NSW GOVERNMENT | Planning & Environment

STATE SIGNIFICANT DEVELOPMENT ASSESSMENT
United Wambo Open Cut Coal Mine Project
(SSD 7142)

Secretary's Environmental Assessment Report
Section 89E of the
Environmental Planning and Assessment Act 1979
December 2017

Cover Photos:
United and Wambo Mine Site - Departmental Site Visit, February 2017

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EXECUTIVE SUMMARY

The United and Wambo coal mining operations are located along the southwestern extent of the Hunter Valley coalfield, approximately 16 kilometres west of the township of Singleton, within the Singleton local government area (LGA). The United Wambo joint venture partnership (United) is seeking approval to expand open cut mining operations at the existing Wambo and United mine sites, to allow for the extraction of an additional 150 million tonnes of thermal and semi-soft coal over a period of 23 years.

This proposal, known as the United Wambo Open Cut Coal Mine Project (the Project), comprises two open cut mining components. The first involves minor extensions to the existing Wambo open cut and a material increase in the depth of the mining area, to allow for the extraction of deeper coal seams that underlay the approved Montrose Pit. The second component involves the development of a new open cut mining area (the United Pit) on the site of the former United Colliery.

In addition to the proposed Project, two modifications are required to integrate the development with the two existing Wambo development consents. These modifications focus on upgrading existing surface infrastructure as required by the Project and the use of this infrastructure over the life of the Project.

The Project is classified as State significant development under section 89C of the *Environmental Planning & Assessment Act 1979* (EP&A Act) as it is 'development for the purpose of coal mining'. The consent authority for the Project is the Minister for Planning. However, the Planning Assessment Commission must determine the application under the Minister's delegations of 14 September 2011 and 11 October 2017 because there were more than 25 public submissions in the nature of objections and a related entity, Glencore Australia Holdings Pty Ltd, has declared reportable political donations.

The Project was declared to be a 'controlled action' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), given the likely significant impacts on listed threatened species and communities, listed migratory species and water resources. In making this determination, the delegate for the Commonwealth Minister for the Environment accredited the State's environmental assessment processes under the EP&A Act. Consequently, the potential impacts on Commonwealth listed matters have been assessed under Part 4 of the EP&A Act.

The Department publicly exhibited the development application and accompanying Environmental Impact Statement (EIS) for the Project from 11 August until 22 September 2016. The Department received 103 submissions, including 10 from NSW Government agencies, 1 from Singleton Shire Council, and 92 from special interest groups and members of the public. In addition, the Department received advice from the Commonwealth Department of the Environment, the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, the Australian Rail Track Corporation, Ausgrid and Transgrid.

None of the public authorities objected to the Project, however several raised concerns. Of the public and special interest group submissions received, three supported the Project, primarily due to the ongoing employment and local economic benefits. The remaining submissions included 89 objections to the Project. In general, objectors were concerned over potential air quality, noise and biodiversity impacts of the Project, as well as other matters including health, blasting, final landforms, water resources, climate change and impacts on the local community.

Following receipt of the Applicant's response to the matters raised in these submissions, the Department undertook a range of further consultation with relevant agencies and stakeholders, and commissioned independent peer reviews of the EIS's air quality and economics assessments. The Department also recommended the Applicant commission a further independent review of its groundwater modelling and assessment.

The Department has carried out a preliminary assessment of the merits of the Project, having regard to its potential environmental, social and economic impacts, relevant statutory obligations, all information provided by the Applicant and material submitted both in support and against the Project.

On 28 November 2017, the Minister for Planning asked the Commission to review the merits of the Project, and requested that the Commission hold public hearings during the review.

The Department is generally satisfied that the Project represents a reasonable and logical extension to the two existing mining operations, and acknowledges that United has designed the Project to incorporate a range of measures to minimise potential environmental and amenity impacts.

However, the Department has identified several aspects of the Project and predicted impacts that require particular attention. These key areas of interest include the:

- potential amenity and health impacts on nearby residential receivers, particularly in relation to air quality, noise and blasting impacts associated with open cut mining and overburden handling;
- impacts on biodiversity, including the clearing of 147 hectares (ha) of previously cleared land and non-native vegetation and around 531 ha of additional native vegetation;
- establishment of final landforms that are sympathetic to the surrounding natural environment and suitably rehabilitated with appropriate vegetation types and deliver acceptable land use outcomes; and
- potential impacts on water resources.

With regards to potential impacts on the local community, the Department considers that the project could be conditioned and managed to comply with relevant blast vibration and overpressure criteria at nearby private residences. However, it would result in perceivable increases in noise and air quality levels at some nearby receivers, relative to the currently approved open cut operations at Wambo. Consequently, the Department has recommended that nine private landowners are given voluntary acquisition rights and the owners of a further 22 residences are given rights to appropriate noise mitigation measures.

The quantum of the proposed biodiversity offset package and rehabilitation works would adequately compensate for the proposed vegetation clearing and associated impacts on threatened flora and fauna species and their habitats. While the Department has noted some minor areas for improvement, the proposed offset and rehabilitation package would lead to an overall improvement in the area and connectivity of woodland communities on the Hunter Valley floor over the medium to long-term.

The Department is also satisfied that the Project could be managed to account for all water take both during operations and post-mining and would not result in any material impacts on water quality, downstream users or receiving environments, beyond those associated with existing mining operations.

The Department's assessment has identified several minor matters for clarification that would strengthen the assessment of the Project, such as greater clarity around the source of remaining biodiversity offset credits and confirmation of the net benefits of the project in light of any changes that may occur in response to the Commission's merit review. The Department does not expect this information to materially change its preliminary findings on the overall merits of the project, but rather assist in the development of robust and specific conditions to govern the Project.

Importantly, the Project would provide for the recovery of a significant 150 million tonne coal resource adjacent to and within the existing open cut operations, maximise the use of existing coal processing and transportation infrastructure and provide several years of continued employment for 250 people and new positions for another 250 people, all without substantially increasing the impacts of the existing operations. Furthermore, the Project would involve around $322 million in additional capital investment and deliver around $40 million per annum in royalties to the NSW Government.

Overall, the Department believes that the benefits of the Project would outweigh its costs and that the proposed mine plan strikes an appropriate balance between protecting the environment and local community, and realising the significant economic benefits of the Project to the region and the State. Consequently, the Department's preliminary findings are that the Project would be expected to deliver a net benefit, is in the public interest and is approvable, subject to strict conditions.

1. BACKGROUND

1.1 Existing Operations

The adjacent United and Wambo coal mining operations are located along the south-western extent of the Hunter Valley coalfield, approximately 16 kilometres (km) west of the township of Singleton, within the Singleton local government area (see **Figures 1** to **3**). Despite being owned by separate entities, these two mining operations have a long history of collaboration and harmonisation.

The existing United Coal Mine is owned by United Collieries Pty Limited (United). This company represents a partnership between a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore, 95% ownership) and the Construction, Forestry, Mining and Energy Union (CFMEU, 5% ownership), with Glencore maintaining responsibility for the operation of the mine.

Development consent for coal mining at the United site was originally granted in the early 1980s, with limited open cut and auger mining commencing in 1989. In 1991, the United and Wambo mines exchanged portions of their adjacent mining leases to instead create stratified lease areas that optimised resource recovery by allowing Wambo access to additional open cut opportunities and United access to additional underground reserves.

Since this time, United has focused on underground coal extraction using continuous miners, bord and pillar mining and longwall panels. Most recently mining has occurred under development consent DA-410-11-2002-i, granted on 21 November 2003 by the then Minister for Planning and Infrastructure under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This consent permitted United to extract up to 2.95 million tonnes per annum (Mtpa) of saleable coal until 2012, process coal at an on-site coal handling and preparation plant (CHPP) and haul this coal in trucks to the Wambo or Mount Thorley coal loaders for subsequent rail transport to market.

In March 2010, prior to the expiry of permitted mining operations, United placed its operations on care and maintenance while it undertook further exploration activities and investigated the future mining potential of the site. DA-410-11-2002-i remains an active consent for all purposes other than carrying out coal extraction, processing and transportation activities on site.

The Wambo Coal Mine is owned and operated by Wambo Coal Pty Limited (Wambo), a subsidiary of Peabody Energy Australia Pty Limited (Peabody) and Sumiseki Materials Co Ltd. The mine consists of both underground and open cut mining operations, an on-site CHPP, a rail spur and rail loading facilities. Mining operations commenced at the site in 1969 and have included the extraction of coal using traditional open cut truck and excavator methods, as well as underground continuous miner, bord and pillar mining and longwall methods.

Current operations at the mine are controlled by two Ministerial development consents granted under Part 4 of the EP&A Act: one for the open cut and underground mining operations (DA 305-7-2003 granted on 4 February 2004 and subsequently modified on 15 occasions), and the other for the associated rail operations (DA 177-8-2004 granted on 16 December 2004 and subsequently modified on two occasions). Under these consents, Wambo is allowed to:

- extract up to 14.7 Mtpa of run-of-mine (ROM) coal, comprising
  - up to 8 Mtpa of ROM coal from its open cut mining operations until 2020; and
  - up to 9.75 Mtpa of ROM coal from its underground mining operations until 2032;
- process this ROM coal at its on-site CHPP; and
- transport up to 15 Mtpa of product coal from the mine via rail, using a maximum of 6 trains per day.

At present Wambo is extracting ROM coal from the South Bates Underground Mine and has sufficient resources and underground approvals to continue mining at approved rates until 1 March 2032. This underground mining is currently accessed from the highwall of the former Bates South open cut area. Open cut operations currently occur in the Montrose and Montrose East pits, toward the northwest of the site, with mining approved to continue in these areas for a further 3 years until the end of 2020.

However, exploration programs have identified that the life the Wambo open cut could be extended through the extraction of deeper coal resources beneath the Montrose Pit (hereafter the 'Wambo Pit'), together with the development of a new open cut mining area at the United mine. To realise this potential, Wambo and United established a joint venture partnership (see **Section 1.2**) and have sought approval for a major extension the existing open cut mining activities across the two sites. The approved operations of both mines are summarised in **Table 1** and depicted in **Figures 2** and **3**.

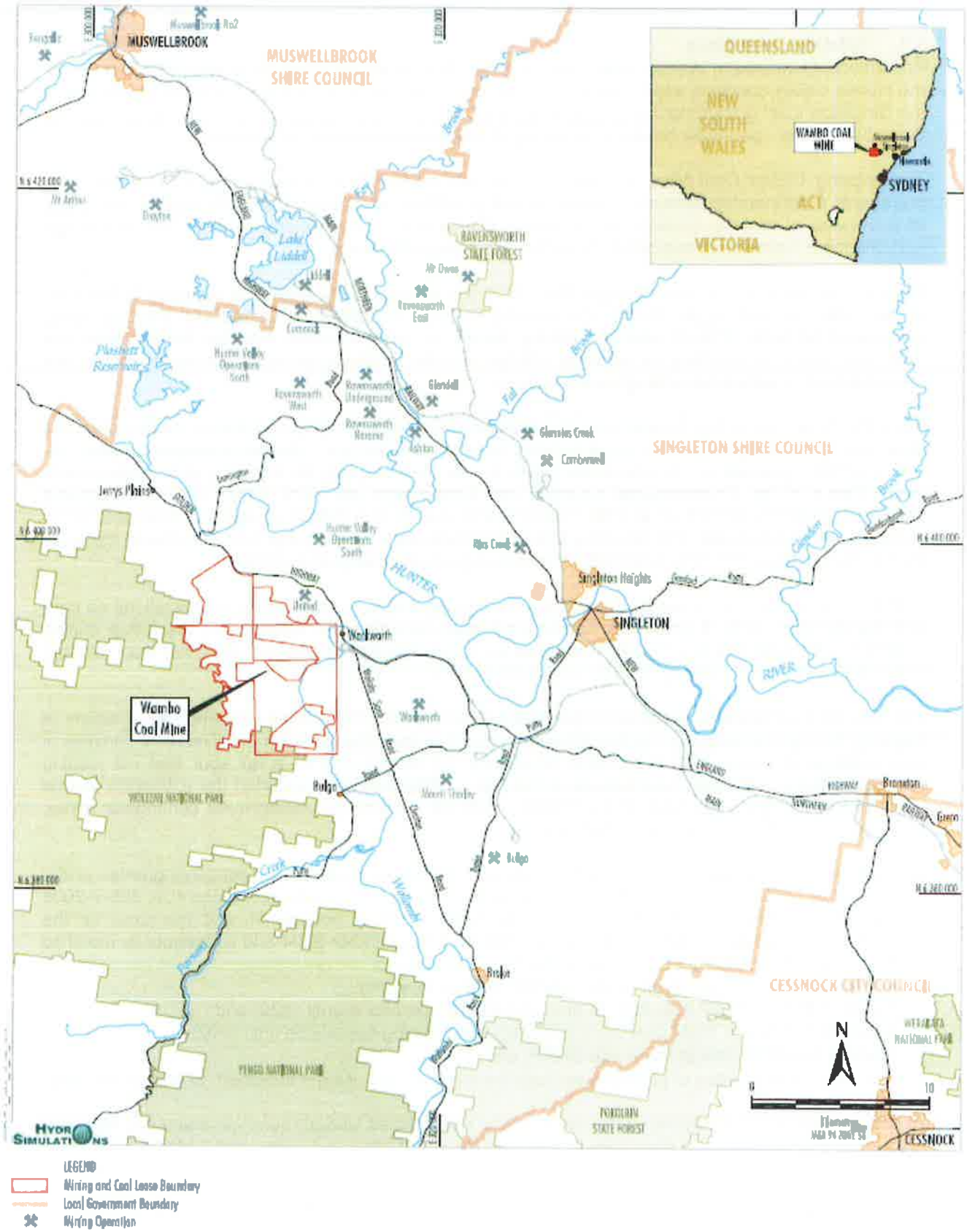


Figure 1: *Project location*

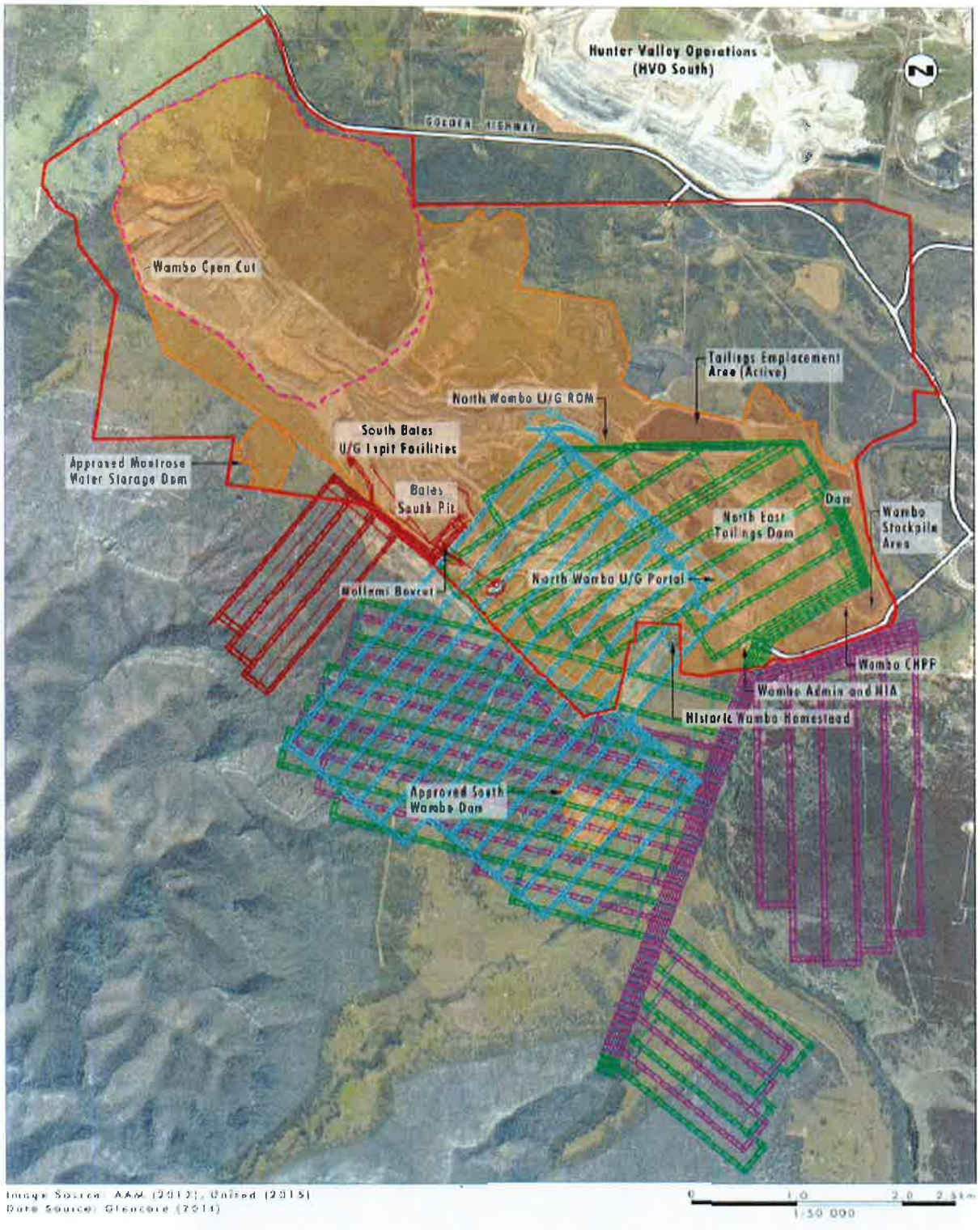


Figure 2: *Existing mining operations at Wambo*

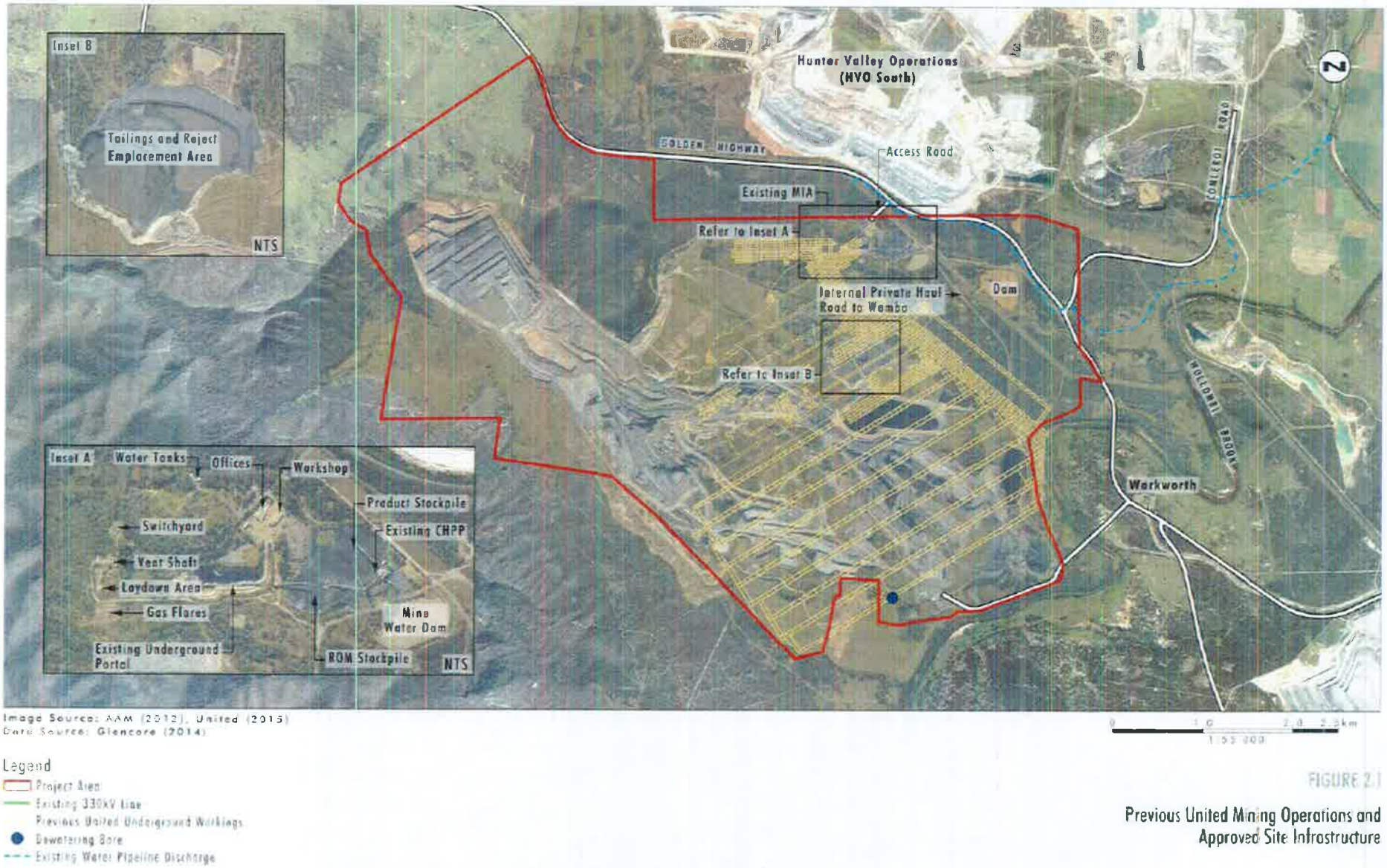


Figure 3: *Existing mining operations at United*

Table 1: *Existing approved operations at United and Wambo Coal Mines*

Aspect	United	Wambo	
Consent	DA-410-11-2002-i (commenced 2003)	DA 305-7-2003	DA 177-8-2004
Company	United Collieries Pty Limited	Wambo Coal Pty Limited	
Expiry Date	2012 (consent continues to apply in all respects other than the right to conduct mining operations until the rehabilitation, offset and closure requirements have been satisfactorily addressed)	2032 (underground) 2020 (open cut)	2025
Remaining Life	0 years	15 years (underground) 3 years (open cut)	8 years
Mining Reserves	N/A	Open cut: 98 Mt ROM Underground: 143.3 Mt ROM	N/A
Hours of Operation	24 hours a day, 7 days a week	24 hours a day, 7 days a week	24 hours a day, 7 days a week
Mining Areas	*United underground mine:* Entrance sealed 2010	*Wambo open cut:* Bates South Pit Montrose Pit Montrose East Pit *Wambo underground:* North Wambo (completed) South Bates South Wambo	N/A
Extraction Rate	Underground approved until 2012 for up to 2.95 Mtpa saleable coal. The mine has been on care and maintenance since 2010.	Total limit of 14.7 Mtpa ROM coal, comprising: Underground: up to 7.5 Mtpa Open Cut: up to 8 Mtpa	N/A
Coal Processing	On-site United CHPP	On-site Wambo CHPP	N/A
Coal Transport	Coal transported to the Wambo train loading facility via a private internal haul road	Coal transported to the Wambo CHPP and then transported from the site via the Wambo train loading facility and rail loop	Transport up to 15 Mtpa of product coal from the mine via rail. Up to six train movements per day
Overburden	Three overburden emplacements (actively being rehabilitated)	In-pit emplacement of waste rock and coarse rejects	N/A
Rejects Disposal	• Tailings emplacement ceased 2010 • Tailing Dams 1 and 2 are drying out	In-pit emplacement of tailings within open cut voids and capping with waste rock and coarse rejects	N/A
Infrastructure	• United CHPP • Site access roads, internal haul roads • Heavy vehicle workshops and washing facilities • Bulk oil and fuel storages, general stores and workshop • Coal stockpiles, conveyors and crushers • Gas and ventilation infrastructure • Office buildings and parking	• Portal access for longwall mining • Wambo CHPP and stockpile • Site access roads and internal haul roads • Mine Infrastructure Area (MIA) and site offices • Explosives magazine and hydrocarbon facilities • Tailings and reject management facilities • Ancillary infrastructure	• Rail spur • Rail loop • Coal reclaim area • Product coal conveyor • Train load out bin • Rail underpass beneath Wallaby Scrub Road
Water Management	Water management system including process water, dewatering bores, sediment dams, pipelines and water sharing infrastructure with Wambo Mine	Water management system including pipelines, sediment and water storage dams, North Wambo Creek diversion and water sharing infrastructure with HVO South and United	N/A
Biodiversity Offsets	18.5 ha compensatory habitat	1,570 ha of woodland revegetation	N/A

