences of impacts on the species, the population and / or extent of the community at local, state and national scales, and
  - confirmation of the level of predicted impact (likely high risk or low risk of impact).
- confirmation of impacts requiring offsetting, the number and class of biodiversity credits needed in accordance with the BAM and, if known, the proposed offsetting approach;
- consideration of any relevant Australian Government guidelines and policy statements, and
- recommendations regarding conditions of development consent.

Table I2 contains a summary table of all impacts and offsets for all impacts on threatened communities and species which are listed as MNES.

I3 Impacts on Water Resources

The former DoEE determined that the proposed action is a controlled action for the controlling provision of water resources (Section 24D and Section 24Eof the EPBC Act). "Water resource" is broadly defined under the Commonwealth *Water Act 2007* (which has application for the purposes of the EPBC Act), as follows:

> *"**water resource** means:*
>
> *(a) surface water or ground water; or*
> *(b) a watercourse, lake, wetland or aquifer (whether or not it currently has water in it);*
>
> *and includes all aspects of the water resource (including water, organisms and other components and ecosystems that contribute to the physical state and environmental value of the water resource)."*

That is to say, there is no list of water resources which may be affected by an action (as there is in the case of TECs, for example). Consequently, the Commonwealth Minister requires a comprehensive assessment of the Project's potential significant impacts on water resources.

A comprehensive assessment of the Project's potential impacts on water resources is provided in NCOPL's EIS (including the Groundwater Assessment and Surface Water Assessment). Further relevant information is provided in the EIS's Subsidence Assessment and final BDAR.

The Department has carefully assessed the proposed action's potential impacts on water resources (see in particular **Sections 6.3 and 6.4** and the assessment of potential impacts on GDEs and aquatic species within **Section 6.5**). The Department has given careful consideration to the advice received from the IESC and NCOPL's responses to this advice. It has also given careful consideration to the advice received from the Mining Panel regarding potential impacts on groundwater and surface water (including GDEs and springs).

The Department considers that the impacts on water resources are limited. They are licensable under the NSW *Water Management Act 2000* and are not anticipated to have unreasonable impacts on either the environment or other water users. The Department advises that the impacts are acceptable.

Table I1: BCS advice on threatened species and communities listed under the EPBC Act

Requirement	*Information*	*Reference (BAM or BLA[31])*
Background & Description of Action	Does the EIS/BDAR[32]: ☒ clearly show how operational and construction footprints, including clearing boundaries, structures to be built and elements of the action are situated with regard to MNES ☒ depict stages and timing of the action that may impact on MNES ☒ provide a map(s) of the subject land boundary showing the final proposal/disturbance footprint with respect to location of MNES, including GIS shape files Include references to where this detail is provided.	BAM Chapters 3, 4, 5 and 8
	Provide advice on the adequacy of the background and action description with respect to MNES and identify any recommended additional information requirements: The BDAR appropriately addresses the above criteria, specific reference to where data is located within the BDAR has been provided below: • Figures 4 – 5 include maps of all development components and clearing required within the project site (including indirect impacts from cracking). • Section 5 details the timing and impact associated with clearing required for the project. • Figure 6 include maps of all development phases associated with the project. • Figures 17 – 26 include maps of species polygons for all species-credit species including MNES. • Figure 12 includes a map of all vegetation within the project site, including MNES TECs. • Appendix H includes a breakdown of all habitat associated with ecosystem credit species, including MNES ecosystem credit species. • Figures 35 – 46 include maps detailing associated habitat within the project site for all MNES species identified as present. • Figure 27 A-C includes maps of all avoidance and iterative project design in relation to biodiversity values within the project site, including MNES.	

[31] Bilateral agreement made under section 45 of the EPBC Act, including Amending Agreement No. 1 (2020)
[32] Or revisions of the BDAR and associated documentation made as a result of previous reviews or Project changes post-exhibition.

Requirement	*Information*	*Reference (BAM or BLA[31])*
Landscape Context of the MNES	**Provide advice on the adequacy of the landscape context information and identify any additional information requirements:** The landscape setting of the project site has been adequately assessed and detailed within the BDAR. Specific reference to where data is located within the BDAR has been provided below: • Figure 7 includes a map of habitat connectivity, IBRA boundaries, riparian stream orders and additional features such as bat caves within the project site. • Figure 8 includes a map with relevant landscape assessment buffers and landscape vegetation extent. All relevant landscape features required for assessment under the BAM are detailed within Section 2 of the BDAR.	BAM Section 3.1 BLA clause 7.4
EPBC Act Listed Threatened Species & Communities	Verify that the EIS/BDAR includes relevant information on the identification of all EPBC Act listed threatened species and communities on the site or in the vicinity[33] via: ☒ field based survey effort ☒ published peer reviewed literature ☐ local data ☒ supporting databases (such as the NSW BioNet Vegetation Classification, NSW BioNet Threatened Biodiversity Data Collection, NSW BioNet Atlas, Commonwealth Species Profile and Threats Database search results) ☒ Verify that the EIS/BDAR includes appropriate mapping of all EPBC Act listed threatened species and communities in accordance with the relevant Commonwealth Listing Advice. The EIS/BDAR should include important populations and critical habitat as defined in Approved Listing Advice, Approved Conservation Advice and Recovery Action Plans.	BAM Chapters 4 and 5
	Provide advice on the adequacy of the identification methods and mapping information / any additional information requirements: • All field-based survey effort was found to be adequate and meet relevant species-specific survey guidelines. • The Commonwealth Assessment of MNES includes reference to published-peer reviewed literature.	