		1,194 ha remnant woodland enhancement	
Rehabilitation	Rehabilitation of tailings and overburden emplacement areas	Two final voids approved in the Bates South pit and Montrose pit.	N/A
Employment	N/A – Care and Maintenance	Up to 670 employees: 230 underground; 290 open cut; and 150 CHPP and support	N/A

1.2 United Wambo Joint Venture Partnership

In November 2014 Glencore and Peabody signed a 50:50 joint venture agreement to facilitate the continuation of open cut mining at Wambo and development of a new open cut area at United. This is the most recent example of a long history of collaboration between these companies, following previous coal lease agreements, shared water management systems, rail loading and rail loop facilities.

To enable a smooth transition of operational responsibilities, the joint venture agreement establishes that Wambo would continue to operate the currently approved Wambo open cut operations in the short term, in line with the requirements of DA 305-7-2003. However, if the joint venture is granted approval for the proposed United Wambo Open Cut Coal Mine Project (the Project), United would assume operational responsibility for all open cut mining activities at both sites under a single consolidated development consent. Importantly, United's assumption of responsibility for the Wambo open cut mining activities would not apply during the initial construction phase of the Project and would only become effective following the physical commencement of mining operations at the United open cut.

Wambo's underground mining operations do not form part of the joint venture agreement and would continue to be owned and operated by Wambo. Likewise, Wambo would retain responsibility for the ongoing management and operation of its existing CHPP and train loading facilities, however these facilities would receive, process and export all ROM coal extracted from the separate open cut and underground operations. While the CHPP has existing approved capacity to handle this throughput, some minor changes to the existing Wambo development consents would be required to integrate the Project with the ongoing Wambo operations and permit an increase in maximum daily rail movements.

Finally, if the Project is approved, the joint venture agreement would replace the existing stratified lease agreement executed in 1991 and provide for the combined management of lease areas. These arrangements would be reflected in any necessary renewals of mining leases held by parties to the joint venture.

1.3 Regional Context

The United and Wambo mines are situated along the southwestern extent of the Hunter Valley coalfield and are generally bounded by Wollombi Brook to the southeast, the Golden Highway to the northeast, natural topographic ridgelines to the northwest and Wollemi National Park to the southwest (see **Figure 4**). The Golden Highway is a 313 km State highway which provides road access from the Central Coast and Hunter Valley through to Dubbo and inland NSW, and separates the United and Wambo mines from Yancoal's Hunter Valley Operations (HVO) South mine.

The region surrounding the Project site has a long history of agricultural land use dating back to early European settlement of the Hunter Valley, as well as extensive mining and industrial pursuits. Smaller scale coal mining operations first commenced in the area in the 1960s, and have grown significantly since this time to contribute to the context and economies of the local area and broader Hunter region. These historic and ongoing mining activities have substantially modified the landscape of the existing Wambo and United sites, along with several nearby mining complexes including Yancoal's adjacent HVO South mine to the north and Warkworth and Mt Thorley mines to the southeast.

Despite the influence of these large scale industrial activities, extensive areas of land surrounding the mines have remained largely undisturbed by mining activity and continue to support a range of agricultural and ecological land uses. These areas include stands of remnant vegetation (particularly around historically uncleared ridgelines and slopes to the northwest and south), newer forest and woodland communities that have regenerated over the past 30-55 years on lands historically cleared for agricultural activities and tracts of open grasslands that are primarily used for agricultural purposes.

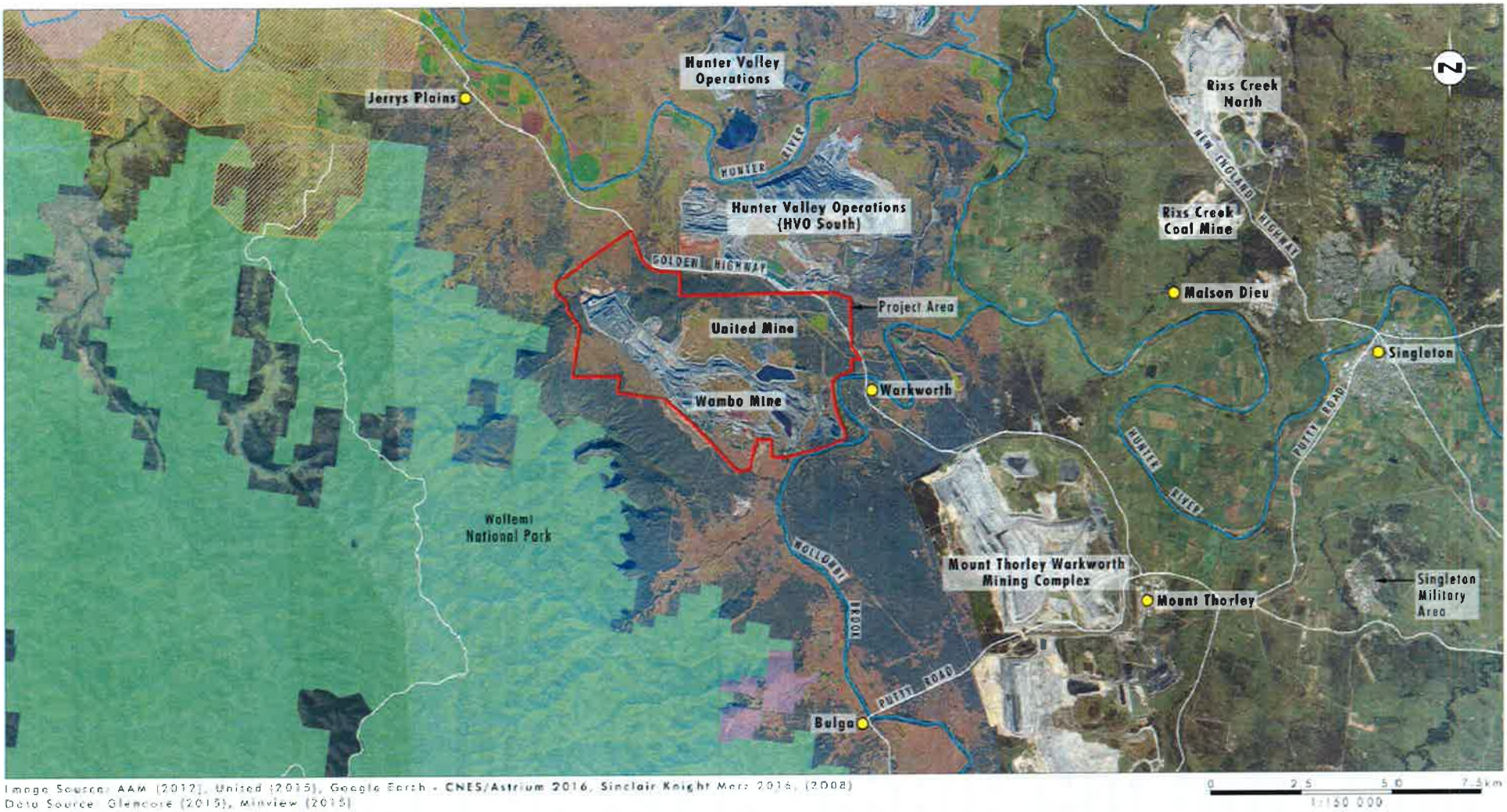


Figure 4: *Regional context of the Project site*

Local agricultural pursuits are closely affiliated with the alluvial soils and readily accessible water supplies of the Hunter River and its local tributaries, including Redbank Creek, North Wambo Creek, Waterfall Creek and Wollombi Brook. These activities range from cattle agistment on unimproved rain-fed pastures to irrigated cropping on improved floodplain lands, along with significant equine breeding operations around 6 km to the northwest, additional equine veterinary services and agistment activities around 2 km to the northwest and viticulture enterprises around 5 km to the south (see **Figure 4**).

The majority of land in the immediate vicinity of the operations is owned by various mining companies, with the nearest private residences to the open cut being located around 2 km to the northwest in Moses Crossing and Redmanvale, along with a single private resident located 800 m to the east in Warkworth Village and two residents located around 3.5 km south of the open cut in South Wambo. Other regional villages are located further afield and include Jerrys Plains to the northwest, Bulga to the south and Maison Dieu to the northeast (see **Figures 4** and **5**).

Being situated 3 km north of the sandstone escarpments of Wollemi National Park, the topography of the site is characterised by undulating foothills, ridgelines and spurs to the south and west, leading down to flatter grasslands and alluvial floodplains typical of the floor of the Hunter Valley to the north and east. Importantly, the natural ridgelines to the northwest occur at an elevation of 200 m AHD and assist in separating the mining operations from the Moses Crossing and Jerrys Plains communities.

Finally, as shown in **Figure 4**, the site is surrounded and traversed by extensive woodland areas, including Wollemi National Park (which forms part of the Greater Blue Mountains World Heritage Area) 0.5 km to the west and southwest, 1,213 ha of biodiversity offsets required under the existing Wambo and United consents, as well as biodiversity offsets required for surrounding projects, including some 2,281 ha of land-based biodiversity offsets to the east, required under the Mt Thorley and Warkworth Continuation Projects. In addition to this, the rehabilitation of the existing Wambo mine would see the establishment and conservation of a further 1570 ha of rehabilitated woodland. Combined with the 1,617 ha of rehabilitated woodland, to be established at Mt Thorley and Warkwarth mines, this would assist in reconnecting the post-mining landscape with surrounding woodland corridors.

2. PROJECT

2.1 Description of the Project

The United Wambo joint venture partnership (the Applicant), is seeking approval to expand open cut mining operations at the Wambo and United mine sites, to allow for the extraction of an additional 150 million tonnes (Mt) of thermal and semi-soft coking coal over a period of 23 years.

This proposal, known as the United Wambo Open Cut Coal Mine Project (the Project), comprises two open cut mining components. The first involves minor extensions to the Wambo open cut and a material increase in the depth of the existing mining areas, to allow for the extraction of deeper coal seams that underlay the approved Wambo Pit disturbance area. The second component involves the development of a new open cut mining area (the United pit) on the site of the former United Colliery.

The Project would result in the integration of open cut mining operations across the two sites under a single contemporary development consent. While no changes are proposed to the existing approved Wambo underground mining operations, relevant updates would need to be made to the Wambo development consent to reflect the operational responsibilities under the joint venture and allow for the ongoing transport of coal from the Wambo underground, Wambo pit and United pit to the Wambo CHPP for processing and export via the Wambo rail loading and transport facilities.

The Project is summarised in **Table 2** below, and described in detail in the Applicant's Environmental Impact Statement (EIS), Response to Submissions (RTS) and additional information (see **Appendices A** & **C**). **Figures 6** to **8** show the key components of the Project, including the proposed open cut mining areas, key infrastructure assets and the original EIS conceptual final landform.

2.2 Justification for the Project

The Applicant has presented several matters which it considers provide justification for the approval of the Project. These matters are discussed and summarised below:

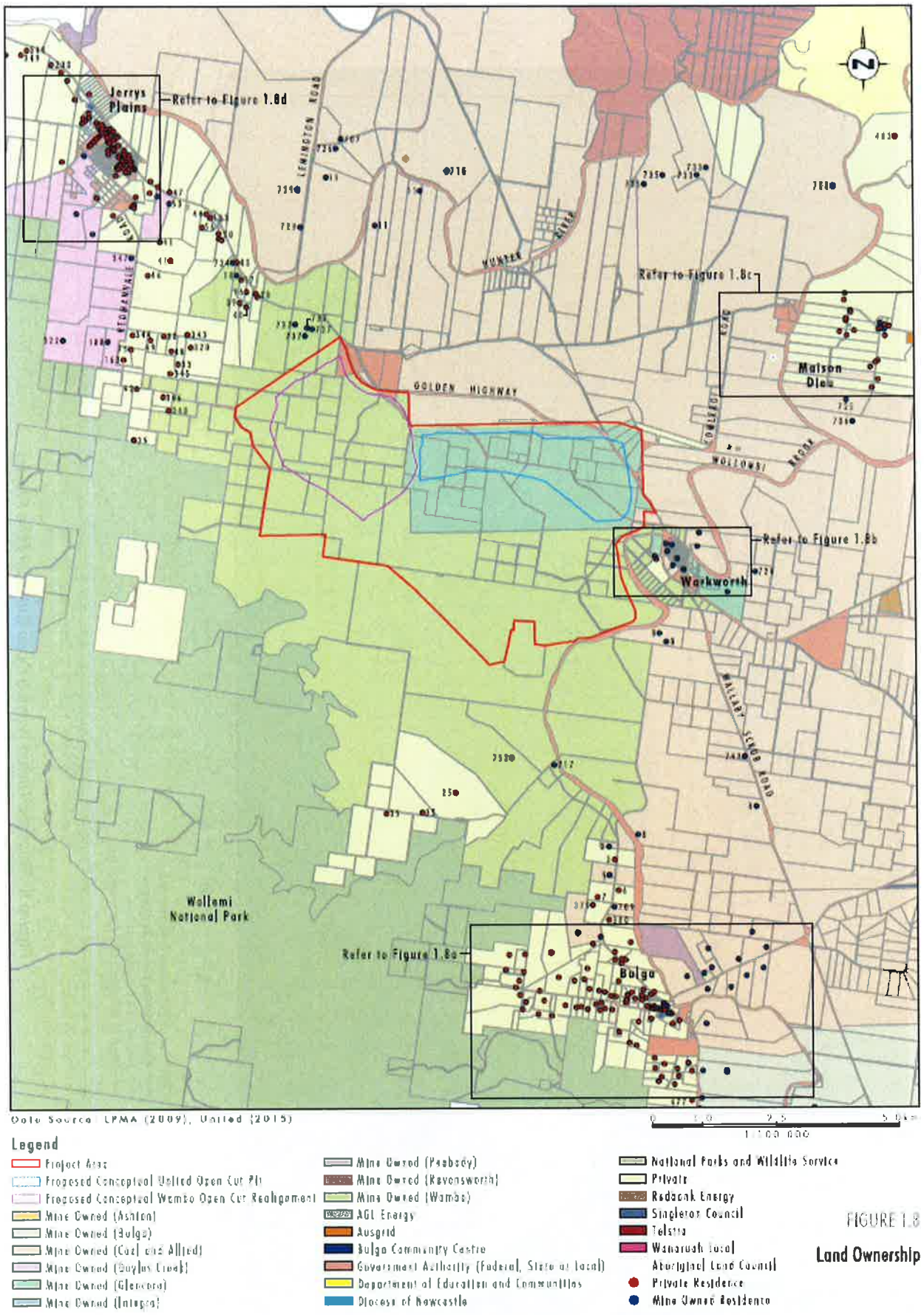


Figure 5: *Surrounding land ownership*

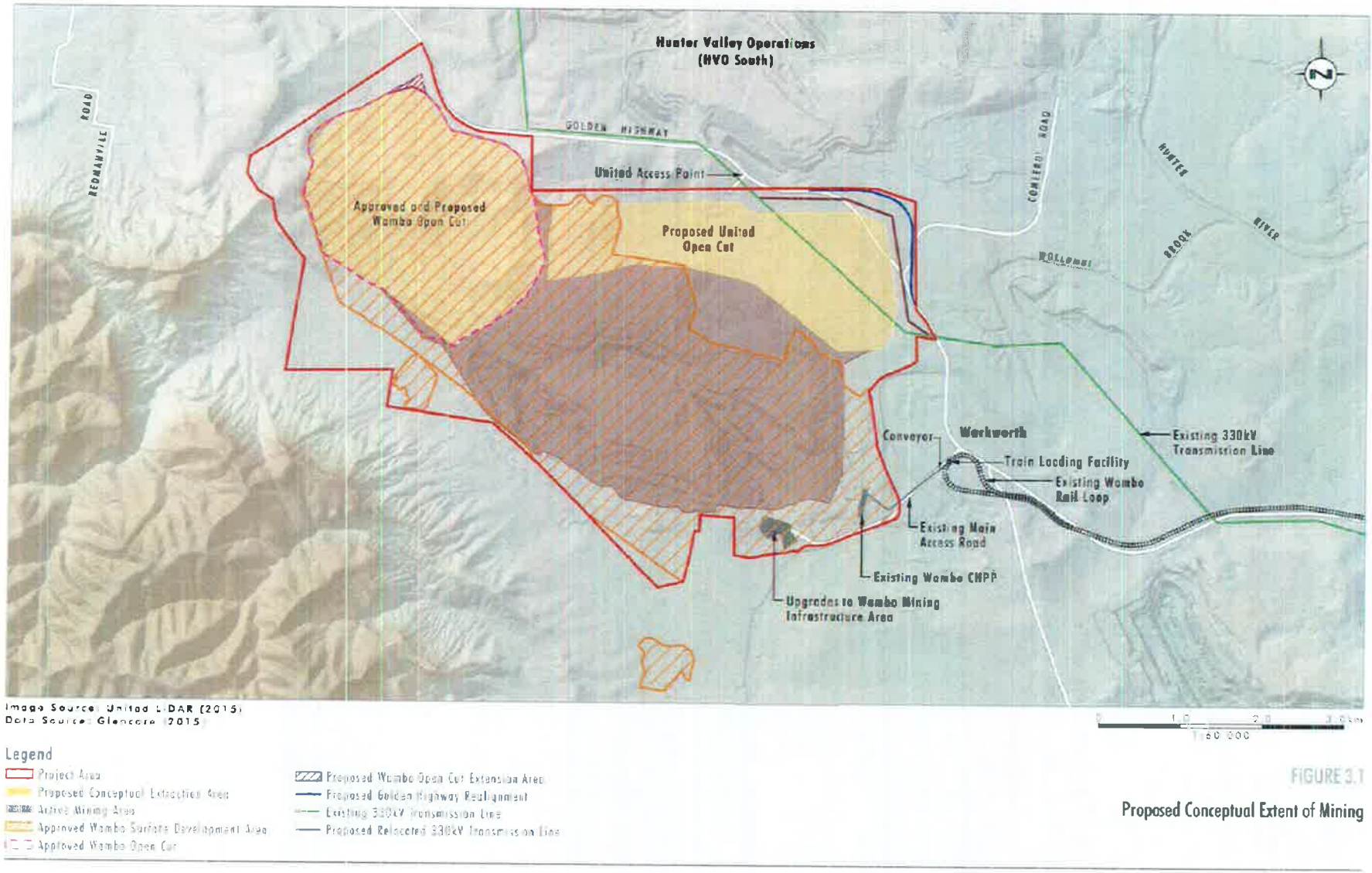


Figure 6: *Proposed United Wambo Open Cut Coal Mine Project*

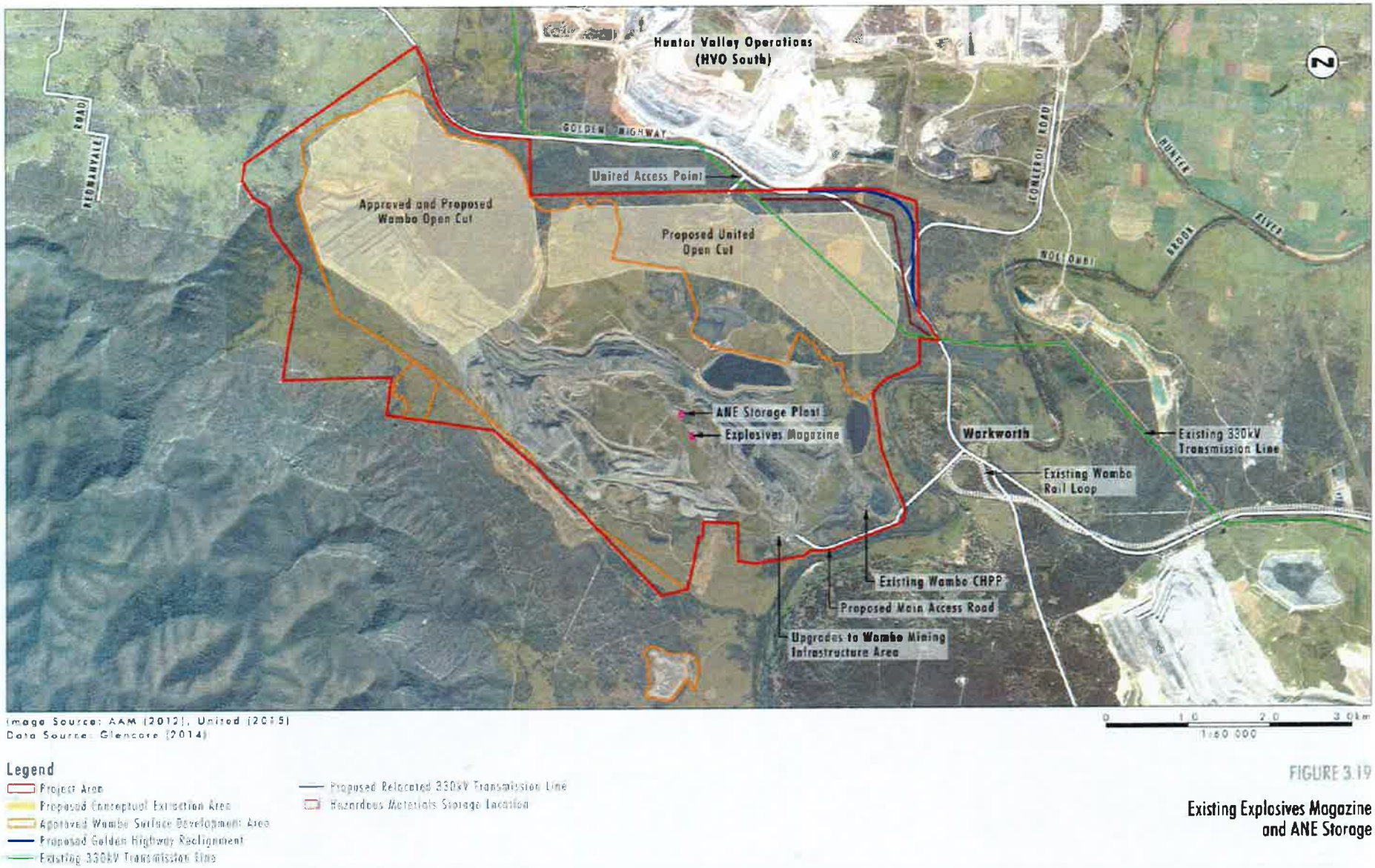


Figure 7: *Existing and proposed infrastructure*

Figure 8: *Proposed final landform*

Table 2: *Key components of the Project*

Aspect	***Description***
Life of Mine	• 23 years from project approval, comprising an additional 20 years of mining for the existing Wambo open cut
Mining Areas	• Open cut mining operations would occur in the following areas (see **Figure 4**): o Wambo Pit with a 3.8 ha increase in surface disturbance relative to the existing approved pit, allowing for recovery of approx. 66 Mt of ROM coal, 40 Mt of which is only accessible due to access to the extended and deeper mining areas; and o New open cut area at United allowing access to approx. 110 Mt ROM coal.
Extraction Rates	• Up to 10 Mtpa ROM Coal.
Mining Methods	• Open cut multi seam mining using a truck and excavator/shovel fleet; and • Approval to supplement open cut mining with the use of alternative high wall or auger mining methods within the proposed mining areas.
Mining Depth	• Mining depths within the Wambo open cut would increase from approximately -30 m AHD to -105 m AHD and target the Arrowfield, Bowfield and Warkworth seams; and • Mining in the United open cut would target the Arrowfield, Bowfield and Warkworth seams, to a depth of approximately -155 m AHD.
Overburden Emplacement and Waste Management	• Use of existing approved tailings storage facilities at Wambo (Homestead and Main Homestead storage facilities) and the Wambo Bates South void; • Overburden to be emplaced within the Wambo and United open cuts, modifications to existing approved overburden emplacements would be required at Wambo to integrate the final landform with the United operations; • Overburden at United would be emplaced within the pit behind the active mining front; and • Coarse rejects from the CHPP transported by truck to the open cut for co-disposal with overburden for the life of the Project.
Coal Processing	• All coal would continue to be processed using the existing Wambo CHPP facilities; and • All ROM coal would be trucked to the Wambo CHPP via internal haul roads.
Transport	• Product coal to be transported via rail to the Port of Newcastle for export; • Up to 15 Mtpa of product coal to be transported via rail; and • Proposed increase from existing maximum of six train movements to eight train movements per day.
Operating Hours	• 24 hours a day, 7 days a week.
Employment	• 500 operational positions at peak production (including 250 existing employees from the Wambo open cut and an additional 250 jobs for the new United mine); and • Up to an additional 120 jobs during the three-year construction period.
Capital Investment	• Approximately $322 million
Infrastructure	• Upgrades to the existing workshops, fuel farm, ancillary infrastructure and Wambo mine infrastructure area including administration buildings, car parking and bathhouse facilities; • Realignment of the Golden Highway, transmission and telecommunication infrastructure; and • Extension to life of Wambo infrastructure including CHPP and train loading facilities and ability to process coal received from United open cut operations, • Decommissioning and removal of United CHPP and surface infrastructure
Site Access	• All operational employees for both mining areas would continue to use the existing Wambo mine access road off the Golden Highway. Limited site access may also occur off private roads and mine owned properties for environmental purposes.
Biodiversity Offsets, Rehabilitation and Final Landforms	• The Project would disturb 678 ha of land, including 147 ha already approved for disturbance under the existing Wambo consent and 531 ha of additional native vegetation and native grassland; • The proposed biodiversity offset strategy currently comprises 2,153 ha of land including 1,275 ha of existing native vegetation and 878 ha of land to be rehabilitated; • The Applicant acknowledges that it needs to obtain additional offsets to compensate for the impacts of the project. Final land uses would involve a mix of agriculture and biodiversity conservation, with rehabilitated woodland areas providing long-term vegetated corridors between nearby conservation areas; and • The Project is seeking approval to retain two final voids.

2.2.1 Coal Resource

The area surrounding Singleton has been known to contain significant coal resources since its early exploration by European settlers. The recovery of coal resources has been a major element of the region's history and economy. In recent years, the Applicant has undertaken a drilling exploration program to verify the extent of coal reserves within its mining tenements at the Project site.

This extensive exploration program identified the potential to recover up to 110 Mt of mineable open cut coal resources from within United's existing surface lease areas, subject to a range of site constraints and limitations. United has identified that, if this resource was to be extracted as a discrete operation, part of it would be sterilised due to the need for additional site infrastructure facilities, constraints to the appropriate management of tailings and limitations from physical boundaries such as watercourses, adjacent mining operations and public infrastructure. The Project also involves a minor extension to the surface disturbance area of the existing Wambo open cut and an increase in the depth of mining within the existing mining footprint to recover an additional 40 Mt of ROM coal. As United currently holds the mining leases over these additional coal seams, the joint venture arrangements enable the efficient recovery of coal from an area that would otherwise be inaccessible to Wambo and would have significantly lower recovery rates if extracted using underground mining methods. With approved extractable open cut resources at Wambo likely to be exhausted in the near future, the Project would extend the life of the mine, provide operational continuity for the existing open cut workforce, achieve more efficient recovery of State coal resources and integrate the operational management and regulation of the two mine sites.

The Department's Division of Resources & Geoscience (DRG) has identified that the unique co-operative approach adopted by United and Wambo would allow for the extraction of an additional 150 Mt of high quality coal that may be sub-economic to recover as standalone operations, maximise the utility of existing mine infrastructure, benefit support industries and provide for the optimised recovery of this resource from an area of the Hunter Coalfield with a long history of mining activities.

2.2.2 Use of Existing Infrastructure

The Applicant asserts that the Project is able to minimise its disturbance footprint by optimising the use of existing Wambo infrastructure, including site access roads, offices, CHPP, train loading facilities and rail loop. Nevertheless, the Applicant is seeking to upgrade some of its existing infrastructure assets and undertake amendments to nearby private and public infrastructure. These works include:

- upgrades to the Wambo Mine Infrastructure Area (MIA), including increased capacity at the existing heavy vehicle workshop, fuel farm and washbays and upgrades to ancillary facilities including power and water services;
- upgrades to existing administration buildings, car parking and bathhouse facilities;
- potential widening of existing internal service roads to accommodate machinery;
- realignment of public infrastructure including a 2 km section of the Golden Highway, telecommunication infrastructure and transmission lines; and
- integration of the Wambo and United water management systems, including construction of new water management structures, changes to existing structures and construction of a flood levee at the United open cut.

2.2.3 Mine Design

The EIS identifies that a range of concept and pre-feasibility studies were undertaken to develop various options for mining methods, extraction areas, emplacement activities and infrastructure uses. The Applicant asserts that the Project reflects its consideration of each of these mine plans and seeks to balance resource recovery and economic viability alongside the minimisation of environmental and human amenity impacts. Importantly, the benefits presented by the chosen Project are noted as being optimised through the joint venture arrangement. These key considerations and optimisations include:

- using the existing Wambo CHPP and train loading facilities, rather than separate processing facilities at each site, thereby minimising the surface disturbance associated with support infrastructure, minimising cumulative noise impacts and optimising resource recovery potential;
- access to deeper coal seams beneath the Wambo Pit, which maximises coal recovery and improves operational efficiencies and strip ratios, with minimal additional disturbance;
- site specific safety constraints, including geotechnical stability, spontaneous combustion, water and gas drainage interactions with former underground workings;

- designing haul roads to minimise vehicle travel distances and maximise the use of topographic barriers or constructed earthen bunds to reduce noise and dust dispersion off-site;
- progressively rehabilitating disturbed areas as mining fronts progress to reduce dust generation, visual impacts and water take;
- creating a single integrated final landform with adequate surface drainage, that blends with the existing mining areas and the surrounding landscape, improves landform continuity relative to the two separate projects and provides for beneficial future land use opportunities;
- managing the mine plan to ensure no net increase in the number of final voids to be retained across the Wambo and United sites, relative to the theoretical potential of a new void being approved under a standalone United project and the retention of existing voids at Wambo; and
- allows for the coordinated and consolidated management of operational impacts from the Project.

2.2.4 Improved Rehabilitation

The Applicant has claimed that the Project would deliver significantly improved rehabilitation outcomes over those that could be achieved through the operation of two open cut mines by separate entities. The proposed integration of mining operations would allow for combined overburden and reject management, overburden emplacement in more strategic locations, reduced influence of boundary constraints imposed by lease areas and land ownership, prevent resource sterilisation and avoid the creation of two 'blocky' landforms by consolidating these landforms into an integrated, more natural looking landform. Further, the consolidation of the two open cut mining areas under a single, modern consent allows for the application of contemporary standards and completion criteria for the woodland habitat and ecological communities across the final landform.

The Applicant has also argued that the Project design would assist in delivering beneficial final land use outcomes by not increasing the number of final voids approved at the two mining sites. To achieve this objective, the Applicant is seeking to relocate and consolidate the two approved Wambo pit voids away from North Wambo Creek and towards the northeast of the Montrose Pit, in the Wambo Pit. The Applicant is also seeking to retain a final void in the United Pit for economic reasons, but has noted that the retention of the two proposed voids would continue to assist in mitigating and managing the potential for post-mining groundwater quality interactions with surrounding water bodies. The Department notes that the final void designs have been further refined throughout the assessment process, including in the Project RTS and additional information.

2.2.5 Economic Benefits

The Applicant's EIS estimated that the Project would generate an overall benefit of $414 million in net present value (NPV) terms for the NSW community, at an incremental benefit to cost ratio of 18.4:1. This assessment noted that the main incremental benefits to the NSW community derive from the generation of $369 million (NPV) in royalties to the NSW Government over the life of the mine. DRG has reviewed the predicted royalties in light of its assumptions about future coal prices for semi-soft coking and thermal coal, and has confirmed that it would expect the Project to deliver around $40 million per annum in royalties, which equates to around $352 million (NPV) over the life of the Project. The EIS includes further qualitative analysis of the extent of additional non-quantifiable externalities that the Project would need to generate in order to result in a net cost to the NSW community. This analysis indicates the Project would need to result in $39 million of additional non-quantifiable costs for each year of operation, in order to outweigh the quantified net benefits of the Project.

To provide additional certainty, the Department commissioned the Centre for International Economics (CIE) to undertake an expert review of the Applicant's Economic Impact Analysis (EIA) and cost-benefit assessment (CBA), which was prepared by Deloitte Access Economics (DAE). This expert review identified that the CBA had been undertaken in a reasonable manner and was broadly consistent with relevant guidelines. However, CIE identified some aspects of the estimated benefits and residual environmental and social impacts that required further consideration.

Given the influence of royalty streams on the quantum of net benefits generated by the Project, CIE undertook sensitivity analysis to consider the likely effects of fluctuations in future coal prices and production quantity assumptions, which provided slightly lower estimates of predicted royalties ranging from $304 to $359 million. Based on this analysis, CIE sought to quantify the minimum net benefits to NSW under a conservative 'lower bound' scenario whereby royalty streams are considered as the only benefit of the Project, all other benefits (estimated by DAE to be $69 million) are excluded and the use of higher costs to NSW for greenhouse gas impacts, which fully allocate Scope 1 and 2 carbon emissions to NSW and include higher per tonnage carbon prices. Even under this highly

conservative scenario, the Project would still be expected to generate a positive NPV of around $257 million (which equates to an incremental benefit to cost ratio of between 2.0-7.5:1).

This analysis supports CIE's overall conclusion that even if "very conservative" assumptions are adopted, the Project would still generate a material net benefit to NSW. In reaching this conclusion, CIE has recognised that the quantum of expected net benefits may need to be revised prior to determination, to reflect any amendments to legislation and policy and to address residual matters raised by NSW Government agencies or the community and associated changes in predicted impacts (or benefits).

The Department considers that the majority of these matters have now been addressed and that conditions can be imposed to ensure these impacts are appropriately mitigated and managed. With these measures in place, the Department is confident the Project could deliver a material net benefit to NSW. It will reaffirm and finalise this assessment of the Project's net benefits prior to determination.

2.2.6 Employment

The existing Wambo mine has an approved workforce of 670 FTE employees, comprising up to 230 underground mine personnel, 290 open cut mine personnel and 150 CHPP, management, administration and support personnel. With current operations in the Wambo open cut scheduled to cease in 2020, most open cut personnel and a number of CHPP and support staff would need to seek alternative employment beyond the current consented mine life.

With a peak operational workforce of up to 500 employees, the Project represents an opportunity for long term continuity of employment for the existing Wambo open cut, CHPP and support services workforce. The Applicant has identified that the approximately 250 employees currently working at the Wambo open cut operations would be preferentially retained under the Project, meaning that the Project would create an additional 250 jobs over the first six to seven years when operating at full production, before reducing to an operational workforce of 450 personnel for the remainder of the Project life. Further to this, the Project is expected to generate temporary employment for up to 120 additional construction jobs, during the three-year construction phase, which is expected to peak in Years 1 and 2 of the Project.

2.2.7 Conclusion

Further justification and detailed discussion of the Project design parameters, alternative mine plans considered and the purported benefits of the adopted proposal can be found in the EIS (see **Appendix A**). The Department has further interrogated these matters throughout **Section 6** below.

2.3 Associated Modifications

In addition to the proposed Project, two modifications are required to integrate the development with the two existing Wambo development consents. These modifications focus on upgrading existing surface infrastructure required for the Project and provide for the use of this infrastructure over the life of the Project. These modifications also allow for the smooth transition of management responsibilities for the Wambo open cut operations, with Wambo retaining full responsibility for these activities under the existing consent (DA 305-7-2003), until such time that United has completed its construction phase and physically commences active mining operations under the Project.

A summary of the proposed modifications is provided below:

DA 305-7-2003 (Wambo open cut, underground and CHPP operations)

- extension of operating life of CHPP and surface facilities to match the life of the Project (23 years from approval);
- approval to transport and process coal from the United open cut to the Wambo CHPP;
- upgrade of existing Wambo surface infrastructure facilities including MIA, site offices, car parking, explosives magazine and hydrocarbon storage, water management systems and power and telecommunication services; and
- emplacement of tailings within Wambo's existing pit voids.

DA 177-8-2004 (Wambo rail infrastructure and operations)

- extension of operating life of the rail facilities to match the life of the SSD Project;
- approval to receive and transport coal from United via the Wambo train loading facilities to market, within currently approved volumes; and

- increase the number of trains approved to depart from the train loading facility (including refuelling infrastructure) from six trains per day to eight trains per day.

3. STRATEGIC CONTEXT

3.1 NSW Coal Industry

Society is heavily reliant on coal to meet its basic energy needs, both at the domestic and international level, with coal delivering energy security and providing around 80% of NSW's electricity needs, 76% of Australia's electricity needs and 40% of the world's electricity needs.

While steps are being taken across the world to increase renewable energy generation and reduce society's reliance on fossil fuels for electricity generation, the International Energy Agency's (IEA's) World Energy Outlook 2016 forecast that, following significant commodity price increases during 2007-2011 and a downward adjustment in coal prices over the past four years, global demand for coal has broadly stabilised at current levels. The IEA indicates that global coal demand is expected to continue to grow at a rate of 0.2% per year over the life of the Project (representing a 5% increase in demand by 2040), in line with an expected increase in world energy consumption of a further 10% by 2040.

The Department recognises that the NSW coal industry has been affected by fluctuations in export coal prices in recent years. However, the recovery of export coal prices throughout 2017, together with the strength of recent Australian coal prices demonstrates the importance of long-run price forecasts and supports the continuance of ongoing global demand for NSW coal products, which will remain a significant State resource and important export commodity over the near to medium term.

The NSW coal industry currently generates around 80% of the value of the State's mineral production and represents about 25% of total NSW exports (for both goods and services combined), making coal by far NSW's biggest mineral and export commodity. NSW coal production has grown steadily over the past decade, primarily to meet demand from Asian markets.

Despite short term downturns in coal prices, NSW produced approximately 246.8 Mt of ROM coal in 2015-2016, yielding 191 Mt of saleable coal worth around $14.6 billion. This saleable coal continues to account for a significant proportion of the State's export revenue, with around 170 Mt exported during 2015-2016, principally through the Port of Newcastle. The remainder of NSW coal production was consumed by domestic industries, including around 20 Mt used for NSW electricity generation.

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

At present, the Hunter Coalfield is the most significant coalfield in NSW, producing around 54% of the State's coal. It comprises 16 large mining complexes, including the Project site, which are located in a broad corridor on either side of the Main Northern Rail Line between Singleton and Muswellbrook.

As at 30 June 2017, the NSW coal industry employed just over 20,538 people, with the Hunter Coalfield (11,748 people) accounting for over half of the coal mining jobs in NSW. With up to 500 ongoing and new FTE operational positions, the Project represents a secure employment opportunity for over 4% of the mining jobs in the Hunter Coalfield.

3.2 Upper Hunter Strategic Regional Land Use Plan

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

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

- maintaining or enhancing future opportunities for sustainable agriculture; and
- defining and protecting strategic agricultural land.

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

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

In considering the potential for impacts on strategic agricultural land, United has identified that while the majority of the Project is located within existing mining leases, new mining leases would be required to allow for deeper mining beneath ML1572, surface disturbance activities within CCL775 associated with existing road corridors and an area of land northwest of the Wambo Pit, which had been mapped as indicative BSAL in the Upper Hunter SRLUP.

To verify the potential for impacts on BSAL, United undertook additional site surveys and in May 2016 applied for a Site Verification Certificate (SVC) for a small section of the Project area. This application indicated that of the 754 ha of land requiring new mining leases, 747.2 ha has been heavily disturbed by historic mining operations and road works, leaving a residual area of 3.8 ha of undisturbed land outside of existing mining leases that has the potential to be BSAL. Following consideration of the information provided by United, OEH advised that the soils in this area do not meet the criteria for BSAL, as they have poor drainage and sodicity or a greater than 10 % slope. A SVC for this area was subsequently issued on 9 June 2016.

United has therefore argued that the Gateway Process does not apply to the Project, as the company holds relevant mining tenements or a SVC over all undisturbed land subject to the proposal, and no CIC land exists in the vicinity of the proposed mining areas.

3.3 Hunter Regional Plan 2036

The Department's Hunter Regional Plan 2036 sets out the strategic vision for the Hunter Region based on four key goals, which are to establish a leading regional economy in Australia, a biodiversity-rich natural environment, thriving communities and greater housing choice and jobs. These goals are to be achieved by delivering on a range of directions and actions set out in the Plan.

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

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

3.4 Upper Hunter Strategic Assessment

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

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

As a signatory and financial contributor to the preparation of the draft Biodiversity Plan underpinning the UHSA, United is eligible to apply to have its Project assessed under the draft UHSA framework. Under this framework, the Project can be considered against the Department's UHSA Interim Policy as a transitional 'Path 1' Project, leading to the assessment of impacts on NSW threatened species under the TSC Act using the *Biodiversity Certification Assessment Methodology* (BCAM). Should the Project be approved, any uncertainty over consistency with the expected outcomes of the final Biodiversity Plan and offset requirements would need to be resolved through conditions of consent.

Consistent with the above, United prepared its EIS to address the requirements of the UHSA Interim Policy on the understanding that the draft UHSA Biodiversity Plan would be publicly exhibited and finalised prior to the determination of the Project. However, delays in the public exhibition of the draft UHSA Biodiversity Plan mean that this process is yet to be finalised. Accordingly, while there is still potential for this process to be completed prior to determination, reliance on the UHSA alone provides uncertainty to both United and the broader NSW community.

Consequently, United has not only provided a complete UHSA assessment, including responses to issues raised in agency and community submissions on the Project, but has also provided an alternative assessment of biodiversity impacts undertaken in accordance with the *NSW Biodiversity Offsets Policy for Major Projects* and associated *Framework for Biodiversity Assessment* (FBA).

The Department's assessment at **Section 6.4** has been undertaken in consideration of both policy frameworks and focuses primarily on United's preferred FBA assessment pathway.

3.5 Applicant's Operations in the Hunter Valley

Both partners in the United Wambo joint venture partnership, Glencore and Peabody, have long histories of mining in the Hunter Valley. Together, these companies own 10 coal mining operations in the Hunter Coalfield, stretching from Bulga in the southeast, to Mount Owen in the northeast, Mangoola in the northwest and the United and Wambo mines in the southwest. Of these operations, Peabody Energy owns and operates the Wambo mine, with the remaining sites being owned and operated by Glencore.

A number of Glencore's existing operations are located adjacent to one another and are managed as mining complexes and larger regional networks of mining complexes. This is particularly the case with Glencore's operations in the greater Ravensworth area, which include the Ravensworth open cut and underground, Liddell open cut, Ravensworth East open cut, Mount Owen open cut and Glendell open cut and Integra underground mines. Glencore currently operates an integrated water management system and consolidated tailings emplacement activities that allow Glencore to balance water demands and surpluses across their sites and coordinate the consolidated management and emplacement of tailings materials. Glencore also has achieved other efficiency gains through the shared use of CHPP capacities at several sites, transfer of gravel material between sites to minimise haul road dust generation and the development of regional scale post-mining land use plans and rehabilitation corridors. This provides a more strategic and coordinated approach to offsetting and rehabilitation, which leads to long-term habitat linkages and strengthened conservation outcomes.

The co-location of the United and Wambo mines provides similar opportunities to generate potential operational efficiencies across these sites. This would be achieved through the shared use of a single CHPP and rail and infrastructure assets, coordinated management of noise and dust emissions, consolidated emplacement of tailings and overburden material, shared water infrastructure and some post-approval operational management plans. Further consideration of these matters is provided in **Section 6**.

3.6 Peabody's Financial Position

A number of submissions received on the Project raised concerns about the financial viability of Wambo's parent company (Peabody Energy Australia) and including the ability for the company to

meet its financial obligations under any development consent, particularly in relation to rehabilitation. These concerns primarily related to Peabody Energy Corporation's filing of voluntary Chapter 11 bankruptcy petitions for its United Stated entities in April 2016.

The Department notes that under the EP&A Act, development applications are made in relation to 'land', meaning that the consent authority must determine the application in relation to the subject land and is not required to consider the financial viability of any individual applicant or person.

Nevertheless, to address the concerns raised in submissions, the Department sought additional feedback from the Applicant on the financial status of Peabody Energy Australia. The RTS has since confirmed that the Australian operations of Peabody Energy were not subject to the Chapter 11 filings in the United States and have been unaffected by these proceedings due to the separate funding arrangements in place for Peabody Energy's Australian operations. In addition to these assurances, the recovery of thermal coal prices over the past 12 months, coupled with a more optimistic outlook for the coal industry, has seen Peabody Energy Corporation's recent emergence from bankruptcy in the United States. Given Peabody Energy's current financial position and considering that the Project is a joint venture arrangement with financial backing from both Peabody Energy Australia and Glencore, the Department is satisfied that concerns over the Applicant's financial status have been addressed.

To provide further surety, the Department notes that the NSW regulatory system includes a range of mechanisms to ensure that financial obligations can be met, including the rehabilitation of the site. These obligations include substantial security deposits for the rehabilitation of every operating mine in NSW, which are held by DRG under the *Mining Act 1992*. The security deposit for each site is designed to cover the full cost of undertaking rehabilitation and may be 'called in' by DRG in the event that a leaseholder fails to meet the rehabilitation requirements set by the *Mining Act 1992* and stipulated in the relevant mining lease. These deposits are regularly reviewed over the life of a Project to reflect the progress of rehabilitation activities and any approved changes to Project outcomes.

Finally, the Project itself would generate significant operational revenue for the Applicant and deliver net benefits to the community. These outcomes have been supported by an independent economic review commissioned by the Department and undertaken by CIE. Consequently, the Department is satisfied that appropriate regulatory controls are in place and that the Project itself is both financial viability and capable of generating net benefits to the State.

4. STATUTORY CONTEXT

The Department has considered statutory requirements for the assessment of the Project under the EP&A Act, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and other relevant legislation. In regard to the EP&A Act, this has included consideration of the:

- objects found in section 5 of the Act;
- matters relating to threatened species found in the recently repealed sections 5A-5D of the Act, in accordance with the transitional arrangements specified in the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*;
- the matters listed under section 79C of the Act;
- applicable environmental planning instruments and draft instruments; and
- various other requirements of the Act and its Regulations, including concerning public exhibition.

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

4.1 State Significant Development

4.1.1 United Wambo Open Cut

The proposed development is declared to be State significant development under section 89C of the EP&A Act as it is 'development for the purposes of coal mining', as specified in clause 5 of Schedule 1 to *State Environmental Planning Policy (State and Regional Development) 2011*.

Consequently, the Minister for Planning is the consent authority for the development. However, the development application falls within the Minister's delegation to the Planning Assessment Commission (Commission) dated 14 September 2011 and 11 October 2017, because there were more than 25 public submissions in the nature of objections and a related entity, Glencore Australia Holdings Pty Ltd, has declared reportable political donations. Consequently, the Commission must determine the application.

4.1.2 Associated Modifications

As identified in **Section 2.3**, the Project would require associated modifications to two existing development consents for the Wambo open cut and underground mining operations (DA 305-7-2003) and rail and coal loading infrastructure (DA 177-8-2004). Both of these consents were granted under Part 4 of the EP&A Act.

In accordance with clause 8J(8) of the *Environmental Planning and Assessment Regulation 2000* and the transitional arrangements under Schedule 6A of the EP&A Act, the modifications are to be determined under the former section 75W of the EP&A Act.

The proposed changes would involve extending the life of both consents, changes and upgrades of existing surface infrastructure to allow integration with the Project and an increase in the maximum number of train movements per day. These changes could be achieved with minimal environmental impact (see **Section 6**). Given these considerations, the Department is satisfied that the proposed modifications are within the scope of section 75W, and may be determined accordingly.

4.2 Permissibility

The Project disturbance area is located in the Singleton local government area. All subject land within the Project area is zoned RU1 (Primary Production) or SP2 (Infrastructure) under the *Singleton Local Environmental Plan 2013* (Singleton LEP). Open cut mining is permissible with consent in areas zoned RU1 but is prohibited within land zoned SP2.

The Department notes that the land zoned SP2 relates to the current Golden Highway road corridor. As agricultural development may be carried out within this zone, mining is permissible with consent on this land under Clause 7(1)(b)(i) of the *State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007* (Mining SEPP).

The Applicant is proposing to realign a substantial section of the Golden Highway over land currently classified as RU1 (Primary Production). Development for the purpose of roads is permissible with consent in this zone.

Following the relocation of the Golden Highway and gazettal of an alternative road corridor, the original road corridor would no longer serve its current purpose as a mapped Classified Road under the Singleton LEP. As identified in clause 5(3) of the Mining SEPP, the provisions of the Mining SEPP also prevail over any inconsistency with the Singleton LEP.

Therefore, given that mining is permissible within this area and an alternative Classified Road corridor would be provided under the Project, all components of the Project are permissible with development consent and the Commission may determine the application.

4.3 Objects of the EP&A Act

The Minister or his delegate must consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the decision on whether or not to approve the Project are found in sections 5(a)(i), (ii), (vi) and (vii). They are:

To encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;

(ii) the promotion and co-ordination of the orderly and economic use and development of land;

(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats; and

(vii) ecologically sustainable development.

The Department is satisfied that the Project encourages the proper development of resources (Object 5(a)(i)) and the promotion of the orderly and economic use of land (Object 5(a)(ii)), since the:

- Project represents permissible land uses on the subject land;
- targeted coal resource has been determined by DRG to be significant from a State and regional perspective;
- targeted coal resource is located almost entirely within existing coal exploration and mining lease areas, in a region that is dominated by coal mining operations;
- Project can be largely carried out using existing mine site and transport infrastructure; and
- Project would provide considerable socio-economic benefits to the community of NSW.

Consideration of the protection of the environment (Object 5(a)(vi)) is provided in **Section 6** of this report. The Department believes that the Project as now proposed has been designed to minimise potential environmental impacts where practicable, including setbacks from significant watercourses, avoidance of certain threatened flora (ie *Acacia pendula*), creation of improved final landform and rehabilitation outcomes and extraction of a further 40 Mt of coal from previously disturbed land.

Overall, the Department considers that the Project is able to be undertaken in a manner that would maintain or improve the biodiversity values of the region in the medium to long-term. The Department is also satisfied that the impacts to threatened species and habitats can be managed and/or mitigated through appropriate conditions that require biodiversity offsets and detailed rehabilitation strategies.

The Department has considered the principles of ecologically sustainable development (ESD, Object 5(a)(vii)) in its assessment of the Project (see **Appendix D**). The Department has also noted the Applicant's consideration of these matters (see Section 9.3 of the EIS), and considers that the Project is able to be carried out in a manner that is consistent with the principles of ESD.

The Department's assessment has sought to integrate all significant environmental, social and economic considerations. The key costs and benefits of the Project have been independently peer reviewed and carefully considered.

4.4 Significant Effect on Threatened Species

The recently repealed sections 5A to 5D of the EP&A Act relate to the consideration, assessment and management of threatened species. In deciding whether the Project is likely to have a significant adverse effect on threatened species, populations or ecological communities, or their habitats, the consent authority was until recently required to take into consideration:

- the factors listed in section 5A(2) of the EP&A Act (the '7 part test'); and
- any assessment guidelines issued and in force under the *Threatened Species Conservation Act 1995* (TSC Act) or *Fisheries Management Act 1994*.

The Department considered the seven part tests presented in Appendix 13 of the EIS and Part B of the RTS, along with the *Threatened Species Assessment Guidelines* (DECC 2007) in deciding whether the Project is likely to cause significant effects on threatened species, populations or ecological communities, or their habitats. This consideration has informed the Department's assessment of these impacts (see **Section 6.4**).

4.5 Environmental Planning Instruments

A number of environmental planning instruments apply to the Project, including:

- *State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007* (Mining SEPP);
- *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP);
- *State Environmental Planning Policy (State and Regional Development) 2011;*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*;
- *State Environmental Planning Policy No. 44 – Koala Habitat Protection*;
- *State Environmental Planning Policy No. 55 – Remediation of Land*;
- *Hunter Regional Environment Plan (Heritage) 1989*; and
- *Singleton Local Environmental Plan 2013.*

The Department has noted the Applicant's consideration of these matters in its EIS and assessed the Project against the relevant provisions of these instruments (see **Appendix D**). Based on this assessment, the Department is satisfied that the Project can be carried out in a manner that is consistent with the aims, objectives and provisions of these instruments.

4.6 Integrated & Other Approvals

Under section 89J of the EP&A Act, a number of approvals are not required to be separately obtained for the Project. These include various heritage approvals required under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977* and certain water related approvals under the *Water Management Act 2000*.

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

Under section 89K of the EP&A Act, a number of further approvals are required, but must be granted substantially consistent with any development consent granted for SSD. These include:

- variations to the existing mining leases and any new mining leases under the *Mining Act 1992*;
- approvals for development within the Patrick Plains Mine Subsidence District under the *Mine Subsidence Compensation Act 1961*;
- variations to existing Environmental Protection Licences (EPLs) under the *Protection of the Environment Operations Act 1997*; and
- consent for road works under section 138 of the *Roads Act 1993*.

The Department has consulted with the authorities responsible for granting these approvals during the assessment process. None of these authorities objected to approval of the Project, subject to the imposition of suitable conditions (see **Section 6**).

4.7 Site Verification Certificate

As outlined in **Section 3.2**, the proposed Project requires new mining leases to be issued to enable open cut mining to occur in an area to the north of the existing Wambo Pit and within the proposed United Pit. Consequently, the provisions of clause 50A of the EP&A Regulation apply and the Applicant is required to obtain either a SVC or Gateway Certificate for the Project.

In May 2016, the Applicant applied for a SVC to confirm that a residual area of 3.8 ha of undisturbed land subject to proposed mining activities and outside of existing mining leases does not contain BSAL. Following consideration of the information provided by United, OEH advised that the soils in this area do not meet the criteria for BSAL, as they have poor drainage and sodicity or a greater than 10 % slope. A SVC for this area was subsequently issued on 9 June 2016.

All areas of mining operations subject to the application have been previously disturbed by historical mining or road infrastructure development, are subject to a SVC or are contained within existing mining leases. The Department is therefore satisfied that the Project would not result in any material impacts to BSAL.

4.8 Commonwealth Approval

A delegate of the Commonwealth Minister for the Environment determined on 7 December 2015 that the Project is a 'controlled action' under the EPBC Act. The Project was determined as being likely to have a significant impact on controlling provisions and matters protected under the EPBC Act, including:

- listed threatened species and communities (under sections 18 & 18A of the EPBC Act). In particular the following species were identified as being likely to be significantly impacted:
  - *Central Hunter Valley Eucalypt Forest and Woodland Ecological Community*;
  - Regent Honeyeater;
  - Swift Parrot; and
  - Spotted-tail Quoll; and
- a water resource, in relation to coal seam gas development and large coal mining development (under sections 24D & 24E).

Following clarification of the (now) Commonwealth Department of the Environment and Energy's (DoEE's) assessment requirements, on 15 December 2015 the Department issued revised

environmental assessment requirements for the Project, including an attachment covering the Commonwealth's matters.

As part of its controlled action determination, DoEE accredited the State's environmental assessment processes under the EP&A Act. Consequently, the potential impacts on the Commonwealth's matters have been assessed under Part 4 of the EP&A Act. The Department's assessment of the potential impacts of the Project on the Commonwealth matters relating to biodiversity and water resources is provided in **Sections 6.4** and **6.6**. Following the NSW determination of the Project, the Department will refer the Project to the Commonwealth Minister for the Environment for separate determination under the EPBC Act.

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

4.9 Exhibition and Notification

Under section 89F of the EP&A Act, the Secretary is required to publicly exhibit the EIS for the Project for at least 30 days. After accepting the EIS, the Department:

- publicly exhibited the EIS from 11 August 2016 until 22 September 2016:
  - on the Department's website;
  - at the Department's Information Centre;
  - at Singleton Shire Council's (Council's) Administration Centre; and
  - at the Nature Conservation Council's office;
- advertised the exhibition in the Newcastle Herald, Hunter Valley News and Singleton Argus;
- notified relevant State Government authorities and Council; and
- notified relevant transport and infrastructure authorities in accordance with the Mining SEPP and the Infrastructure SEPP.

In undertaking these processes, the Department has satisfied the notification requirements of section 89F of the EP&A Act and the relevant environmental planning instruments.

During the assessment process, the Department also made a wide range of documents relevant to the assessment of the Project available on its website.

4.10 Planning Assessment Commission Review

On 28 November 2017, the Minister for Planning asked the Commission to review the merits of the Project, and requested that the Commission hold public hearings during the review. The terms of reference for the Commission's review are shown below. Once it receives the Commission's review report, the Department will finalise its assessment of the merits of the Project and refer the development application back to the Commission for determination.

1. Carry out a review of the United Wambo Open Cut Coal Mine Project, by:
   a) considering the EIS for the development, the issues raised in submissions, the response to submissions, any other information provided concerning the development by the Applicant and any information provided during the course of the review or as part of the public hearing;
   b) considering the likely economic, environmental and social impacts of the development in the locality, the region and the State;
   c) assessing the merits of the development as a whole, having regard to all relevant NSW Government policies and guidelines; and
   d) providing recommendations on any additional reasonable and feasible measures that could be implemented to avoid, minimise and/or manage the potential impacts of the development.
2. Hold a public hearing during the review as soon as practicable after the Department of Planning and Environment provides its preliminary assessment report to the Commission; and
3. Submit its final report on the review to the Department of Planning and Environment within 12 weeks of receiving the Department's preliminary assessment report, unless otherwise agreed with the Secretary of the Department.

5. CONSULTATION

In response to the exhibition of the Project, the Department received 103 submissions, comprising:

- 11 from public authorities, including Singleton Shire Council and 10 NSW Government agencies;
- 3 public submissions in support of the Project; and
- 89 public and special interest group submissions objecting to or commenting on the Project and the associated modifications.

The Department also received advice from DoEE, the IESC, the Australian Rail Track Corporation (ARTC), Ausgrid and Transgrid.

A summary of the issues raised in submissions is provided below. A full copy of these submissions and the Applicant's response to submissions (RTS) are provided in **Appendices B** and **C,** respectively.

5.1 Public Authority Submissions

No public authorities objected to the Project. However, most of the public authorities raised issues or expressed concerns with specific aspects of the Project in submissions and/or advice, and made recommendations relating to their administrative and regulatory responsibilities.

Following the provision of additional information in the RTS, these public authorities have advised the Department that they are satisfied that their concerns have been adequately addressed and/or can be managed through appropriate conditions of approval. Accordingly, the following summary focuses primarily on the key residual issues or concerns that require further consideration in **Section 6**.

Singleton Shire Council (Council) did not object to the Project and noted that the Applicant provided an extensive RTS. However, Council considers that final land uses and particularly for the final voids, requires ongoing discussion and consideration.

The **Office of Environment and Heritage** (OEH) raised a number of issues with aspects of the biodiversity assessment provided for both NSW and Commonwealth matters. This included initial deficiencies and information gaps in the justification of the Applicant's assessment pathway, mapped biodiversity impacts, credit calculations and proposed offsets.

The Applicant has responded to these matters in its RTS and later additional information. The Applicant has also met with OEH to discuss and clarify technical aspects of OEH's biodiversity offset requirements. The Department has considered these matters in detail in **Section 6.4**.

OEH considered that the Applicant's Aboriginal cultural heritage assessment adequately addressed any potential impacts and was satisfied that the proposed management measures would be appropriate. Aboriginal cultural heritage is discussed further in **Section 6.10**.

OEH noted that while the Applicant's flooding assessment was not in accordance with Singleton Council's assessment it was conservative and acceptable. OEH considered the Applicant's assessment showed minimal impact to private property, but recommended conditions requiring updated flood modelling to be accounted for in the design of the proposed flood protection levee. Flooding impacts are discussed in further detail in **Sections 6.6**.

The **Heritage Division of the OEH**, on behalf of the Heritage Council of NSW, raised concerns over the potential impacts and proposed management measures for specific items including the Dog-leg Fence, Former House Site, Shearing Shed and Creamery and Montrose Property. Overall, the Heritage Division considered that the EIS did not provide sufficient detail to assess the potential significance of the items or the proposed management actions. The Heritage Division also noted that, in some instances, the timing of proposed management actions would be too close to or after the expected commencement of impacts.