[33] On land to which impacts may extend

Requirement	*Information*	*Reference (BAM or BLA [31])*
	• Relevant government databases have been accessed to inform decision making and project site context e.g. NSW BioNet Vegetation Classification, NSW BioNet Threatened Biodiversity Data Collection, NSW BioNet Atlas, Commonwealth Species Profile and Threats Database search results. • Figures 35 – 46 include maps detailing associated habitat within the project site for all MNES species identified as present. • Figure 12 includes a map of all vegetation within the project site, including MNES TECs.	
	Confirm that all EPBC Act listed threatened species and communities that occur on the subject land, or in the vicinity, have been identified in the BDAR/EIS including those that are ecosystem credit species. If any species and communities identified in the referral documentation (provided by DAWE) have been ruled out because they don't occur on or near the site, verify that there is robust analysis and justification for why these species can be ruled out. Provide advice on whether there are any other MNES species or communities that are missing from the assessment based on BCS knowledge and experience.	
	Advise whether there is appropriate justification and supporting evidence for the addition and/or exclusion of any EPBC Act listed threatened species and/or communities from the list (if applicable): The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)-listed threatened species and communities that occur on the project site or in the vicinity as generated from the Protected Matters Search Tool have been identified in the EIS. An assessment of the likelihood of each entity occurring has been undertaken (Section 4 of the BDAR) and a decision as to whether an assessment of significance is required has been made (Section 9.2 of the BDAR). All communities and species listed in the referral documentation have been assessed in the BDAR, those being: • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland) Threatened Ecological Community (TEC) • *Tylophora linearis* • Coolabah Bertya *(Bertya opponens)* • Superb Parrot (*Polytelis swainsonil*) • Regent Honeyeater (*Anthochaera phrygia*) • Koala (*Phascolarctus cinereus*) • Large-eared Pied Bat (*Chalinolobus dwyeri*) • Pilliga Mouse (*Pseudomys pilligaensis*)	

Requirement	*Information*	*Reference (BAM or BLA[31])*
	• South-eastern Long-eared Bat (*Nyctophilus corbeni*) An additional MNES TEC, and four MNES species (listed below) are assessed in the BDAR: • Poplar Box Woodland on Alluvial Plains TEC • Swift Parrot (*Lathamus discolour*) • White-throated Needletail (*Hirundapus caudacutus*) • Painted Honeyeater (*Grantiella picta*) • Spiny Peppercress *(Lepidium aschersonii)* The MNES TEC Box Gum Woodland has been excluded from further assessment from within the BDAR as a result of being absent from the project site. BCS accepts the proponent's conclusion that no vegetation is present within the site which is representative of Box Gum Woodland TEC. A comparative assessment of equivalency can be found in Attachment B of the BDAR. All other species identified in the referral documentation (provided by DAWE) or their potential habitat has been identified within the BDAR and appropriately assessed.	
Avoidance, Minimisation, Mitigation & Management	Verify that the EIS/BDAR demonstrates all feasible alternatives and efforts to avoid and minimise impacts on EPBC Act listed threatened species and communities (including direct, indirect and prescribed impacts) including an analysis of alternative: ☐ designs and engineering solutions ☒ modes or technologies ☒ routes and locations of facilities ☐ sites within the subject site ☒ Verify that the EIS/BDAR identifies any other site constraints in determining the location and design of the proposal (such as bushfire protection requirements, flood planning levels, servicing constraints, etc). Verify that the EIS/BDAR provides feasible measures to mitigate and/or manage impacts on EPBC Act listed threatened species and communities (including direct, indirect and prescribed impacts) including: ☒ techniques, timing, frequency and responsibility ☒ identify measures for which there is risk of failure ☒ evaluate the risk and consequence of any residual impacts ☒ any adaptive management strategy proposed to monitor and respond to impacts.	BAM Chapters 6, 7 and 8 BLA clause 7.1

Requirement	*Information*	*Reference (BAM or BLA[31])*
	Provide advice on whether all feasible impact avoidance, minimisation, mitigation and management measures have been considered and are adequately justified: The BDAR describes the nature and extent of all relevant direct and indirect impacts to MNES. Section 5.1 of the BDAR discusses measures to avoid and minimise impacts. The BDAR describes all impact avoidance and mitigation measures applied to the project for each relevant MNES in Section 9. The key avoidance measure that has been implemented for the project has focused on the repositioning of surface infrastructure to alternative routes and sites. This has included additional targeted survey to search for areas of lesser biodiversity value i.e. not occupied by threatened species and repositioning surface infrastructure into these areas, this has included the iterative avoidance of approximately 10,500 individuals of *Bertya opponens.* Refinement of the project footprint since the EIS was exhibited has resulted in the avoidance of impact to a variety of sensitive biodiversity values as summarised in Section 5 and 6 of the BDAR. BCS considers that the project has undertaken an appropriate level of avoidance and mitigation for impacts to MNES.	
Impact Assessment	Verify that the EIS/BDAR: ☒ identifies the residual adverse impacts likely to occur to **each** EPBC Act listed threatened species and/or community after the proposed avoidance and mitigation measures are taken into account ☒ provides adequate justification and evidence for the predicted level of impact, with reference to the: • Commonwealth's Significant Impact Guideline*:* *https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf* • DPIE Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact (SAII): (*https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf*)	BAM Chapters 8 and 9 BLA clauses 6.2(b)(i)-(ii) and 7.1

Requirement	*Information*	*Reference (BAM or BLA [31])*
	Complete the following information for each EPBC Act listed threatened species and/or community (add/remove rows as necessary): • EPBC Act listed threatened species and/or community • nature and consequences of impacts (i.e. direct and indirect) • duration of impact (e.g. construction, operation, life of project) • quantum of impact • consequences of impacts on the species, the population and/or extent of the community at local, state & national scales Confirm the level of predicted impact (cross appropriate): ☐ high risk of impact (requiring offsets)[#] or SAII ☐ Low risk of impact (not requiring offsets) [#] For purposes of EPBC approval, as a minimum, significant adverse residual impacts **must** be offset (significant impact can be evaluated with reference to the significance impact guidelines) **Provide advice on whether adequate justification and evidence is provided for species and communities that have been identified as being at low risk of impact.** **Poplar Box Woodland TEC** • The Project would result in the direct clearance of approximately 3.8 ha of Poplar Box Woodland EEC comprising various woodland patches. Approximately 4.1 ha of Poplar Box Woodland EEC is located in the area of potential cracking impacts on trees (indirect impact). • Impact would occur during construction and operation of the project. • *The Project's adverse impacts on the Poplar Box Woodland EEC are not likely to be significant given the small size of the impact (approximately 7.9 ha) relative to the wider occurrence of the community (which is indicative of the wider occurrence of PCT 244) and the mitigation measures.* • *The impacts on the Poplar Box Woodland EEC (PCT 244) would be offset in accordance with the NSW Biodiversity Offsets Scheme and would result in the retirement of the required number and class of like-for-like biodiversity credits for the Poplar Box Woodland EEC.* (Section 9.2.1 BDAR). ☒ high risk of impact (requiring offsets)[#] or SAII ☐ Low risk of impact (not requiring offsets) * The BAM has been fully applied in terms of survey effort and determining a credit lability for the vegetation representative of this TEC. However, as the TEC is only listed under Commonwealth legislation the offset liability is representative of a non-threatened credit trading class of ecosystem credits.	

Requirement	Information	Reference (BAM or BLA [31])
	Tylophora linearis • The Project would result in the clearance of approximately 405.2 ha of known and potential habitat for the *Tylophora linearis*. • The clearance would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. It has been proposed by the proponent that follow-up rehabilitation of clearance areas would occur either progressively or at the end of the project life. • *The Project is not considered likely to have a significant impact on this species given that this species would persist within the Subject land and is known to occur in a number of locations throughout NSW, including 13 NSW conservation reserves and 11 NSW State Forests. The residual impacts on this species would be offset in accordance with the NSW Biodiversity Offsets Scheme* (Section 9.2.1 BDAR) ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) **Coolabah Bertya *(Bertya opponens)*** • The Project would result in the direct clearance of approximately 3.6 ha of known habitat for the *Bertya opponens*, comprising an estimated 15,345 individuals. • The majority of individuals to be cleared would occur within a single clearing event within Phase 6 of the project. • *The Project may lead to a long-term decrease in the size of an important population of a species. The residual impacts on this species would be offset in accordance with the NSW Biodiversity Offsets Scheme.* (Section 9.2.2 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) **Superb Parrot *(Polytelis swainsonil)*** • The Superb Parrot has not been recorded in the Subject land surrounding the Project. • The Project would result in the progressive clearance of approximately 234.7 ha of native vegetation that may provide potential foraging habitat that may be occasionally used by the Superb Parrot. No breeding habitat would be cleared as the species does not breed in the locality. • The clearance would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. It has been proposed by the proponent that follow-up rehabilitation of clearance areas would occur either progressively or at the end of the project life. • *The loss of potential foraging habitat (prior to rehabilitation) is likely to be of little consequence to the Superb Parrot given that this species has not been recorded in the Subject land (despite targeted surveys), is a vagrant in the locality and the occurrence of similar potential habitat in the surrounding landscape.*	

Requirement	Information	Reference (BAM or BLA [31])
	• *This species is classified as an 'Ecosystem Credit Species' in the BioNet Threatened Biodiversity Data Collection. The ecosystem credit generated by the Project would be offset in accordance with the NSW Biodiversity Offsets Scheme.* (Section 9.2.6 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) * BCS agree with the proponent's conclusions that the site would not represent breeding habitat for the species. The loss of approximately 234.7 ha of native vegetation could be seen as a significant reduction of foraging habitat for the species within an already fragmented and over-cleared region. This impact would be mitigated by the progressive nature of the clearing proposed and proposal for follow-up rehabilitation of clearing impacts. The quantum of impact would be exacerbated if rehabilitation efforts within the subject land prove unsuccessful. **Regent Honeyeater *(Anthochaera phrygia)*** • The Regent Honeyeater has not been recorded in the Subject land surrounding the Project. • The Project would result in the progressive clearance of approximately 421.6 ha of native vegetation that may provide potential foraging habitat that may be occasionally used by the Regent Honeyeater. No breeding habitat would be cleared as the species does not breed in the locality. • The clearance would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. It has been proposed by the proponent that follow-up rehabilitation of clearance areas would occur either progressively or at the end of the project life. • *The Pilliga forest is recognised as a subsidiary breeding site for the Regent Honeyeater (DotE, 2016) and, therefore, meets the definition of 'habitat critical to the survival' of the Regent Honeyeater. However, there is no evidence that the species uses the potential habitat in the Project area for either foraging or breeding.* • *The loss of potential foraging habitat (prior to rehabilitation) is likely to be of little consequence to the Regent Honeyeater given that this species has not been recorded in the Subject land (despite targeted surveys), is a vagrant in the locality and the occurrence of similar potential habitat in the surrounding landscape.* • *This species is classified as an 'Ecosystem Credit Species' in the BioNet Threatened Biodiversity Data Collection. The ecosystem credit generated by the Project would be offset in accordance with the NSW Biodiversity Offsets Scheme (Section 10).* (Section 9.2.7 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) *The DPIE Important Habitat Maps identify areas that are considered essential to support critical life stages of the species, e.g. breeding areas or locations important for foraging/over-wintering for migratory species and is inclusive of Important Habitat for	