Following the provision of addition information, the Heritage Division considered that the specific impacts of the Project on heritage items could be satisfactorily mitigated through proposed management actions (see Section **6.10)**. More broadly, the Heritage Division advised that impacts on historic heritage could be sufficiently addressed through appropriate conditions of consent.

The **NSW Environment Protection Authority** (EPA) sought clarification on a range of issues relating to predicted air quality and noise impacts and how there related to the noise and air quality emissions from the Wambo Coal Mine.

The EPA raised significant concerns over the differentiation and regulation of Project noise emissions from different components of Wambo's existing noise sources (ie haul road, CHPP and rail facility). The EPA advised that insufficient information was provided in the EIS to determine robust noise criteria for the separate projects. To address this, the EPA requested an explanation of the noise sources and project components included in modelling scenarios and how compliance with any proposed noise limits would be achieved through a noise management system across both the Project and the Wambo Coal Mine.

In its RTS the Applicant noted that:

- the Wambo Mine would continue to operate under the existing noise criteria in DA 305-7-2003 until mining activities commenced under a separate development consent for the Project;
- following commencement of mining in the United pit, all open cut operations would be managed by United and all underground mining, CHPP and rail facilities would be managed by Wambo; and
- it would develop a management system that utilises a detailed monitoring process and program to determine the source of noise emissions and exceedances.

The Applicant considered that the EPA's concerns relating to monitoring and enforcement of separate noise limits could be adequately addressed through the development of a noise monitoring regime and a corporate agreement on which entity would be responsible for noise generation in different areas, with United responsible solely for open cut operational noise.

However, the EPA was not satisfied with the Applicant's approach to monitoring and enforcement of separate noise limits, given the close proximity and overlapping nature of certain activities. The EPA recommended that the Applicant further develop its proposed monitoring system to ensure that compliance with noise criteria and operational responsibility could be determined for any potential exceedance. The Applicant provided a further response to these matters in November 2017. The EPA and the Department both reviewed this response and consider that it resolves the issues raised by the EPA. Potential noise impacts are discussed in **Section 6.2**.

The EPA requested further information to adequately assess the potential predicted exceedances of relevant air quality criteria and also diesel emissions and commitments surrounding diesel emission controls. The Applicant proposed to implement several best practice measures to reduce diesel emissions, including around the maintenance of equipment and engine replacement.

The independent review of the Air Quality Impact Assessment (AQIA) commissioned by the Department raised similar concerns to the EPA. The Applicant provided further information which resolved these concerns including an updated cumulative assessment which considered the adjacent HVO South modification applicant (MOD 5).

The only private residence predicted to experience air quality impacts above the relevant assessment criteria is already entitled to voluntary acquisition rights and would be expected to continue to have these rights as part of the approval of the Project. The air quality assessment is discussed further in **Section 6.1**.

The EPA questioned whether saline water from the Project would be transferred to Wambo's Hunter River Salinity Trading Scheme discharge point. The Applicant confirmed that saline water would be discharged under the requirements of Wambo Mine's EPL. The EPA noted that all related matters could be managed through an EPL, as discussed further in **Section 6.6**.

The **Division of Resources and Geoscience** of the Department (DRG), formerly the Division of Resources and Energy of the Department of Industry, identified that there are no constraints resulting from Biophysical Strategic Agricultural Land or critical industry clusters in the Project area. Potential resource sterilisation was considered and DRG concluded that there would be no impact to open cut or underground coal resources in the biodiversity offset areas.
Clarification was sought on the proposed post-mining uses for the final voids, the final land use around the Wambo Homestead and North Wambo Creek and the topsoil resources available to meet proposed rehabilitation proposals. DRG considered that the RTS adequately addressed potential

issues over the availability of topsoil resources, while further clarification was needed regarding post-mining final voids and the saline levels proposed to accumulate in these voids. **Sections 6.5** and **6.6** provide further discussion of final landform and water resources.

DRG also advised the Department that approved exploration activities within CCL 775 and ML 1572 would be limited to the development consent boundary.

The **Department of Primary Industries** (DPI) provided comment on the Project from its **Crown Land and Water Division** (CLWD (formerly DPI Water)) raised concerns about potential impacts to water users, watercourses and GDEs.

CLWD requested additional information in relation to the numerical groundwater model, including a further peer review. This was provided in the RTS and is discussed further in **Section 6.6**.

CLWD recommended the development of a water management plan requiring consultation with potentially affected water users, TARPs to manage potential impacts to these water users and compensation in the event of impacts to their water supplies. The Applicant advised that, while one privately owned bore (GW060780) was likely to experience drawdown impacts above the Level 1 minimal impact considerations in the *NSW Aquifer Interference Policy*, this bore is currently not serviceable and is located on a property that has recently been purchased by United.

CLWD raised concerns about potential erosion and scour to surface watercourses from site discharges. The Applicant clarified in its RTS that there are no discharges to Waterfall Creek proposed as part of this Project and all other discharges would be controlled through existing licences. This is discussed further in **Section 6.6**.

CLWD requested that the Applicant provide further details of the site water balance including the water needs of land requiring rehabilitation. The RTS contained a detailed site water balance to address CLWD's concerns. This is discussed further in **Section 6.6**.

Existing mining projects in the region are already approved to impact a GDE consistent with the *Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregion* Endangered Ecological Community (EEC). CLWD noted that the proposed Project is predicted to bring forward this cumulative impact by one year (without changing the scale of the impact) and recommended further assessment and consultation with OEH.

The Applicant considers these impacts to the GDE are already approved and that the Project would result in this impact occurring earlier. For further discussion of GDEs see **Sections 6.4**.

CLWD recommended that a water management plan is developed to manage and mitigate potential impacts. The Applicant proposes to develop and implement a comprehensive water management plan that would include:

- consultation with potentially impacted water users;
- development of trigger action plans to manage potential impacts on the alluvial aquifers, GDEs, and private users;
- erosion and sediment control mitigation measures (including for works within waterfront land);
- expansion of the monitoring network in the alluvium and shallow regolith; and
- rehabilitation strategies for watercourses impacted by the Project.

For further discussion of potential water impacts of the Project see **Section 6.6.**

DPI's **Division of Agriculture** did not raise any issues over the EIS but later noted concerns with the Land and Soil Capability classes as discussed in the RTS. These issues related to comments in the RTS that, at the completion of mining, around 887.2 ha of Land and Soil Capability Class 3 – 5 would be returned to lower classes, with limited land made available for post-mining grazing and other agricultural activities. DPI recommended that, regardless of the final land use, a similar final Land and Soil Capability Class should be returned, to ensure healthy soil and ecosystems for the area. The Applicant provided a further response to DPI's concerns, noting that the majority of the stated impacts relate to the existing Wambo operations and that the Project results in significantly lower changes in land use capabilities. This matter is discussed further in **Section 6.5.**

Subsidence Advisory NSW (SA NSW) requested confirmation that there would be no subsidence impacts to surface improvements and noted that the proposed realignments of the Golden Highway and transmission line would require its approval. SA NSW requested inclusion of conditions requiring consultation with it over these matters.

SA NSW also noted that if any open cut areas are backfilled and inadequately compacted, future development would be unlikely without first requiring the elimination of any residual land settlement (ie mine subsidence risk).

NSW Health did not object to the Project, but raised several concerns over the potential air quality, noise and health impacts on the local community. Specifically, NSW Health expressed a preference for the EIS to consider the potential for revised air quality standards in accordance with the recently revised National Environment Protection (Ambient Air Quality) Measure (NEPM) and made several recommendations related to conditions for the Project, including the application of reasonable and feasible dust mitigation measures, appropriate noise mitigation, consultation with residences subject to acquisition rights and management of dust impacts on rainwater tanks.

The Applicant provided a discussion on air quality impacts (see **Section 6.1**) and noise impacts (see **Section 6.2**) in its RTS. NSW Health did not raise any additional issues in response to the RTS.

Roads and Maritime Services (RMS) did not object to the Project but requested additional information relating to the proposed Golden Highway realignment corridor, including a geotechnical assessment, detailed design plans of the future road capacity and information on closure and dedication of the road reserve.

In its RTS, the Applicant provided a geotechnical assessment of the proposed realignment route and noted that, as the current road reserve would be mined as part of the Project, it would be closed following the construction and gazettal of the realigned section of road. The Applicant advised that, while the realignment design is for a two-lane single carriageway, the realignment corridor width would allow for future upgrades.

RMS was satisfied with the geotechnical assessment and made several recommendations to ensure that mining activities would not impact the realigned Golden Highway. These are discussed further in **Section 6.7**.

Transport for NSW (TfNSW) did not object to the Project, and advised that the Golden Highway is a classified road and the agreement of RMS would be required for the re-alignment.

NSW Rural Fire Service (RFS) had no objections to the Project, subject to the implementation of the comprehensive fire management plan prepared in consultation with the RFS's Singleton Fire Control Centre.

ARTC confirmed that the NSW rail network is available for the Project and no further investigation of rail network capacity above the assessment contained in the EIS is necessary. Transport impacts are discussed in **Section 6.7**.

Ausgrid advised it would require site specific assessment during the design phase of the transmission line realignment. This would focus on poles which may have mounted transfers or utilise stay wires as these poles may response differently to blast vibrations.

Transgrid advised that the blasting criteria proposed by the Applicant are acceptable. The Department's consideration of blasting is discussed in **Section 6.3**.

The **Commonwealth Department of the Environment and Energy** (DoEE) made a number of comments on and liaised directly with OEH in relation to the Commonwealth's Matters of National Environmental Significance (MNES), namely listed threatened and migratory species and water resources.

The Department has provided its preliminary consideration of Commonwealth matters in **Section 6.4**. Further assessment of these matters will be undertaken prior to determination of the Project.

The Commonwealth **Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development** (IESC) provided scientific advice on the Project to both the Department and DoEE. The IESC advised that it considered the key potential impacts of the Project to be:

- changes to groundwater and surface water quality resulting from mine water discharges;
- reductions to baseflow in the Hunter River and Wollombi Brook from changed surface-groundwater interactions;
- contamination to surface water and groundwater systems from the final void lake; and
- impacts to GDEs from drawdown in the alluvial aquifer.

The IESC considered that parameters used in the EIS's surface water numerical modelling should be further justified. To address these issues, the IESC identified a range of additional information that could be provided by the Applicant, for consideration in the assessment.
Likewise, the IESC considered the groundwater model could benefit from further clarification and sensitivity analysis of hydraulic parameters, as well as consideration of how geological faults may influence groundwater flow. Additionally, the IESC considered that the storage of minewater had not been appropriately included in the numerical modelling.

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

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

The Applicant responded to the IESC's advice in its RTS. The Department has considered the IESC's advice, the Applicant's response to these matters and further expert advice from CLWD in completing its assessment of water resources in **Section 6.6**.

5.2 Community and Interest Group Submissions

The public exhibition of the EIS attracted strong interest in the local community, with the Department receiving 92 public submissions. Of these submissions, around 93% objected to the Project.

Three submitters expressed support for the Project due to the local and regional socio-economic benefits, ongoing job security and environmental benefits from utilising an existing brownfield site. Of the remaining public submissions 86 objected to the Project and 3 made comments. **Figure 9** shows concerns raised by submitters objecting to the Project.

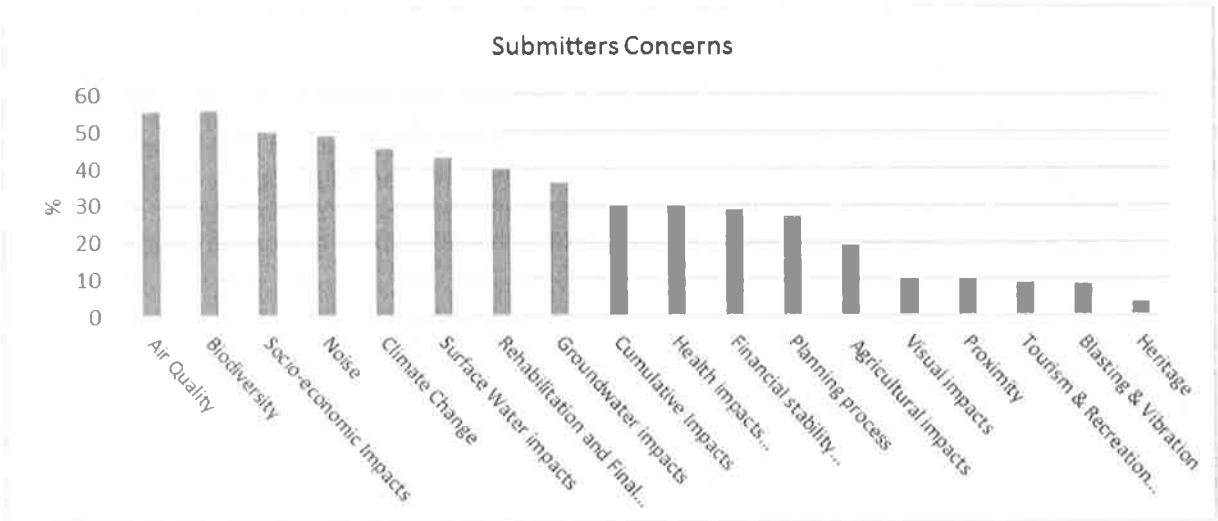


Figure 9: *Concerns raised in submissions objecting to the Project.*

5.2.1 Issues Raised

The majority of submitters expressed concerns about the potential impacts which are addressed in the following subsections.

Air Quality Impacts
Submitters noted general concerns about the existing air quality around the Project and that the Project would contribute additional dust to an area already subject to high levels of dust from neighbouring open cut mining operations. The concerns over air quality were also linked to health concerns from respiratory illnesses and dust accumulation in water tanks. Concerns were also raised that the assessment had not applied the new NEPM.

The Department's assessment of air quality impacts is discussed in **Section 6.1**.

Biodiversity Impacts
The majority of submitters raised concerns over the biodiversity impacts of the Project. These concerns were focused on the loss of habitat for endangered species such as the Spotted-tail Quoll and the clearance of vegetation listed as a Critically Endangered Ecological Community. Many submitters also considered that the biodiversity offsets proposed were not appropriate and had concerns over the proportion of rehabilitated vegetation proposed to contribute to these offsets. The Department's assessment of biodiversity impacts is discussed in **Section 6.4**.

Noise Impacts
Submitters noted the cumulative impacts of existing noise from mines in the area, and raised concerns over the noise impacts of the Project extending for a further 23 years. Concerns were also raised about the monitoring and compliance of noise emissions from the Project. The Department's assessment of noise impacts is discussed in **Section 6.2**.

Climate Change
A high number of submitters were opposed to extracting any more coal in NSW in light of global climate change. Many drew upon Australia's recent signing of the *Paris Agreement*, which set out a global action plan between 195 countries to limit global warming and avoid climate change. The Department has considered greenhouse gas emissions in **Section 6.1.**

Socio-economic Impacts
Half of all the objecting submitters raised concerns over the Project's potential socio-economic impacts. These concerns covered a range of issues, including the loss of local jobs in industries that conflict with mining, impacts on property values, a reduction in rural and village populations and loss of social cohesion resulting from property acquisitions and inadequate benefits. The Department's assessment of economic and social impacts is discussed in **Sections 6.8** and **6.9**.

Other issues raised in submissions objecting to the Project included:
- *ground and surface water* – concerns over potential catchment impacts including water losses and water quality;
- *final void and rehabilitation* – concerns over delays in rehabilitation at the site, the proposed final landform and the two proposed final voids which may cause future impacts to water resources;
- *cumulative impacts* – concerns over cumulative impacts with adjacent operations and requests for a more comprehensive consideration of the cumulative impacts of mining in the Hunter Valley;
- *human health and amenity* – concerns over potential health and amenity impacts and requests for the installation of mitigation measures and/or property acquisitions in the local region; and
- *financial stability* – concerns regarding the long-term financial stability of Peabody and global coal prices.

The Department has considered all of the above matters in its assessment of the Project (below).

6. ASSESSMENT

The Department has considered the following in its assessment of the Project:
- the EIS, submissions from the public, special interest groups, public authorities and the IESC;
- United's RTS and related additional information provided by United in response to submissions on the RTS;
- applicable environmental planning instruments and draft instruments;
- relevant NSW Government policies and guidelines, including the SRLUP and the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP);

- the suitability of the site for the Project;
- relevant provisions of the EP&A Act, including its objects and the requirements of section 79C.

The Department also commissioned independent expert reviews of two key assessment issues:

- **Air Quality Review** – Ramboll Environ Australia Pty Ltd (Ramboll) reviewed the air quality impact assessments contained in the EIS and RTS, including consideration of issues raised by the EPA (see **Appendix E**); and
- **Economic Review** – the Centre for International Economics (CIE) reviewed the economic assessments contained in the EIS and RTS, including the Cost Benefit Analysis and Economic Impact Analysis (see **Appendix F**).

The outcome of each review is discussed in the relevant assessment sections (see **Sections 6.1** and **6.8**).

The following is a summary of the Department's assessment.

6.1 Air Quality

The EIS includes a specialist AQIA which was prepared by Jacobs Group (Australia) Pty Ltd to evaluate the potential air quality emissions generated by the Project over a range of representative years and mining stages. This AQIA includes consideration of 24-hour, monthly and annual average air quality criteria for dust deposition, total suspended particulates (TSP), fine particulate matter (PM_{10} and $PM_{2.5}$) and blast fumes and has been prepared to meet the requirements of the Approved Methods for the *Modelling and Assessment of Air Pollutants in NSW* (DEC 2005, Approved Methods 2005), which are the relevant guidelines that apply to this proposal.

The Department is aware that mining-related air quality impacts are an important concern within the Hunter Valley community and that a number of residents in the broader region raised concerns over the Project's potential health effects and amenity impacts. Members of the community also objected to any further particulate emissions that would contribute to cumulative impacts at their properties and questioned the accuracy and validity of the predicted air quality modelling.

The EPA and NSW Health also raised issues in relation to the AQIA, which were responded to in the RTS. The EPA has since confirmed that it is satisfied with the responses to its comments around air quality impacts, but that further conditions are required to ensure that diesel particulate emissions, blast fume emissions and 24-hour impacts are appropriately mitigated and managed. NSW Health noted the health effects of air quality impacts, commented on the consideration and modelling of air quality impacts on the nearby community and recommended a further review of these matters. The Department's consideration of these matters is provided below.

6.1.1 Peer Review

The Department commissioned Ramboll to undertake a comprehensive review of the AQIA and United's responses to concerns raised in respect of the predicted air quality impacts (see **Appendix E**). The expert review of AQIAs for large scale coal mining projects in the Hunter Valley is established practice within the Department's assessment process and recognises the community's concerns over these potential impacts and the challenges presented by the detailed technical modelling required for a major coal mining development.

Ramboll completed its initial review of the AQIA in September 2016 and identified several uncertainties that required further attention and clarification, along with potentially material issues with the air quality methodology and impact assessment. The Department requested that United provide a complete and thorough response to these issues as part of its RTS.

On 31 January 2017, Coal & Allied (now Yancoal) lodged an application to modify the neighbouring Hunter Valley Operations South coal mine (HVOS Mod 5), to enable increased production rates and facilitate the progression of mining at HVO South. This separate modification would provide greater production flexibility for the HVO Complex and more capacity to meet market demand. The revised mine plans for the modification allow access to deeper coal seams in the Riverview Pit and South Lemington Pit 2, and would facilitate the recovery of an additional 56.8 Mt of ROM coal. While the modification would not change the existing surface disturbance area, it would increase the volume of overburden to be emplaced and change the final landform designs for HVO South, with the intent on improving visual amenity and blending emplacement areas in with the surrounding natural landscape.

United subsequently provided its RTS Part A in March 2017, including specific responses to air quality issues raised in the Ramboll review and in submissions by the EPA, NSW Health and the community.

While conceptual plans for HVO Mod 5 had been incorporated into United's AQIA, following a comparative review of the AQIA for HVOS Mod 5 and the AQIA and RTS for the Project, the Department identified a range of inconsistencies in predicted cumulative air quality impacts between these proposals. While a limited degree of variation in AQIAs may be expected due to data availability, the model setup and focus on each respective operation, the Department was concerned with the degree of variation in predicted impacts between these AQIAs.

Consequently, the Department commissioned Ramboll to undertake a further, coordinated expert review of the AQIAs for both proposals. This expert review included a specific focus on the worst-case cumulative impacts, to help inform a full and proper assessment of potential impacts on the surrounding community. In particular, this robust and consistent information was necessary to inform the consideration of landowner rights under the VLAMP and the development of any potential operational management conditions.

While acknowledging that the two AQIAs would be expected to have some minor variations given they had been calculated against different sets of future years and slightly different mining scenarios, Ramboll was able to confirm the presence of notable differences in predicted cumulative annual average PM_{10} concentrations between the two assessments. The differences generally occurred within 3 km of the site boundaries and were most significant to the east of HVO South near Maison Dieu, west of HVO South near Moses Crossing, and east of the Project in Warkworth Village.

Ramboll concluded that the primary reason for these differences was likely to be the input emissions inventories adopted for different mining operations in the region. Ramboll identified that the two AQIAs included different emissions inventories based on their relative proximity to surrounding mines and that the HVOS Mod 5 AQIA had conservatively assumed 70-80% higher emissions for the Project, based on preliminary information. To address this, Ramboll recommended that emissions for neighbouring mine sites are quantified in a consistent manner and that the two proposals agree on the cumulative worst case future modelling years.