Requirement	Information	Reference (BAM or BLA [31])
	the Regent Honeyeater. The project site is not mapped within the DPIE Important Habitat Map for the Regent Honeyeater. The closest area of mapped important habitat is approximately 50km to the east of the Project Site north of Manilla. (Access to the DPIE Important Habitat Map can be made available upon request). The loss of approximately 234.7 ha of native vegetation could be seen as a significant reduction of foraging habitat for the species within an already fragmented and over-cleared region. This impact would be mitigated by the progressive nature of the clearing proposed and proposal for follow-up rehabilitation of clearing impacts. The quantum of impact would be exacerbated if rehabilitation efforts within the subject land prove unsuccessful. **Koala *(Phascolarctus cinereus)*** • The Koala has not been recorded in the Subject land surrounding the Project; however, evidence was recorded during surveys (i.e. scats). • The Project would result in the progressive clearance of approximately 455.5 ha of known habitat for the Koala over a 23-year period, likely used for foraging and potentially breeding. The habitat meets the definition of habitat critical to the survival of the Koala. • *The clearance would occur during all phases of the Development Footprint. During operations, potential habitat would be fragmented for linear surface infrastructure (e.g. access tracks) and gas drainage bore holes, however after operations, the potential habitat would be re-connected due to rehabilitation/natural regeneration. For this reason, no adverse impacts on the Koala are likely to occur in the long-term.* (Section 9.2.9 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) **Large-eared Pied Bat *(Chalinolobus dwyeri)*** • The Project would result in the progressive clearance (over a 23-year period) of approximately 217.6 ha of potential foraging habitat for the Large-eared Pied Bat within 2 km of two rocky outcrops with bat habitat, as well as subsidence of a rocky outcrop with bat habitat. Impacts from subsidence would include cracking (i.e. not complete removal). No known breeding habitat (maternity sites) have been recorded at the rocky outcrop to be affected by subsidence, despite targeted survey. • The clearance of foraging habitat would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. It has been proposed by the proponent that follow-up rehabilitation of clearance areas would occur either progressively or at the end of the project life.	

Requirement	Information	Reference (BAM or BLA [31])
	• *This species is classified as a 'Species Credit Species' in the BioNet Threatened Biodiversity Data Collection. The impacts on the known habitat for the Large-eared Pied Bat would be offset in accordance with the NSW Biodiversity Offsets Scheme and would result in the retirement of the required number and class of like-for-like biodiversity credits for the Large-eared Pied Bat* (Section 9.2.11 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) **Pilliga Mouse *(Pseudomys pilligaensis)*** • The Project would result in the progressive clearance (over a 23-year period) of approximately 378.1 ha of known habitat for the Pilliga Mouse, likely used for foraging and breeding. • The clearance would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. It has been proposed by the proponent that follow-up rehabilitation of clearance areas would occur either progressively or at the end of the project life. • *During operations, potential habitat would be fragmented for linear surface infrastructure (e.g. access tracks) and gas drainage bore holes; however, after operations, the potential habitat would be re-connected due to rehabilitation/natural regeneration. For this reason, no adverse impacts on the Pilliga Mouse are likely to occur in the long-term.* • *This species is classified as an 'Ecosystem Credit Species' in the BioNet Threatened Biodiversity Data Collection. The impacts on the native vegetation that provides habitat for the Pilliga Mouse would be offset in accordance with the NSW Biodiversity Offsets Scheme.* (Section 9.2.12 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) * BCS accepts that given the progressive nature of impact and proposal for follow-up rehabilitation of clearing impacts that the habitat loss for the above listed species may not be as significant over the long term. However, this statement is contingent on rehabilitation efforts within the subject land proving to be successful. **South-eastern Long-eared Bat *(Nyctophilus corbeni)*** • The Project would result in the progressive clearance of approximately 421.6 ha of known habitat for the Corben's Long-eared Bat, likely used for foraging and breeding. The clearance would occur during all phases of the Development Footprint. • The clearance would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. • *The clearance areas would be progressively rehabilitated and revegetated when the surface facilities are no longer required or at the end of the mine life. For this reason, no adverse impacts on the Corben's Long-eared Bat are likely to occur in the long-term.*	

Requirement	Information	Reference (BAM or BLA [31])
	• *This species is classified as an 'Ecosystem Credit Species' in the BioNet Threatened Biodiversity Data Collection. The impacts on the native vegetation that provides habitat for the Corben's Long-eared Bat would be offset in accordance with the NSW Biodiversity Offsets Scheme*. (Section 9.2.10 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) * BCS accepts that given the progressive nature of impact and proposal for follow-up rehabilitation of clearing impacts that the habitat loss for the above listed species may not be as significant over the long term. However, this statement is contingent on rehabilitation efforts within the subject land proving to be successful. **Swift Parrot *(Lathamus discolour)*** • The Swift Parrot has been recorded in the Subject land on a single occasion in 2021. • The Project would result in the progressive clearance of approximately 429.6 ha of native vegetation that may provide potential foraging habitat that may be used by the Swift Parrot during its non-breeding season. No breeding habitat would be cleared as the species does not breed in NSW. • *The clearance would occur during all phases of the Development Footprint. The clearance areas would be progressively rehabilitated and revegetated when the surface facilities are no longer required or at the end of the mine life. For this reason, no adverse impacts on the Swift Parrot are likely to occur in the long-term.* • *This species is classified as an 'Ecosystem Credit Species' in the BioNet threatened Biodiversity Data Collection. The ecosystem credit generated by the Project would be offset in accordance with the NSW Biodiversity Offsets Scheme*. (Section 9.2.5 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) * BCS accepts that given the progressive nature of impact and proposal for follow-up rehabilitation of clearing impacts that the habitat loss for the above listed species may not be as significant over the long term. However, this statement is contingent on rehabilitation efforts within the subject land proving to be successful. **Painted Honeyeater *(Grantiella picta)*** • The Painted Honeyeater was recorded in the Subject land surrounding the Project. • The Project would result in the progressive clearance of approximately 421.1 ha of native vegetation that may provide potential foraging habitat that may be occasionally used by the Painted Honeyeater. • The clearance would be progressive in nature during the construction phase of the project and occur over an approximate 23-year period coinciding with the continuation of extraction activities. It has been proposed by the proponent that follow-up rehabilitation of clearance areas would occur either progressively or at the end of the project life	

Requirement	Information	Reference (BAM or BLA [31])
	• *This species is classified as an 'Ecosystem Credit Species' in the BioNet Threatened Biodiversity Data Collection. The ecosystem credits generated by the Project would be offset in accordance with the NSW Biodiversity Offsets Scheme.* (Section 9.2.8 BDAR). ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) *It should be noted that the significant impact assessment for the Painted Honeyeater also states the following: *"The loss of potential foraging habitat (prior to rehabilitation) is likely to be of little consequence to the Painted Honeyeater given that this species has not been recorded in the Subject land (despite targeted surveys), is a vagrant in the locality and the occurrence of similar potential habitat in the surrounding landscape".* This statement is contradicted in other parts of the assessment for the Painted Honeyeater, which correctly details that the species has been identified within the project site. It is likely that this paragraph is a copy and paste transcription error from another species assessment. **Spiny Peppercress *(Lepidium aschersonii)*** • The Project would result in the direct clearance of approximately 42.6 ha of potential habitat for the Lepidium aschersonii, comprising one location of known individuals. • The entire presence of the species and associated habitat within the project site would occur within a single clearing event within Phase 2 of the project. • *NCOPL considers that it is not feasible to avoid the known individual Lepidium aschersonii recorded by ELA because it is located in an area planned for a service borehole with power reticulation. The location of the service borehole with power reticulation is required to be along the service corridor and above the underground roadway, as described above. The known individual Lepidium aschersonii is located in an agricultural grazing property.* • *The Project may have a significant impact on this species (in accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance) as it would result in the removal of the known individuals inside the MLAs (potentially an important population defined by DotE [2013] noting that the species has also been recorded elsewhere locally).* • *The residual impacts on this species would be offset in accordance with the NSW Biodiversity Offsets Scheme.* (Section 9.2.3 BDAR) ☒ high risk of impact (requiring offsets)# or SAII ☐ Low risk of impact (not requiring offsets) **White-throated Needletail *(Hirundapus caudacutus)***	

Requirement	*Information*	*Reference (BAM or BLA[31])*
	• The White-throated Needletail has been recorded in the locality. • The White-throated Needletail is a migratory species that is widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1,000 m above the ground (DAWE, 2021b). White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats. This species does not breed in Australia, but instead migrates to the Northern Hemisphere. • The only known current threat to the White-throated Needletail in Australia is collision with wind turbines and overhead wires, though, as this affects only a few individuals, it is not a threat to the species overall. This is not a relevant threat from the Project. A suspected threat may be loss of woodland that results in a reduction in invertebrate prey. • *The Project is not likely to result in a reduction in the invertebrate prey given that the White-throated Needletail and its prey can move large distances and the Project area adjoins an extensive area of native vegetation within Jacks Creek State Forest, Pilliga East State Forest and neighbouring reserves. This species is not likely to be significantly impacted by the Project and is therefore not discussed further.* (Section 9.2 BDAR). ☐ high risk of impact (requiring offsets)# or SAII ☒ Low risk of impact (not requiring offsets) *BCS accepts the assessment on the likelihood of impact to the White-throated Needletail **Box Gum Woodland TEC** • As stated above the TEC Box Gum Woodland has been confirmed as absent from the project site. ☐ high risk of impact (requiring offsets)# or SAII ☒ Low risk of impact (not requiring offsets) *BCS accepts the proponent's conclusion that no vegetation is present within the site which is representative of Box Gum Woodland TEC. A comparative assessment of equivalency can be found in Attachment B of the BDAR.	
Offsets	Verify that the EIS/BDAR: (f) ☒ identifies any MNES that haven't been offset using the BAM (g) ☒ identifies how impacts requiring offsets correlate to MNES impacts (h) ☒ identifies the plant community types (PCTs) requiring offset and the number and type of ecosystem credits required for impacts to MNES (i) ☒ identifies threatened species requiring offset and the number of species credits required for impacts to MNES (j) ☒ correctly uses the BAM (and BAM calculator) to identify the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity (k) ☒ identifies if ecological rehabilitation and/or biodiversity conservation actions are proposed for offsetting	BAM Chapter 10 BLA clauses 7.1 and 7.2