In addition to emissions inventories, Ramboll noted differences in the approaches taken to calculate background datasets for non-modelled mining sources and differences in the local meteorological datasets used in each assessment. While Ramboll acknowledged the merits of these approaches and data inputs, any difference in the adopted approach and inputs between the two AQIAs would contribute to differences in model outcomes and dispersion conditions. Consequently, Ramboll recommended that the two air quality consultants agree to a uniform approach to the selection of appropriate background concentrations and configuration of the meteorological models to capture localised conditions through the inclusion of a consistent set of monitoring datasets.

To ensure the Department's assessment is based on accurate and consistent modelling of potential cumulative air quality impacts in the area, in July 2017 the Department requested that United and Yancoal address the inconsistencies identified in the Ramboll review and prepare a coordinated assessment of the air quality impacts of both proposals, using shared modelling inputs and jointly validated outputs. The Department also requested that this coordinated assessment be undertaken in accordance with the contemporary methods and standards published in the updated version of the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants* (2016, Approved Methods 2016).

In September 2017, United and Yancoal provided a joint response to address the recommendations of the Ramboll review. This response focused on the provision of a joint cumulative assessment for annual average PM_{10} and $PM_{2.5}$ emissions, noting that these two criteria had the highest probability of impacts for residential receivers. This modelling was undertaken based on shared emissions inventories, exchanged meteorological monitoring data and background particulate levels for the combined 'worst-case' model year. These updated modelling results and isopleth diagrams are contained in the documents at **Appendix E**.

The Department notes that this cumulative assessment focused on the provision of updated annual average predictions, as these impacts have the greatest scope to exceed the criteria and are the most challenging to operationally control. In response to further review comments from Ramboll, United

and Yancoal provided a further response which included an assessment of the combined 24-hour results associated with each project's respective impacts and background levels, overburden densities and the adoption of a uniform background $PM_{2.5}$ level in response to a lack of localised background data.

Ramboll has reviewed this revised modelling and advised that all issues identified in its independent technical review had been adequately addressed, with the exception of the use of a fixed background $PM_{2.5}$ level instead of deriving it from the ratio of ambient $PM_{2.5}$ to PM_{10}. Nevertheless, Ramboll acknowledged that, even with derived $PM_{2.5}$ levels, the ultimate conclusions of the cumulative assessment were unlikely to change. Consequently, Ramboll concluded that the revised modelling provides sufficient certainty to determine the PM_{10} and $PM_{2.5}$ impacts of each proposal.

Given that the combined worst-case annual average impacts are relatively consistent and somewhere between those predicted for each project in the two original AQIAs, the combined 24-hour impacts are also likely to result in levels similar to those originally predicted. Furthermore, as 24-hour impacts are largely influenced by local meteorological dispersion (particularly winds), it is unlikely that both proposals would simultaneously contribute significant particulate levels at the same receiver location. Consequently, Ramboll has advised that the project specific modelling undertaken in each of the original AQIAs is likely to provide an appropriate prediction of each project's individual impact at specific receivers.

The Department is satisfied that the residual issues raised in Ramboll's expert reviews have been addressed and that a conservative assessment of the Project's air quality impacts and application of the VLAMP can be undertaken.

6.1.2 Existing Air Quality Environment

The existing air quality environment around the Project area is influenced by a number of natural topographic factors and historical land use practices. Being situated along the southwest axis of the Hunter Valley, the Project site borders the elevated natural cliff-lines of the Wollemi National Park. These steep cliffs and dominant natural ridgelines throughout the area provide varying degrees of attenuation for dust impacts and, together with the dominant northwest-southeast wind axis that runs between Jerrys Plains and Warkworth Village, influence air quality dispersion patterns.

The area is also influenced by particulate emissions from existing mining operations, especially during the drier months when there is higher potential for wind erosion from exposed areas. As this area is located some distance from the regional centres of Singleton and Muswellbrook, it is also less prone to elevations in $PM_{2.5}$ fine particulate levels during winter months, which have been identified in the CSIRO's *Upper Hunter Fine Particle Characterisation Study* as being more heavily influenced by the burning of wood heaters in townships, rather than any seasonal change in mining operations.

Given the long history of open cut mining in the area, extensive monitoring data is available to provide a detailed picture of the current air quality environment in the immediate vicinity of the Project site. This data is gathered by a range of high volume air samplers (HVAS), tapered element oscillating microbalance instruments (TEOMs) and dust deposition gauges associated with the air quality monitoring networks for the existing Wambo and HVO South coal mines, and is supplemented by OEH's Upper Hunter Air Quality Monitoring Network and monitors at other surrounding mining projects.

United's AQIA and responses to Ramboll's reviews have identified annual average PM_{10} background levels in the area of up to 19.2 $\mu g/m^3$, with daily levels known to approach and occasionally exceed the 24-hour PM_{10} assessment criterion of 50 $\mu g/m^3$ at mine-owned and private residences, particularly during drier months. Nevertheless, United has highlighted that the existing Wambo mine has generally complied with these limits at nearby private residences which are not already subject to acquisition rights. This compliance is due in part to the natural topographic ridgelines and buffer of mine-owned properties that surround the site and in part to the mine's existing pro-active and reactive management measures.

In considering the existing air quality environment, it is important to recognise that the existing Wambo mine is not the only contributor to cumulative air quality impacts in the region and that a number of nearby residences have been acquired by other mining companies due to air quality emissions from other mining operations in the vicinity (see **Figure 5**). Together these mine-owned

properties provide a degree of separation between the current impacts of mining and nearby communities.

6.1.3 Mitigation Measures

Peabody currently implements a range of dust mitigation measures at the Wambo mine that have been designed to meet the requirements of the conditions of consent, along with the EPA's EPL and Pollution Reduction Programs (PRPs), which aim to identify and further reduce dust emissions from the site. These existing mitigation measures also reflect consideration of the benchmarking study prepared by Katestone Environmental in 2011 for the control of dust emissions from coal mines in NSW, which has been generally adopted by the Department and the EPA as representing current best practice in the mining industry.

A number of these measures are reflected in Peabody's existing Wambo Air Quality and Greenhouse Gas Management Plan (AQGHGMP). Under the Project, United would continue to implement a range of best practice mitigation measures aimed at minimising dust emissions through:

- use of water carts and dust suppressants on unsealed haul roads;
- restrictions on dust-generating activities during adverse meteorological conditions, such as reducing vehicle speeds, delaying blast activities, minimising vehicle access to soil stockpiles, reducing dump heights and modifying equipment fleet locations;
- operation of real-time dust monitoring and automatic alarm systems, to inform the mine when dust levels are approaching the relevant criteria;
- managing mining operations to minimise dust generation at the source, including through the application of water sprays, dust skirts and/or curtains and shields for relevant equipment, during drilling, at ROM hopper bins and coal stockpile areas; and
- progressive site rehabilitation, focusing on timely revegetation of disturbed landforms.

United would build on the existing real-time meteorological and air quality monitoring network to help forecast meteorological conditions likely to increase the generation and dispersion of particulate emissions and blast fumes, and proactively alert and modify the operational equipment fleet to meet relevant air quality criteria. United has further stipulated a range of specific measures in its EIS that aim to assist in the effective management of emissions from the site, such as managing the length and number of concurrently used haul roads.

United has also argued that existing open cut coal mining projects in the Hunter Valley demonstrate that operations should be able to independently manage their 24-hour particulate matter and emission impacts on a daily basis, using a combination of these pro-active and reactive management systems.

The Department considers the dust mitigation, management and monitoring measures currently in place at Wambo and proposed for the Project to be reasonable and feasible and reflective of contemporary controls for dust emissions from open cut coal mines in NSW.

6.1.4 Air Quality Impacts

The likely sources of air quality emissions associated with the Project broadly reflect a continuation of the existing Wambo open cut operations, with some incremental intensification of operations associated with the increased equipment fleet and extraction of coal and overburden from two active mining areas.

As the Wambo Pit would be operated at similar or lower extraction rates than currently approved and with a similar vehicle fleet and mining methods, the Project impacts to the northwest would be expected to be sustained at similar levels to those currently experienced, but over a longer period associated with the extended 20-year life of operations in this area.

By comparison, the development of a new mining area (the proposed United open cut) and the operation of additional haul roads, associated dumping activities and increased CHPP throughput, would result in a short-term increase in air quality impacts to the southeast of the Project, diminishing over time as mining progresses to the northwest away from Warkworth Village.

These general shifts in the emissions envelope of the Project are reflected in the Applicant's AQIA modelling and responses to the Ramboll expert reviews, which indicate that particulate levels at nearby private properties would change over the life of the Project in response to the proximity of mining activities. Overall, the Project would generate elevated PM_{10} and $PM_{2.5}$ levels in the immediate

vicinity of the site and increase the number of 24-hour periods where elevated cumulative air quality impacts would be experienced at the one privately-owned residence remaining in Warkworth Village. Given the long history of mining in this area, a large proportion of the land surrounding the site has been previously acquired (by Wambo, United, HVO or other mining operations) and provides a buffer between the impacts of the proposal and other nearby communities (see **Figure 5**).

In undertaking its assessment of particulate matter impacts for private residences, the Department acknowledges that NSW Health and a number of public submissions commented on recent variations to environmental assessment advisory standards set in the National Ambient Air Quality NEPM and the EPA's Approved Methods 2016, gazetted in January 2017. The revised NEPM adopts the former $PM_{2.5}$ advisory reporting standards of 25 $\mu g/m^3$ 24-hour and 8 $\mu g/m^3$ annual average as assessment standards for $PM_{2.5}$ emissions, establishes goals for the further reduction of $PM_{2.5}$ by 2025 and includes a reduced PM_{10} annual average assessment standard of 25 $\mu g/m^3$. While the NEPM provides guidance on the establishment of air quality standards, each participating jurisdiction is responsible for the application of these standards under its own laws and policies.

As the development application for the Project predates the gazettal of the EPA's Approved Methods 2016, the Project must be assessed against the air quality modelling and assessment criteria established in the Approved Methods 2005.

This means that while the Department's review report may refer to and consider the above PM_{10} and $PM_{2.5}$ assessment standards, the Project must be assessed and determined against applicable NSW policies and standards. The current VLAMP also prescribes that mitigation and acquisition rights must be determined in accordance with PM_{10} criteria of 50 $\mu g/m^3$ 24-hour and 30 $\mu g/m^3$ annual average and does not provide for any mitigation or acquisition on the basis of $PM_{2.5}$ impacts.

Having established the appropriate assessment criteria for considering the air quality impacts of the Project, the Department notes that only one private residence in Warkworth Village (Receiver 19) is predicted to experience exceedances of applicable particulate matter criteria and NEPM advisory standards. The air quality impacts at Receiver 19 are expected to include cumulative annual average PM_{10} impacts of up to 43.4 $\mu g/m^3$ (including a contribution of 13 $\mu g/m^3$ associated with the Project), 24-hour PM_{10} impacts above the 50 $\mu g/m^3$ criteria on up to 13 days in Year 6 with a maximum project-alone impact of 87 $\mu g/m^3$, cumulative total suspended particulates (TSP) of 69 $\mu g/m^3$, a project contribution of 1.3 g/m^2/month towards the cumulative deposited dust levels of 4.0 g/m^2/month, project-alone 24-hour $PM_{2.5}$ impacts of 24 $\mu g/m^3$ and cumulative annual average $PM_{2.5}$ impacts of 8 $\mu g/m^3$. The Department considers these impacts to be significant, however Receiver 19 is already entitled to acquisition rights associated with the air quality and noise impacts of existing operations, and would continue to have these rights under the Project.

Apart from Receiver 19, the greatest impacts for private residences are predicted to occur near Moses Crossing, where the Project alone would generate up to 21 $\mu g/m^3$ 24-hour PM_{10} and contribute between 1.4 - 4.5 $\mu g/m^3$ towards the cumulative annual average PM_{10} levels of up to 21 $\mu g/m^3$, 5 $\mu g/m^3$ towards the cumulative TSP levels of up to 57 $\mu g/m^3$ and 0.5 g/m^2/month towards the cumulative deposited dust levels of up to 3.0 g/m^2/month. These levels of dust emissions are not predicted to result in any exceedances of the relevant 24-hour or annual average PM_{10}, TSP or dust deposition criteria at any additional private residence or over 25% of any vacant land where a dwelling could be built under existing planning controls. The Department also notes that while the new NEPM standards do not apply to the Project, the predicted impacts for Project-alone 24-hour $PM_{2.5}$ of 4 $\mu g/m^3$ and cumulative annual average $PM_{2.5}$ of 5 $\mu g/m^3$ would nonetheless comply with these standards for both PM_{10} and $PM_{2.5}$.

Importantly, the modelling years identified in the AQIA represent the worst-case scenarios for Project dust generation and are therefore a conservative representation of the maximum probable 24-hour PM_{10} impacts for nearby privately-owned land over the Project life. Given that Receiver 19 is the only private residence predicted to experience any exceedances of the 50 $\mu g/m^3$ 24-hour PM_{10} criteria in any of these modelled years, the Department is satisfied that no properties without existing acquisition rights would exceed the criterion on more than five days over the life of the Project and that no further acquisition rights are required for air quality impacts generated by the Project.

Furthermore, the Project is not expected to cause exceedances of the daily or annual average NEPM $PM_{2.5}$ standards at any other private residence during its life, although these levels are expected to be

exceeded at several mine-owned properties. Overall, the Department is satisfied with the acceptability of the Project's $PM_{2.5}$ impacts and considers that the Project's air quality (and specifically PM_{10}) mitigation and management measures are sufficient to mitigate the potential for elevated $PM_{2.5}$ impacts. The Department notes that the Applicant could also be required to monitor and report on the Project's $PM_{2.5}$ emissions, and abide by the requirements of any future EPL or PRP conditions that the EPA implements to manage $PM_{2.5}$ emissions from the site.

The Department is also satisfied that existing arrangements and landowner entitlements are sufficient to address the Project's likely impacts at nearby private residences, and supports the EPA's advice that the Applicant should be required to implement best practice air quality management measures, including proactive and reactive measures to minimise emissions from all crustal and combustion sources to the maximum extent achievable. The Department considers that these measures can be reflected in conditions of consent and implemented through reasonable and feasible management measures contained in an Air Quality Management Plan.

6.1.5 Mine-Owned Residences

The Department recognises that the Applicant and other nearby mining companies own and tenant a number of residences in the area surrounding the mine, and that dust levels at 22 of these mine-owned properties would continue to significantly exceed the relevant dust criteria for the Project.

While there are no set dust criteria for mine-owned properties, the Department believes that tenants of these properties should be informed of the potential health risks associated with elevated air quality impacts. The Department considers that, if the Project were approved, conditions would be required to ensure that the Applicant advises landowners and/or tenants of any property that is significantly affected by air quality emissions about the possible health and amenity impacts of the predicted dust concentrations, and allow tenants to terminate their tenancy agreements without penalty at any time.

With these measures in place, the Department is satisfied that all current and future tenants would be made aware of the potential health implications of dust generated by the Project and that these issues can be appropriately managed.

6.1.6 Blast Fumes

The AQIA includes a detailed blast fume assessment that predicts the likely fume impacts associated with the proposal to undertake controlled blasts between 9 am and 5 pm during favourable weather conditions and a worst-case comparative scenario which represents the unlikely event of an uncontrolled blast between 9 am and 5 pm during adverse weather conditions. This assessment indicated that, even during adverse weather conditions, blast fumes from the Project would not exceed the 1-hour average NO_2 assessment criterion of 246 $\mu g/m^3$ at nearby private residences. However, there is limited potential to exceed this criterion in Warkworth Village, should an uncontrolled blast occur during adverse weather conditions.

The Applicant has stressed that the Project would incorporate a number of management measures that are aimed at reducing the likelihood of blast fumes approaching or exceeding the criterion. These measures are similar to those in place under the existing Wambo Blast Management Plan and include proactive and adaptive measures to avoid blasting during higher risk and adverse weather conditions. With these measures in place, the Department is confident that blasts can be undertaken during appropriate meteorological conditions and managed to meet relevant limits, with there requirements to be reflected in conditions of consent.

Maximum blast fumes are also predicted to exceed the 1-hour average NO_2 level of 246 $\mu g/m^3$ where they disperse to the north of the Project across sections of the Golden Highway and the neighbouring HVO mine. Again, these predictions are primarily associated with the worst-case scenario involving an uncontrolled blast during adverse weather conditions.

As the Applicant would be required to close the Golden Highway during any blast event that is likely to cause impacts on road users, the Department is satisfied that these predictions do not represent any material risk to public safety. Furthermore, the Department notes that the EPA has indicated that any EPL for the Project would require the Applicant to ensure that it does not emit any offensive blast fumes from the premises where these fumes could be harmful or unreasonably impact upon the comfort and repose of any person outside of the site.

The Department is satisfied that the predicted blast fume NO_2 levels, coupled with the implementation of proactive and adaptive management measures, are sufficient to ensure that blast fume emissions could be managed to comply with relevant NSW policy limits and would be unlikely to cause any unreasonable interference with the comfort and repose of individuals on privately-owned land. This confidence in the ability of the Applicant to manage blast fumes is strengthened by the effective blast management practices and protocols implemented at the existing Wambo operations, which demonstrate the type of systems that could continue to be implemented under the project.

6.1.7 Diesel Emissions

The emission of NO_x from diesel combustion on site has also been assessed in detail in the AQIA, RTS and the Applicant's response to additional information requests. The management of off-road diesel emissions on mine sites has been a longstanding priority of the EPA. This is reflected in the EPA's submission on the Project, which sought further information on the prediction of diesel emissions, particularly as a component of $PM_{2.5}$ emissions, and proposed controls for this source.

The Applicant responded to these matters in its RTS by providing further justification for its modelling approach and application of control factors, along with details of the measures it would implement to control diesel emissions, including servicing vehicles according to manufacturer recommendations, targeting maintenance to ensure equipment is fit-for-purpose throughout its life, minimising equipment failure by identifying risks and effects, and scheduling vehicle downtimes. In particular, the Applicant stressed that the modelling undertaken in the AQIA was based on appropriate and conservative control factors for the total crustal (ie wheel generated dust) and diesel emissions from vehicles operating on haul roads, and that further modelling would not provide additional clarity around the predicted $PM_{2.5}$ levels. With respect to its equipment fleet, the Applicant expressed concerns over the practicality of sourcing Tier 4 equipment by January 2019 and instead committed to continue the practice of purchasing new (not including recommissioned) equipment as US Tier 2 lower emission engines where available, until such time as the new generation of Tier 4 equipment is available for purchase.

The EPA's feedback on the RTS acknowledged the proposed control measures, but provided further discrete consideration of the Project's likely percentage of diesel emissions as a component of $PM_{2.5}$ and recommended further analysis of the Project's diesel emission inventories. To manage these potential diesel emissions, the EPA recommended that the Project be conditioned to require the Applicant to implement all reasonable and feasible measures to minimise off-site particulate matter emissions (including diesel emissions) and ensure that all non-road diesel equipment commissioned after 1 January 2019 meets US Tier 4 emissions standards, unless otherwise agreed to by the EPA.

In response to the EPA's advice, the Applicant provided further information around the existing measures it has adopted for the management of diesel emissions across their NSW mining operations and proposed management and mitigation for diesel emissions under the Project. The Applicant also committed to purchase new equipment in accordance with a PRP expected to be applied to the Project requiring the use of Tier 4 engines.

The EPA has indicated its satisfaction with the Applicant's response to this matter and maintained its position that these issues can be appropriately managed and accounted for through implementing its recommended conditions, including both proactive and reactive measures to minimise emission sources (crustal and combustion) to the maximum extent achievable.

The Department supports the EPA's objective to regulate and manage off-road diesel emissions and notes that the EPA has recently presented to the mining industry about a proposed future PRP that would seek to establish baseline diesel combustion emissions at mine sites and identify practicable (ie technically and operationally feasible) mitigation measures to reduce these emissions through the use of site-specific controls tailored to specific mining fleets. If, during this process, the EPA determines that any further or specific management measures should be implemented, then these measures could be reflected and implemented through either the Project's Air Quality Management Plan or EPL.

The Department is therefore satisfied, that with the adoption of the EPA's recommendations, appropriate measures could be implemented to manage the Project's diesel emissions.

6.1.8 Greenhouse Gas Emissions

The EIS includes a Greenhouse Gas and Energy Assessment (GHGEA) that assessed direct and indirect emissions associated with the Project. This assessment indicates that the Project would increase annual average greenhouse gas emissions (GHGEs), compared to the existing Wambo operations, in line with the increased extraction rate and would increase the total emissions over the life of the Project in line with the relative 21-year extension in open cut mine life. In undertaking its assessment of GHGEs, the Department has considered the *NSW Climate Change Policy Framework* (OEH, 2016) which provides important context around the Government's approach to climate change.

The GHGEA estimated that the Project and associated harmonisation modifications would contribute to about 7.2 Mt of Scope 1 and 2 CO_2 - equivalent GHGEs over the life of the Project. These direct emissions are primarily derived from the operational stage, where the Project and associated modifications would generate about 252,000 tonnes of Scope 1 and 60,500 tonnes of Scope 2 CO_2 - equivalent GHGEs each year.

In considering these estimates, the GHGEA recognises that the Commonwealth Government has made commitments in line with the Paris Agreement under the United Nations Framework Convention on Climate Change that seek to achieve a 26–28% reduction on Australia's 2005 greenhouse gas inventory by 2030. The GHGEA notes that the Project would account for around 0.053% of Australia's annual GHGEs levels in 2030, and thus concludes that it is unlikely to prevent Australia from achieving its international obligations towards the climate change targets and the objectives established under the Paris Agreement.

Total indirect emissions over the life of the Project would comprise about 259.4 Mt of Scope 3 CO_2 - equivalent emissions. These emissions would occur after product coal has been exported overseas and are largely associated with downstream electricity generation. For the most part, these indirect emissions would not be accounted for in Australia's annual emissions targets.

In considering the impacts of the proposed GHGEs, the Department notes that it would be more greenhouse intensive to extract the equivalent 150 Mt of coal from the development of a new mine compared to the proposed consolidation and intensification of mining activities at the Wambo and United sites. Likewise, it would be more greenhouse intensive for each of the joint venture partners to extract the same amount of coal from two separate and potentially sub-economic projects. By mining in a more efficient manner to recover an additional 40 Mt of coal from beneath the Wambo Pit and integrating the establishment of the new 110 Mt United Pit with the processing and rail facilities at Wambo, the Project enables the more efficient use of available equipment and would achieve a lower per tonne GHGEs rate than each operation alone on a standalone basis.

While recognising that the Applicant already has a significant financial interest in minimising energy-related emissions, particularly regarding the quantities of diesel used by the mining fleet, the Department considers that the Applicant should be conditioned to investigate all reasonable and feasible ways to minimise the release of GHGEs from the Project. With such conditions in place and given the relatively minor change in annual average GHGEs compared to the existing Wambo mine, the Department is satisfied that the predicted GHGE impacts of the Project are acceptable and could be appropriately managed.

6.1.9 Conclusion

In summary, the Project would be expected to generate air quality impacts that are reflective of the continuation of existing Wambo operations to the north, with some minor intensification due to the increased equipment fleet and extraction rates. By comparison, one private resident and several tenants of mine-owned properties in Warkworth Village to the southeast are predicted to experience increased air quality impacts associated with establishing and progressing the United Pit. This private resident (Receiver 19) is predicted to experience significantly elevated air quality impacts above relevant trigger levels in the VLAMP and their existing acquisition rights under the Wambo consent would need to be transferred and continued under the Project.

The Department considers that the proposed operational measures would be an effective way to manage and minimise potential air quality and amenity impacts on nearby privately-owned land and meet acceptable standards for particulate matter, blast fumes, diesel emissions and GHGEs from the Project, especially during adverse meteorological conditions.

Overall, the Department believes the air quality aspects of the Project can be managed through the development of robust conditions and the implementation of comprehensive management measures.

6.2 Noise

A detailed noise impact assessment (NIA) for the Project was prepared by Umwelt (Australia) Pty Ltd in accordance with the then current *NSW Industrial Noise Policy* (INP), the Interim Construction Noise Guideline (ICNG), the *NSW Road Noise Policy* (RNP), the *Rail Infrastructure Noise Guideline* (RING) and in consideration of the EPA's draft Industrial Noise Guideline (draft ING). On 27 October 2017, the EPA released the *Noise Policy for Industry* 2017 (NPI), which replaces the INP as the relevant NSW Government policy for the management and control of industrial noise sources from 27 October 2017. As the Project predates the release of the NPI, the transitional arrangements stipulate that, apart from those aspects of the NPI that relate to low frequency noise, the INP continues to apply as the relevant NSW Government policy for the assessment and determination of the Project.

In accordance with the requirements of the INP, the Applicant's NIA treated the Project as a modification or expansion to the existing Wambo open cut mine. The NIA therefore included the integration of the new United open cut with the existing and ongoing operations of the Wambo open cut and the extension of the operational life of associated infrastructure (including the CHPP and rail facilities) until 2039.

Under the joint venture's Partnership Agreement, United would assume responsibility for the management of all open cut operations following the commencement of mining operations in the United Pit. However, Peabody would retain independent ownership and separate management of the Wambo underground mine, CHPP and rail facilities (see **Section 2.1**). Consequently, the assessment of noise from the Project must establish and consider separate noise limits for these two distinct but related operations.

The NIA used a combination of monitoring data from the existing Wambo continuous noise monitoring network and attended monitoring measurements to establish an existing baseline noise environment to inform the modelling of the Project's predicted impacts. This modelling focused on four key stages of the proposed mine progression (Years 2, 6, 11 and 16), which together represent the worst-case scenarios for the total sound power levels from the equipment fleet and maximum production levels during the Project (see **Figures 6** to **8**).

The Department considers that the use of monitoring data to validate the noise model has resulted in more accurate predictions of the likely noise impacts and is satisfied that the NIA provides a sound basis for the characterisation and consideration of the Project's impacts. Nevertheless, the Department recognises that noise impacts are a key concern for both community members and special interest groups, in particular those residents located in the immediate vicinity of the Project. These objectors expressed concerns over existing noise impacts from the Wambo mine, the potential for increased noise impacts, modelling accuracy and the consideration of cumulative noise effects.

The Department has considered the NIA, the Applicant's proposed protocols for differentiating the Project's noise impacts from the separate Wambo mine, relevant matters raised by agencies and the community, and the mitigation and acquisition thresholds for noise impacts established under the VLAMP.

6.2.1 Background Noise

As discussed in **Section 1.3**, the Applicant and other nearby mining operations own the large majority of residences surrounding the Project. Many of the 34 mine-owned properties that occur within 3 km of the proposed open cut mining activities are tenanted or leased for agricultural practices. Together, these properties provide a substantial buffer for the amenity impacts of mining on private land.

In establishing background noise levels for surrounding privately-owned land, the Applicant identified private receivers into seven representative areas located varying distances from the proposed mining activities. These properties include one private residence in Warkworth Village around 800 m east of the United pit, 32 private residences in Redmanvale and Moses Crossing around 2 - 5.5 km northwest of the Wambo pit and 3 private residences in South Wambo about 3.5 - 4.5 km south of the existing Wambo open cut operations. Additional private properties occur at greater distances from the project, in Jerrys Plains around 5 km northwest of the Wambo Pit, Maison Dieu over 5 km northeast of the United Pit and Bulga over 4.5 km south of the existing Wambo open cut operations (see **Figure 10**).

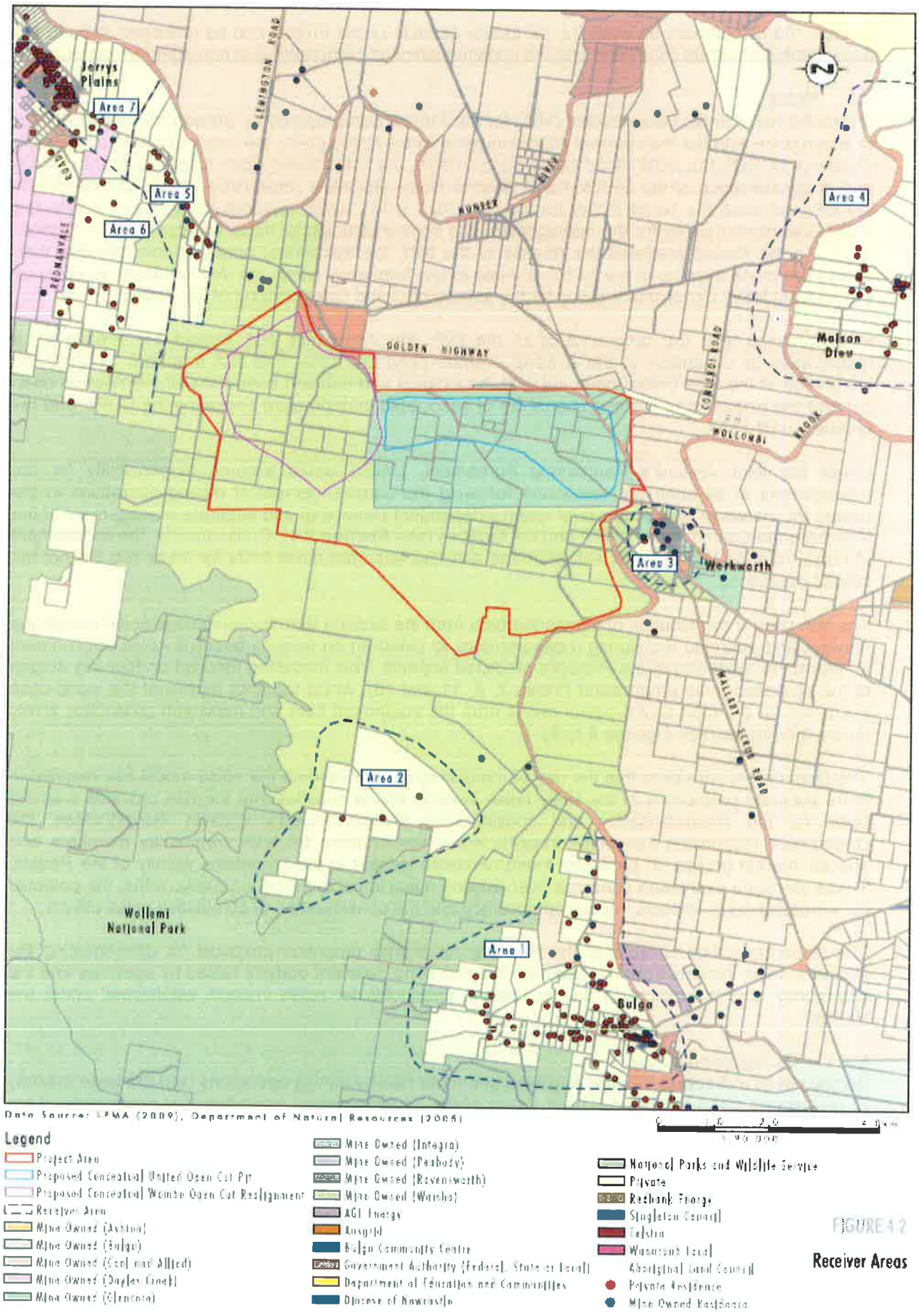


Figure 10: *Locations of sensitive noise receivers*

While most of these areas already experience a degree of impacts associated with existing mining operations, those receivers located in Jerrys Plains, Redmanvale, Moses Crossing and South Wambo are slightly more sheltered from existing mining noise due to distance and intervening topography. The influence of existing mining operations on noise levels is more evident in Maison Dieu (with mines located to the west and south), and Warkworth Village (largely surrounded by existing mines). The Golden Highway provides an additional source of existing noise, particularly in the evenings, and contributes to rated background noise levels (RBLs) of 35 - 39 dB(A) in Warkworth Village, Moses Crossing and Jerrys Plains.

RBLs in the South Wambo, Redmanvale and North Bulga areas reflect typical levels for rural residential and farming environments in the Hunter Valley, with noise levels remaining below 30 dB(A) at all times. While these areas experience slightly higher background noise in the evening and night than the day, this has no implication for establishing RBLs for the Project, as the INP sets a default minimum value of 30 dB(A). Furthermore, the NIA presents results for two noise monitoring locations in Redmanvale and Moses Crossing, which identify different levels of measured background noise. To ensure a conservative assessment of the Project's potential noise impacts in these areas, the Department considers that the lowest of these measured results should be used to inform RBLs.

6.2.2 Establishing Project Specific Noise Limits

The noise modelling undertaken for the Project sought to establish the worst-case impacts expected to occur at each of the seven representative receiver locations shown in **Figure 10**. This modelling included consideration of the extended duration of mining in the Wambo open cut, development and operation of the new United open cut to 2039, along with changes in the location of blasting activities, overburden emplacements, ongoing coal processing and increased rail traffic.

To determine the significance of the noise impacts generated by the Project, the Applicant sought to develop operational Project Specific Noise Limits (PSNLs). While cumulative noise impacts have been considered in the NIA, the Applicant has also established separate PSNLs for the Project and the ongoing operation of Wambo's CHPP, rail and underground facilities under the existing Wambo consent.

In accordance with the INP, the Applicant first derived RBLs for the site using a significant volume of background data sourced from surrounding monitoring sites and attended monitoring surveys. The Applicant then applied a range of adjustment factors to account for other existing industrial noise sources and aspects of the EPA's draft Industrial Noise Guideline (ING), to establish criteria that generally reflect existing industrial noise sources and seek to address the risks of any excessive intrusive or land based amenity impacts.

Following careful consideration of the data provided in the NIA, the Department felt that further refinement and adjustments were required for the PSNLs for nearby residential receivers. These refinements sought to more accurately reflect unique characteristics of the existing noise environment, including the presence of elevated background levels during the evening and night-time periods and the INP provisions for the assessment of impacts of industrial noise sources.

The Department identified a range of intrusive criteria for noise impacts, including operational PSNLs and noise goals for both sleep disturbance and construction activities (see **Table 3**). These criteria were established following consideration of the allowance provisions for atypical areas under the INP and reflect the precedent set in the Department's previous assessments of the Integra Mining Complex and the Mount Owen Continued Operations Project by allowing the maximum evening and night time RBLs to be set at up to 3 dB(A) and 1 dB(A) above the measured daytime noise level, respectively. Consistent with general community expectations and current practice, the Department does not set the daytime noise criterion lower than either the evening or night time periods, nor does it set the evening noise criterion lower than is set for the night.

Table 3: *Assessed noise criteria - Project*

Receiver locations	***Measured RBLs*** ($L_{Aeq,\ 15min}$) *(day/evening/night)*	***Adopted RBLs*** ($L_{Aeq,\ 15min}$) *(day/evening/night)*	***Adjusted PSNLs*** ($L_{Aeq,\ 15min}$) *(day/evening/night)*	***Sleep Disturbance Criteria*** ($L_{A1,\ 1min}$) *(night only)*
Area 1 - South Wambo	27 / 28 / 27	30 / 30 / 30	35 / 35 / 35	45
Area 2 - North Bulga	27 / 29 / 28	30 / 30 / 30	35 / 35 / 35	45

Area 3 – Warkworth Village	39 / 39 / 38	39 / 39 / 38	44 / 44 / 43	53
Area 4 - Maison Dieu	37 / 37 / 36	37 / 37 / 36	42 / 42 / 41	51
Area 5 - Moses Crossing	35 / 30 / 29	35 / 30 / 30	40 / 35 / 35	45
Area 6 - Redmanvale	28 / 28 / 27	30 / 30 / 30	35 / 35 / 35	45
Area 7 - Jerrys Plains	34 / 35 / 31	34 / 35 / 31	40 / 40 / 36	46
Construction Noise Management Levels			+5 / +0 / +0	+0

While the PSNLs have been based on the provisions of the INP, the Department has also considered the effects of recent guidelines and policies. This includes the EPA's recently released NPI, which states that PSNLs for the evening and night periods should be set at less than that of the day period, while recognising that in some cases alternative approaches may be justified and adopted where atypical events would result in perverse outcomes.The NPI also sets a minimum daytime criterion of 40 dB(A), which is higher than the Department's adopted PSNLs for most receivers in **Table 3**, except those located in Warkworth Village and Maison Dieu. The Department is therefore confident that its adopted PSNLs provide for a conservative assessment of noise impacts.

The Department also notes that the PSNLs for non-residential land uses (ie a school, community hall, church, fire station and certain industrial premises) included in the NIA are consistent with the amenity criteria prescribed in Table 2.1 of the INP and detail the acceptable and maximum noise levels permissible when these non-residential facilities are in use. Likewise, the PSNLs associated with the harmonisation modifications reflect the current consent requirements for the Wambo Coal Mine and are acceptable as PSNLs for the assessment of the ongoing operation of this separate consent.

The Department also considers that, following the transfer of operational responsibility for open cut mining to United, the modified consent for the Wambo CHPP, rail and underground operations should be required to meet the PSNLs in **Table 4**. These PSNLs are lower than those in the existing Wambo consent and reflect that the ongoing operation of Wambo's underground and surface facilities (ie excluding open cut noise sources), would be expected to achieve noise levels below 35 dB(A) at all but six private residences in South Wambo, North Bulga and Warkworth Village.

Table 4: *Assessed noise criteria - Wambo underground and surface facilities*

Receiver locations	***PSNLs under DA 305-7-2003 after open cut operations cease*** ($L_{Aeq,\ 15min}$) *(day/evening/night)*	***Sleep Disturbance Criteria*** ($L_{A1,\ 1min}$) *(night only)*
Area 3 – Warkworth Village	44 / 44 / 43	53
All Other Areas	35 / 35 / 35	45
Construction Noise Management Levels	+5 / +0 / +0	+0

Overall, the Department is confident that the PSNLs adopted for its assessment are consistent with the INP, align with the aims of the NPI and provide an accurate and conservative basis for the assessment of potential noise impacts arising from the Project.

6.2.3 Operational Noise

The NIA indicates that the management of intrusive noise impacts was carefully considered by the Applicant during development of the proposed mine plan, with preliminary modelling used to inform iterative changes to the mine plan to reduce the potential noise impacts at nearby residential locations. The intrusive noise level predictions in the NIA have been modelled against a range of weather conditions to provide worst-case noise scenarios for operational noise in Years 2, 6, 11 and 16. These modelling scenarios assumed that relevant equipment is appropriately attenuated and that the Applicant's proposed noise mitigation measures would be implemented throughout the Project.

As would be expected for a Project of this scale, the modelling identified that the nearest receivers in Moses Crossing, Redmanvale, South Wambo and Warkworth Village would experience the greatest incremental change in noise impacts, with receivers in North Bulga also expected to experience some increase. More distant receivers in Maison Dieu and Jerrys Plains are expected to experience limited or reduced impacts during the daytime and evening, and some limited increases in the night time.

Despite these increases, the Project would meet the minimum PSNLs calculated in accordance with INP and identified in **Table 3** at the majority of surrounding residences. The Department also notes

that other existing mining operations (including Wambo, HVO South and Warkworth) already impact on the surrounding noise environment and that the potential noise impacts generated by the Project would be partially mitigated by intervening ridgelines and dispersion distances across mine-owned buffer lands.

Overall, the Project is predicted to exceed the PSNLs at 37 nearby privately-owned residences, including negligible exceedances of up to 2 dB(A) at 6 residences in North Bulga, South Wambo and Redmanvale (Receivers 6, 7, 35a, 41a, 46 and 379). As identified in the VLAMP, exceedances of this nature would not be discernible to the average listener and do not lead to receiver based treatments. The majority of remaining exceedances are between 3-5 dB(A) above the PSNLs and trigger the requirement for voluntary mitigation rights at 22 residences (Receivers 3, 25, 29, 30, 33, 41b, 42, 44, 48, 49, 50a, 50b, 56, 75, 133, 163, 320, 343, 344, 345, 346 and 348).

These mitigation rights would enable these residents to require the Applicant to install a variety of noise treatments at their properties, directed at minimising the Project's impacts on intrusive and amenity noise levels. While these landowners should be entitled to mitigation rights to address the moderate exceedances of intrusive criteria at their residences, it is relevant to note that the cumulative impacts of industrial sources on amenity values at these properties are expected to either comply with or negligibly exceed the acceptable amenity criteria for rural residential properties in Table 2.1 of the INP (see below). Consequently, the Department considers that mitigation treatments should be directed at increasing the ability of the building (eg fixtures and facades) to minimise intrusive noise levels.

In addition to the above marginal impacts, the NIA predicts that the Project would result in significant exceedances (ie excess of 5 dB(A)) at 9 residences (Receivers 16, 17, 19, 28a, 28b, 39, 40, 43 and 50c). The Department notes that the Applicant has recently purchased Receiver 28, that Receiver 19 already has existing acquisition rights under other consents and that the remaining receivers would be entitled to both voluntary mitigation and acquisition rights under the VLAMP. These rights would afford each landowner the option to have noise treatments installed at the properties or require the Applicant to purchase their properties in accordance with the provisions of the VLAMP. The Department also notes that the Project is predicted to exceed the acceptable cumulative amenity criteria in the INP at each of these 9 rural residential properties (see below) and considers that this supports the basis for offering these landowner's acquisition rights.

With respect to the separate Wambo operations, the Department notes that six private receivers are predicted to experience noise impacts above the PSNLs in **Table 4**, including exceedances of up to 2 dB(A) at Receivers 7, 379 and 35a, 3-4 dB(A) at Receivers 3 and 25 and 16 dB(A) at Receiver 19. As identified above, Receivers 3 and 25 would also be entitled to voluntary mitigation rights for operational noise impacts under the Project and Receiver 19 would be entitled to acquisition rights. Given these impacts and in consideration of the VLAMP, the Department considers that these rights should also be reflected in any modified consent for the ongoing Wambo operations.

6.2.4 Cumulative Noise

The NIA included two modelling approaches to assess the potential cumulative noise impacts of the Project together with other industrial sources, including HVO South, Warkworth, Mt Thorley and Rix's Creek mining operations and road traffic noise from the Golden Highway. These assessments indicate that cumulative noise levels are predicted to comply with the INP's acceptable night-time rural amenity criteria of 40 dB(A) for all residences in South Wambo, Redmanvale and Jerrys Plains.