Requirement	*Information*	*Reference (BAM or BLA[31])*
	(l) ☐ if known, identifies any other offsetting approach proposed, such as land-based offsets, retiring credits by payment into the Biodiversity Conservation Fund and/or through supplementary measures[#]. [#] In accordance the BAM there is no longer a requirement to define the offsetting approach at EIS stage. **Complete the Impacts and Offsets Summary table below (Table I2)**	
	Provide advice on the adequacy of the proposed offsets in meeting the requirements of the BAM: Two MNES have not been offset using the BAM as both entities have either been confirmed to be absent from the project site (Box Gum Woodland TEC) or unlikely to be impacted from the project (White-throated Needletail) For all other MNES all residual impacts arising from the project have been appropriately calculated according to the NSW Biodiversity Offsets Scheme (See Table I2 for details).	
Other Considerations	Verify if any relevant Commonwealth guidelines and policy statements are applicable to the action and listed threatened species and/or community, including but not limited to: ☐ International environmental obligations ☒ Recovery Plans ☒ Approved Conservation Advice ☐ Threat Abatement Plans *The relevant Commonwealth guidelines and policy statements for each species and community are available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl*	BLA clauses 6.2(b)(iv), 7.2(c), 7.3 and 7.4
	For each EPBC Act listed threatened species and/or community, provide advice on whether the assessment has been adequately informed by applicable Commonwealth guidelines and/or policy statements. For example, the interaction between the proposed action and important populations or critical habitat identified in policy documents and/or the interaction between the proposed action and threatening processes or recommended conservation actions outlined in Commonwealth policies and plans.	

Requirement	*Information*	*Reference (BAM or BLA [31])*
	Poplar Box Woodland TEC • A comparative assessment of equivalency has identified that this TEC is present within the project site and meets the condition thresholds outlined in the *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DEE, 2019). • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. ***Tylophora linearis*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment of the species references the *Approved Conservation Advice for Tylophora*. (DEWHA 2008d). **Coolabah Bertya *(Bertya opponens)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The MNES assessment also acknowledges that the population to be impacted within the site is representative of an important population of the species. • It is noted that although Approved Conservation Advice exists for Bertya opponens this advice has not been referenced within the species MNES assessment. As stated above, all residual impacts associated with this species have been appropriately calculated according to the BAM. **Superb Parrot *(Polytelis swainsonil)*** • The MNES assessment for the species has assessed that the project is unlikely to lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment of the species references the *National Recovery Plan for the Superb Parrot* Baker-Gabb, D. (2011). **Regent Honeyeater *(Anthochaera phrygia)*** • The MNES assessment for the species has assessed that the project is unlikely to lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines.	

Requirement	*Information*	*Reference (BAM or BLA [31])*
	• The assessment accurately recognises the identification of the Pilliga forest as a subsidiary breeding site for the Regent Honeyeater, as stated in the *National Recovery Plan for the Regent Honeyeater* (DotE, 2016). **Koala *(Phascolarctus cinereus)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment accurately recognises that habitat within the project site meets the definition of habitat critical to the survival of the Koala according to the *EPBC Act Referral Guidelines for the Vulnerable Koala* (DotE, 2014). **Large-eared Pied Bat *(Chalinolobus dwyeri)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment of the species references the *National Recovery Plan for the Large-eared Pied Bat* (DERM 2011). **Pilliga Mouse *(Pseudomys pilligaensis)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment of the species references the *Approved Conservation Advice for Pseudomys pilligaensis (Pilliga Mouse)* (DEWHA, 2008c). **South-eastern Long-eared Bat *(Nyctophilus corbeni)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment of the species references the species Commonwealth Profile and Threats Database (DEWHA 2021b). • It is noted that although Approved Conservation Advice exists for *Nyctophilus corbeni* this advice has not been referenced within the species MNES assessment. As stated above, all residual impacts associated with this species have been appropriately calculated according to the BAM. **Swift Parrot *(Lathamus discolour)*** 	

Requirement	*Information*	*Reference (BAM or BLA[31])*
	• The MNES assessment for the species has assessed that the project is unlikely to lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment identifies habitat which is critical to the Swift Parrot, as stated in the *National Recovery Plan for the Swift Parrot (Lathamus discolor)* (Saunders and Tzaros, 2011). **Painted Honeyeater *(Grantiella picta)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The assessment of the species references the *Conservation Advice Grantiella picta painted honeyeater.* (DotE, 2015c). **Spiny Peppercress *(Lepidium aschersonii)*** • The MNES assessment for the species has accurately recognised that the project will likely lead to an impact to the species within the project site, according to the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines. • The MNES assessment also acknowledges that the population to be impacted within the site is representative of an important population of the species. • The assessment of the species references the *National Recovery Plan for the Spiny Peppercress Lepidium aschersonii* (Carter 2010). ***White-throated Needletail (Hirundapus caudacutus)*** • A preliminary assessment has identified that the species is unlikely to be impacted by the project, this assessment references the *Conservation Advice Hirundapus caudacutus White-throated Needletail*. **Box Gum Woodland TEC** • A comparative assessment of equivalency has identified that this TEC is not present within the project site, this assessment references the diagnostic criteria contained within the *Commonwealth Listing and Conservation Advice on White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands*. (Threatened Species Scientific Committee 2006). **Summary assessment of potential impact as stated by the proponent (Section 9.2.13 BDAR)**	

Requirement	*Information*	*Reference (BAM or BLA[31])*
	The Project would adversely impact Poplar Box Woodland EEC, Coolabah Bertya, Tylophora linearis, Spiny Peppercress, Koala, Corben's Long-eared Bat, Pilliga Mouse and Large-eared Pied Bat. The impacts would be offset in accordance with the NSW Biodiversity Offsets Scheme (Section 9.2.13 BDAR) BCS notes that there is a general amount of inconsistency between the summary statement within Section 9.2.13 of the BDAR and statements for some species, for example the Koala, which states "*For this reason, no adverse impacts on the Koala are likely to occur in the long-term"* (Section 9.2.9 BDAR). BCS agrees with the summary statement above regarding the species which would be impacted by the project i.e. those entities which will be impacted by loss of potential or known habitat as a result of the proposal. All residual impacts arising from the project have been appropriately calculated according to the NSW Biodiversity Offsets Scheme. BCS also accept that given the progressive nature of impact and proposal for follow-up rehabilitation of clearing impacts that the habitat loss for the above listed species may not be as significant over the long term. However, this statement is contingent on rehabilitation efforts within the subject land proving to be successful. The two exceptions to this statement are Spiny Peppercress and Coolabah Bertya for which the project will result in a significant long-term decrease in the population size of both species within the site (this is acknowledged by the proponent). Given the population of Coolabah Bertya occurring within the project site is part of the most significant population in NSW BCS has negotiated mitigation outcomes for the species. This includes a propagation and translocation management plan to be prepared by the proponent and the iterative avoidance of approximately 10,500 individuals.	
Recommended Conditions	**Provide advice on any recommended conditions and reasons for imposing the conditions:** Sections 7.1 – 7.16 detail measures which will be implemented to manage and mitigate impacts to MNES within the project site, these include: • Vegetation Clearance Protocol • Rehabilitation and Revegetation (including a propagation and translocation trial for the Coolabah Bertya) • Salvage and Relocation of Habitat Resources • A Nest Box Programme • Site Induction/Access Controls • Sediment and Erosion Controls • A Creek Line Monitoring Programme • Construction of Drainage Line Crossings	BLA clause 6.2(c)(iii)

Requirement	*Information*	*Reference (BAM or BLA[31])*
	• Fencing and Managing Poplar Box Woodland EEC • Weed Management • Animal Pest Management • Bushfire Prevention and Control Measures • Remediation of Surface Cracks • Vehicle Speed Limits An associated Monitoring Programme inclusive of each biodiversity mitigation measure above will also be prepared. The above measures are included within the individual assessments of significance for MNES within Section 9 of the BDAR and have been considered in the final determination of impact significance for each specific MNES. As the inclusion of the mitigation measures detailed within Sections 7.12 – 7.16 of the BDAR have been considered in the final determination of impact significance for MNES, BCS recommend that these mitigation measures are reviewed and considered for inclusion within the conditions of consent for the project.	

Table I2: Impact and offset summary for all MNES threatened communities and species

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS, BDAR)
Coolabah Bertya *(Bertya opponens)*	Species Credit Species (SC)	15,345 individuals (Count Species)	46,035	Not yet identified. The proponent intends to meet the credit requirements through one, or a combination of the options available under the BOS.	Pg 210 Pg161
Spiny Peppercress *(Lepidium aschersonii)*	SC	42.6	1,731		Pg 210 Pg 161
Tylophora linearis	SC	405.2	13,607		Pg 210 Pg 161
Painted Honeyeater *(Grantiella picta)*	PCT 88, 435, 399, 401, 404, 405, 406, 408, 244, 55 and 206	421.1	Ecosystem Credit Species (EC) (See Table H9 in BDAR)		Pg 210 Pg 161 H9
Koala *(Phascolarctus cinereus)*	SC	455.5	14,796		Pg 210 Pg 161
South-eastern Long-eared Bat *(Nyctophilus corbeni)*	PCT 88, 141, 435, 399, 401, 404, 405, 406, 408, 244, 55 and 206.	421.6	EC (See Table H13 in BDAR)		Pg 210 Pg 161 H13
Large-eared Pied Bat *(Chalinolobus dwyeri)*	SC	217.6	11,140		Pg 210 Pg 161

Pilliga Mouse *(Pseudomys pilligaensis)*	PCT 88, 141, 399, 401, 404, 405, 406, 408 and 244	378.1	EC (See Table H16 in BDAR)		Pg 210 Pg 161 H16
Regent Honeyeater *(Anthochaera phrygia)*	PCT 88, 141,435, 399, 401, 404, 405, 406, 408, 244, 55 and 206	421.6	EC (See Table H8 in BDAR)		Pg 210 Pg 161 H-8
Superb Parrot *(Polytelis swainsonil)*	PCT 88, 435, 399, 401, 404, 405, 408, 244, 55 and 206	234.7	EC (See Table H7 in BDAR)		Pg 210 Pg 161 H-7
Swift Parrot *(Lathamus discolour)*	PCT 88, 435, 399, 401, 404, 405, 406 and 408	429.6	EC (See Table H6 in BDAR)		Pg 210 Pg 161 H-6
Poplar Box Grassy Woodlands on Alluvial Plains	PCT 244	7.9	144 (Credit liability representative of non-threatened Ecosystem Credits)		Pg 158

I4 Other Protected Matters

The former DoEE determined that other matters listed under the EPBC Act are not controlling provisions with respect to the proposed action. These include listed World Heritage, National Heritage, migratory species, Ramsar wetlands, Commonwealth marine environment, Commonwealth land, Commonwealth actions, nuclear actions, the Great Barrier Reef Marine Park and Commonwealth Heritage places overseas.

I5 Conclusions on Controlling Provisions

Threatened species and communities (Sections 18 and 18A of the Act)

For the reasons set out in **Section 6.5**, BCS's advice regarding the Project's potential impacts on biodiversity MNES and this Appendix, the Department recommends that the impacts of the action would be acceptable, subject to the impact avoidance, mitigation and offsetting measures described in NCOPL's EIS, Submissions Report, Amendment Report, final BDAR and the recommended conditions of consent in **Appendix H**.

A water resource, in relation to coal seam gas development and large coal mining development (Sections 24D and 24E of the Act)

For the reasons set out in **Sections 6.3, 6.4** and relevant sub-sections of **Section 6.5** 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 impact avoidance and mitigation measures described in NCOPL's EIS, Submissions Report, Amendment Report and the recommended conditions of consent in **Appendix H**.

I6 Additional EPBC Act Considerations

Table I3 contains the additional mandatory considerations, factors to be taken into account and factors to have regard to under the EPBC Act which are additional to those already addressed.

Table I3 – 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 considered in detail in **Sections 5 and 6** of this assessment report, particularly in **Section 5.4** and **Sections 6.6 to 6.8**. Negative social impacts, including noise impacts on local residents living close to the Project area and the costs of GHG emissions, have been considered in the assessment. A range of mitigation and offsetting measures for social impacts have been proposed by the Applicant. In particular, this includes offers of substantial VPAs to both NSC and GSC.	The Department concludes that the proposed development would result in a range of economic and social benefits for the local and regional communities and economies and is of public benefit to the community of NSW. Overall, social impacts would be very minor compared with the social and economic benefits.

EPBC Act section	Consideration	Conclusion
Factors to be taken into account:		
3A, 391(2)	The ***principles of ESD***, including the precautionary principle, have been taken into account throughout this assessment report (see in particular **Section G1** in **Appendix G**). In particular, this has involved: • careful consideration of the long term and short term economic, environmental, social and equitable considerations relevant to this decision; • the assessment being based on the importance of conserving biological diversity and ecological and cultural integrity; • proposed mitigation measures which reflect improved valuation, pricing and incentive mechanisms and place a financial cost on the Applicant to mitigate the environmental impacts of the proposed action; • proposed conditions that restrict environmental impacts and impose monitoring and adaptive management requirements and reduce uncertainty related to the potential impacts of the proposed action; and • proposed conditions requiring the proposed action to be delivered and operated in a sustainable way, so as to protect the environment for future generations and conserve all applicable MNES.	The Department considers that the proposed action, if undertaken in accordance with the recommended conditions of consent, would be consistent with the principles of ESD.
136(2)(e)	***Other information*** on the relevant impacts of the proposed action to MNES. The Department is not aware of any information on relevant impacts which was not provided by NCOPL; not considered by relevant agencies, the IESC and the Mining Panel and not considered by the Department in completing its assessment report.	The Department considers that all required information that is relevant to the impacts of the proposed action has been provided by NCOPL and taken into account in its assessment, proposed conditions of consent and its advice to the Minister under the EPBC Act.
136(2)(f)	***Advice from the IESC:*** The Department and DoEE collaborated in preparing a request for advice from the IESC. The advice received was duly considered by NCOPL, the Mining Panel and the Department (see **Section 5.3** and **Sections 6.3** and **6.4**).	The Department's assessment took into account all advice received from the IESC.
Factors to have regard to:		

EPBC Act section	Consideration	Conclusion
176(5)	***Bioregional plans***	There is no approved bioregional plan relevant to the proposed action.
Considerations on deciding on conditions:		
134(4)	The ***drafting of conditions*** must consider: Article I. information provided by the person proposing to take the action or by the designated proponent of the action; and Article II. the 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. All Project-related documentation, including the material provided by NCOPL, is available from the Department's website: www.majorprojects.planning.nsw.gov.au.	The recommended conditions are based on the material provided by NCOPL (including its EIS, Submissions Report, Amendment Report and final BDAR) and consultation with the IESC, the Mining Panel, the former DoEE, DPI – Water, BCS, EPA, the Resources Regulator and other agencies. The Department considers that the conditions of consent included in **Appendix H** are comprehensive. They are efficient and cost-effective means of achieving their various purposes.