This modelling also indicates that the Project would contribute between 1-3 dB(A) to the worst case cumulative amenity impacts in North Bulga (10% Project contribution), Maison Dieu (30% Project contribution) and private properties in Moses Crossing that would not be subject to acquisition rights due to the Project's operational noise impacts (40% Project contribution). These residences are predicted to experience cumulative noise impacts in the range of 41-42 dB(A) at night, which constitutes a 'negligible' exceedance of the acceptable amenity criteria in these areas. Exceedances of this magnitude would not be discernible to the average listener and in accordance with the VLAMP, no further mitigation treatments or acquisition rights are required for these impacts.

Finally, the Department notes that the Project alone would result in exceedances of the cumulative amenity criteria at the nine residences in Moses Crossing and Warkworth Village which have been identified as experiencing significant exceedances of the PSNLs due to the Project's operational noise

levels. As each of these residences would already be entitled to acquisition rights, the maximum potential treatments under the VLAMP have already been afforded to these receivers.

In considering these potential worst-case cumulative noise levels, the NIA notes that its modelling approach is likely to overestimate noise impacts at any given location, as it involves summing the maximum predicted impacts due to all surrounding industrial sources at a single point in time, despite the predominant meteorological conditions and wind directions influencing the propagation of noise such that the maximum effect of each operation would not occur simultaneously. The Applicant has therefore identified that the modelled cumulative impacts provide an overly conservative estimate and that actual cumulative noise levels would likely be 3 to 6 dB lower than predicted.

Nevertheless, to address these potential cumulative noise impacts and ensure the maintenance of acceptable noise amenity levels for nearby residents, the Applicant has committed to implement a comprehensive monitoring program to determine the contribution of the Project to cumulative noise levels in the region and guide the management of noise emission sources on site. The Department is satisfied that this represents a reasonable and feasible approach to ensuring that the contributions of the Project are not the primary or driving cause of any exceedances of cumulative noise criteria.

6.2.5 Sleep Disturbance

In accordance with the INP's Application Notes and consistent with current practice, the Project's predicted operational noise $L_{A1\ (1\ min)}$ emissions have been compared against background noise levels to evaluate potential sleep disturbance. Under modelled worst case meteorological conditions, only one existing dwelling (Receiver 19) is predicted to exceed the sleep disturbance criterion, shown in **Table 3**.

The Department notes that Receiver 19 is predicted to experience noise levels of up to 56 dB(A) $L_{A1\ (1\ min)}$ during the day with winds of 3 metres/second (m/s) from the northwest, and 54 dB(A) $L_{A1\ (1min)}$ during the night, under F-Class stability conditions where a 4°C/100 m inversion occurs accompanied by a 1.3 m/s drainage flow from the south (representative of worst case winter nights). Importantly, these predicted impacts would only occur during the early stages of mining in the United open cut and are primarily associated with the operation of trucks, bulldozers and excavators (including air horns, reversing beepers, bulldozer track clatter and machinery striking or dropping heavy objects).

As identified in the EPA's submission and reflected in the INP Application Notes, assessment of sleep disturbance impacts should focus on protection of peak intrusive impacts at residences during the night time period. Accordingly, the management of potential exceedances of the night-time sleep disturbance criterion at Receiver 19 should focus on the location and types of equipment operating at night under adverse meteorological conditions (ie conditions similar to worst case winter nights).

Given the restricted range of meteorological conditions, limited magnitude of maximum noise impacts and known sources of noise generation, the Department is confident that the likelihood of sleep disturbance impacts could be effectively managed and mitigated through the implementation of appropriate controls and adaptive management in a Noise Management Plan for the Project.

Finally, the Department notes that Receiver 19 is already eligible for acquisition rights under the existing Wambo and Mt Thorley Warkworth operations and that this receiver would also be eligible for acquisition and/or the installation of mitigation treatments targeted at improving the building's ability to attenuate and reduce intrusive noise impacts from the Project.

The Department considers that these impacts can be appropriately managed through the development of relevant conditions of consent.

6.2.6 Low Frequency Noise

The Department acknowledges the community's interest in the assessment of low frequency noise impacts and has long taken the position that more robust procedures were required for such assessment. This situation has been addressed to a large extent with the release of the NPI, which provides for more contemporary assessment methods, such as frequency analysis. The NIA was prepared in consideration of the draft ING (now the NPI) and presents a range of contemporary data to support the claim that the Project would not result in excessive low frequency noise impacts.
In considering the Project's predicted impacts, the NIA recognises that mine-generated noise may sometimes display annoying characteristics. Accordingly, the NIA included a specific assessment that

aligns with the NPI's contemporary assessment methodology and identifies that the Project would not cause excessive levels of tonality or low frequency noise at any nearby private residence.

This analysis is consistent with the Department's understanding of low frequency noise. Notwithstanding, the Department considers that conditions should be imposed to ensure the Applicant undertakes periodic contemporary assessment of low frequency noise as part of its regular compliance measurements.

6.2.7 Operational Noise Management

Several aspects of the proposed Project involve ongoing interactions with the Wambo CHPP, rail loop and facilities, shared use of haul roads, common fleet and the co-location of potential noise sources (see **Section 2**). The EPA identified the need to develop a methodology to accurately determine the noise emissions arising from the Project and the separate Wambo operations, and differentiate these noise sources from each other and extraneous noise, including noise generated from other nearby mining operations, surrounding land uses (eg farming equipment) and the natural environment (eg birds and insects).

While the differentiation of contributing noise sources from surrounding land uses and the natural environment is a standard process for acousticians, the intersection between Project activities and ongoing Wambo operations presents additional challenges. This is particularly the case for field monitoring at greater distances from the mines, where the noise sources appear to be generated from a similar point.

In responding to the EPA's request, the Applicant has developed a protocol that has been agreed to by United, in its capacity as representative of the joint venture, and Wambo as the owner and operator of the ongoing CHPP, rail and underground operations. This assessment and compliance protocol relies on the use of attended monitoring to supplement the proposed continuous monitoring network to determine the relative impacts of the projects in each representative receiver area. The attended monitoring would record $L_{Aeq(15\ min)}$ noise levels measured at a particular locations and the timing and duration of audible noise sources that contribute to the maximum recorded noise level. These measured results would then be analysed in light of meteorological data and any relevant modifying factors, to determine the likelihood of an exceedance of the PSNLs under either consent.

Considering the sound power levels, location and type of noise sources associated with the proposed open cut operations and separate CHPP, rail and underground operations, it is expected that the proposed open cut operations would contribute the majority of noise emissions. To this end, the Applicant has identified that in Areas 4, 5, 6 and 7 (see **Figure 10** and **Table 3**), the Project would assume responsibility for any estimated exceedance of the noise limits associated with the combined operations, unless the protocol and associated operational checklist determines that the potential non-compliance is related to the Wambo operations or unrelated noise sources.

In these circumstances and in Areas 1, 2 and 3 (see **Figure 10** and **Table 3**), where the ongoing Wambo operations are predicted to contribute a more significant proportion of the cumulative noise levels, a more detailed assessment is required. This process is described in detail in Appendix 1 of the Applicant's response to additional information request. In summary, if field measurements indicate that intrusive noise impacts for the combined Project and Wambo operations are exceeding the combined PSNLs for both projects, then there is a potential for one or both operations to be exceeding their respective limits. Similarly, if the combined noise impacts are estimated as less than the combined PSNLs, but more than one or both of the separate Project or Wambo PSNLs, this indicates that while one of the operations may be exceeding its limits, it is also possible that both operations are complying with their noise limits.

For each monitoring scenario where there is the potential for an exceedance to occur, the Applicant's proposed assessment protocol identifies specific procedures that the acoustician would need to follow in order to determine the contribution of each project and confirm whether each operation is complying with its PSNL. Importantly, in the event that a specific site can be confirmed as causing the potential non-compliance, that site would be notified to rectify the problem. For all other situations where there is any uncertainty regarding the primary source of the noise emissions, the Applicant would be notified and would be responsible for ensuring that the relevant operation/s is advised to implement adaptive management measures to ensure compliance with the noise limits in its consent.

While the EPA was generally satisfied that the proposed approach would allow for the effective management of noise emissions from the sites, it requested that the Applicant provide a system that would identify the status of relevant equipment fleet and allow the EPA to undertake independent monitoring for regulatory purposes, without needing to contact the site. The Applicant responded to this request by confirming that all mobile equipment on the site is GPS tracked every 6 seconds and that these records are able to confirm the status of all active fleet operating at any given time. The presence of this information allows independent monitoring to be undertaken without prior contact with the site. The acoustician could then seek an initial verbal confirmation of operating equipment in the field by contacting a designated operator at the site and could subsequently verify the accuracy of this verbal advice through the provision of detailed data files covering any designated timeframe requested by the regulator. The EPA has confirmed its satisfaction with this system and is confident that this information would allow for independent regulation of the site.

Overall, both the EPA's and Department's acoustics experts have reviewed the proposed compliance protocol and are satisfied that it provides for the robust and rigorous determination of each site's respective noise emissions and allows for the effective and efficient regulation of noise compliance under both consents.

6.2.8 Construction Noise

The Project is expected to generate short-term elevated levels of construction noise associated with the realignment of a section of the Golden Highway, 330 kV transmission lines and mine infrastructure. Given the short duration and nature of these activities, the Department considers their assessment against the ICNG to be appropriate.

For the most part, these construction activities would be undertaken during standard construction hours. However, for safety reasons and constraints such as integrating with the existing road network and minimising disruption to the electricity supply network, there may be some activities which must be undertaken outside of normal working hours. In such cases, the Department recommends that any noise generated from construction activities is managed within the mine's operational noise limits.

In considering the potential construction impacts of the Project, the NIA predicts that the $LA_{eq,15min}$ construction noise levels would be no greater than 35 dB(A) at any surrounding private residence. The Department's standard approach to managing short term construction noise for mining proposals is to require the combined operational and construction noise of a project to not exceed a level of 5 dB(A) above the recommended operational criteria (ie PSNLs) during standard construction hours of 7 am to 6 pm Monday to Friday and 8 am to 1 pm on Saturdays. Given the predicted construction noise levels, the Department is confident that these limits could be readily achieved for the Project.

For any construction activities to be undertaken outside standard construction hours, the Applicant has proposed the application of operational noise limits. This approach is consistent with the Department's established approach for other open cut coal mines in the Hunter Valley, which requires that combined operational and construction noise impacts do not exceed the recommended PSNLs, unless an out-of-hours operational procedure for specified works has been developed and approved by the Secretary. In the Department's experience, the application of this type of out-of-hours operational procedure is an effective means to manage potential worst-case construction noise impacts.

Considering that the Project is not predicted to cause any significant construction noise impacts at nearby private receivers, the Applicant has proposed to meet PSNLs during non-standard construction hours and the proposed construction activities would be short-term, the Department does not believe that any further measures are necessary to mitigate construction noise.

6.2.9 Traffic Noise

The contribution of noise impacts associated with the Project's operational and construction traffic was assessed against the criteria set out in the RNP. The Project would increase the construction and operational workforce (relative to the existing Wambo mine), along with coal extraction rates, the equipment fleet operating at any given time and the associated number of heavy vehicle deliveries. The NIA considered the noise impacts associated with these traffic volumes at 6 receiver locations located along the transport route in Jerrys Plains and at 3 setback distances from the Golden Highway.

The proposed changes in employee and heavy vehicle traffic are predicted to increase noise levels over the early years of the Project, with predicted traffic noise impacts in Year 11 reaching 53.7 dB(A) during the 6.30 - 7.30 AM peak period and 52.8 dB(A) during the 5.00 - 6.00 PM peak period. At the 9 representative locations assessed, the predicted noise levels during the morning period are expected to increase by 2.7-2.9 dB(A) relative to existing road traffic noise levels (partly due to the increase in heavy vehicle deliveries). While afternoon traffic noise is predicted to have a short-term reduction of 1.6-1.8 dB(A) in Year 2, traffic volumes are expected to increase as production rates ramp up, with the Year 11 afternoon period only predicted to result in a minor reduction of 0.2-0.6 dB(A) relative to current levels. The Department notes that the relative change in afternoon noise impacts would be undiscernible to most people, but considers that the morning impacts would be noticeable.

Notwithstanding, the Department notes that the predicted road traffic noise levels associated with the Project would continue to comply with the RNP's objectives for arterial / sub-arterial roads at all times. Consequently, the Department does not recommend any further treatments or conditions.

6.2.10 Rail Noise

The Applicant has identified that the Project would not change the approved annual freight capacity or operation of the existing Wambo rail spur, loop and train load-out facility and as such would not increase the peak rail noise impacts at nearby receivers. However, the Department recognises that the proposed increase in the number of potential train movements (from 6 to 8 per day) may increase the potential frequency of rail noise impacts at individual receiver locations.

The noise impacts associated with the movement, stoppage and loading of trains on the Wambo rail loop have been previously assessed in line with the INP and conditioned through the adoption of PSNLs under DA 177-8-2004 and a requirement that Wambo take all practicable measures to minimise train movements on Friday evenings and Sunday mornings. Despite the potential increase in allowable daily train movements, the Applicant is proposing to manage the timing of its rail movements to ensure that rail noise from the Project can still meet the existing Wambo PSNLs.

The Department is confident that, with the adoption of appropriate management measures and train scheduling, these limits can continue to be complied with. Nevertheless, the Department considers that, if the Project is approved, standard conditions should require Wambo to undertake all reasonable and feasible measures to manage its train movements and rail loading processes to minimise the generation of wheel squeal and wagon bunching noises.

With respect to rail noise generated by trains travelling along the Mt Thorley Line and Main Northern Rail Line, the NIA notes that the allowable noise levels on these tracks are regulated through an EPL held by the ARTC. While this EPL does not set specific limits, it seeks to manage and progressively reduce rail noise for sensitive receivers along the rail line and ensure that any individual development does not increase rail noise levels by more than 0.5 dB(A) or exceed criteria of 65 $L_{Aeq\ (day\text{-}time\ 15\ hour)}$, 85 $L_{Amax\ (day\text{-}time)}$, 60 $L_{Aeq\ (night\text{-}time\ 9\ hour)}$ and 85 $L_{Amax\ (night\ time)}$. The EIS identified that the noise levels associated with the Project would be unlikely to be perceivable at current residential setback distances along the railway corridor and, when considered alongside forecast rail tonnages, would not be expected to increase rail noise impacts by more than 0.5 dB (A) on the State rail network.

It is also relevant to note that ARTC has confirmed that sufficient rail network capacity is available to accommodate the proposed rail movements over the life of the Project. Given that the Project would continue to use the existing Wambo rail dispatch processes, similar rail fleet and equivalent annual rail tonnages, the Project is not expected to materially change the existing pass-by noise levels for individual train movements on the Main Northern Rail Line.

Having considered that the Project is not predicted to increase rail by-pass noise impacts and is not proposing any changes to the existing PSNLs under DA 177-8-2004, the Department is satisfied that Wambo could continue to manage the loading of trains on its rail loop to meet relevant PSNLs. Furthermore, the Department notes that the only private receiver in close proximity to the rail loop (Receiver 19) is already entitled to acquisition rights for operational noise and air quality impacts. It also notes that those private residences located further along the Wambo rail spur near the Mt Thorley Industrial Estate have existing acquisition rights under the consent for the Warkworth Continuation Project and would not be expected to experience increased noise impacts due to bypass noise along the rail line, relative to that approved under DA 177-8-2004.

6.2.11 Conclusion

In summary, the Project is predicted to result in minor to moderate increases in the existing noise levels experienced at a range of nearby receivers, particularly near the areas of Moses Crossing, Redmanvale, South Wambo and Warkworth Village. The Department is satisfied that the majority of these predicted increases are relatively minor in nature when considered in relation to the current noise environment and existing Wambo operations, and that appropriate mitigation and acquisition rights could be afforded to those receivers who are likely to experience elevated and more material impacts, including 22 residences that would be eligible for mitigation rights and 9 for acquisition rights. The Department is also confident that the Project could be operated to minimise the likelihood of impacts to the greatest extent possible, especially during adverse meteorological conditions.

The Department also considers that the Applicant should be required to prepare a detailed site Noise Management Plan, that must include reasonable and feasible measures to mitigate and manage the Project's noise emissions, a noise management system that uses meteorological forecasting and real-time noise monitoring to guide daily mining operations, and detailed measures and protocols to ensure compliance monitoring for all activities across the Wambo and United mine sites.

6.3 Blasting and Vibration

The Applicant proposes to extract coal through drill and blast open cut mining methods. The EIS contained a Blast Impact Assessment (BIA) using ground vibration and air blast overpressure modelling to consider the potential impacts of blasting at the proposed open cuts on surrounding receivers, including potential impacts from flyrock. Potential impacts of blast fumes and odour are discussed in **Section 6.1.**

Table 5 shows the progression of blasting activities and their proximity to a range of receiver locations including residences, historic structures and buildings, privately-owned land and infrastructure including the Golden Highway, transmission lines and HVO South's nearby mining operations.

Table 5: *Blasting activities associated with staged mine plans*

Stage	Mining Year	Key blasting development/operational activities	
		United Open Cut	Wambo Open Cut
Stage 1	Year 2	• Golden Highway and transmission line relocation completed. • Blasting in eastern area of open cut, within 1 km of Warkworth Public School building.	• Blasting in the most northern section of the open cut, closest to Jerrys Plains.
Stage 2	Year 6	• Blasting activities progressing away from Warkworth Village.	• Blasting activities continuing in the northern-most area closest to Jerrys Plains.
Stage 3	Year 11	• Blasting activities progressing in a westerly direction, away from Warkworth Village.	• Blasting activities progressing in a southerly direction. Blasting activities modelled as continuing in the area closest to Jerrys Plains.
Stage 4	Year 16	• Blasting activities progressing in the most western corner of the open cut, 2 km further from Warkworth Village than Stage 1.	• Blasting activities are progressing in a southerly direction approximately 1.2 km from Stage 1 (further from Jerrys Plains).
Stage 5	Year 23	• Cessation of blasting activities.	• Cessation of blasting activities.

The Applicant considers that blasting for the Project would continue in a similar manner as the existing Wambo open cut. Currently blasting at the Wambo open cut can occur between 9 am and 5 pm Monday to Saturday, with a maximum of 15 blasts per week, limited to three per day with allowances for low vibration blasts and misfires.

6.3.1 Assessment

The BIA identified potential impacts of ground vibration and airblast overpressure on surrounding residential receivers, infrastructure, historic buildings and structures and interactions with neighbouring mining operations (see **Figure 11**). **Table 6** provides predicted 'worst case' vibration and airblast overpressure levels for key receiver locations and the relevant guideline or standard used to derive the Applicant's proposed blast criteria. The Department considers the Applicant's proposed blast criteria to be appropriate and supported by relevant information.

To avoid any combined impacts on adjacent communities, blasting would not occur simultaneously in both pits. The Applicant has therefore identified sensitive receivers for each open cut (see **Table 6**).

Table 6: *Blast emission criteria (ANZECC) and predicted results for the Project*

Receivers	Distance (m)	Vibration Criteria (mm/s)	Airblast Criteria (dBL)	Maximum Predicted
Private residences - United				
Receiver 19	1,070	5/10 [a]	115/120 [a]	4.4-6.1 mm/s[b] 119-121 dBL[b]
Other private residences	4,324 - 4,971	sw5/10[a]	115/120 [a]	0.5-0.6 mm/s[d] 102-104 dBL[d]
Private residences - Wambo				
Private residences	1,790-4,981	5/10[a]	115/120 [a]	2.6-3.6 mm/s[d] 114-116 dBL[d]
Infrastructure - United				
Public roads and bridges				
Golden Highway (existing)	150	100	n/a	102-140 mm/s[b]
Golden Highway (relocated)	120	100	n/a	145-201 mm/s[b]
Comleroi Road	180	100	n/a	76-105 mm/s[b]
Warkworth Village (concrete bridge)	830	100	n/a	6.6-9.1 mm/s
Moses Crossing (concrete bridge)	4,610	100	n/a	0.4-0.6 mm/s
330kV transmission towers:				
Tension towers	170	50	n/a	83-115 mm/s[b]
Suspension towers	140	100[e]	n/a	113-157 mm/s[b]
66 kV transmission towers:				
Tension towers	100	50	n/a	195-269 mm/s[b]
Suspension towers	95	100[e]		211-292 mm/s[b]
Hunter Valley Glider Club	670	25	133	9.2-13 mm/s 126-128 dBL
Warkworth Shooting Complex	500	25	133	15-20 mm/s 130-131 dBL
Telstra repeater	660	100	n/a	9.4-13 mm/s
Telstra buried communication cables	240	100	n/a	48-66 mm/s
Wambo tailings dam	1,300	40[c]	n/a	3.2-4.4 mm/s
HVO Riverview pit dam	380	n/a	n/a	32 mm/s
HVO surface infrastructure (occupied)	1,290	25	133	3.3-4.5 mm/s
HVO surface infrastructure (unoccupied)	1,030	100	133	4.6-6.4 mm/s
Infrastructure - Wambo				
Public roads and bridges:				
Golden Highway (existing)	120	100	n/a	194-269 mm/s[b]
Golden Highway (relocated)	3,560	100	n/a	0.9-1.2 mm/s
Comleroi Road	4,390	100	n/a	0.6-0.8 mm/s
Warkworth Village (concrete bridge)	5,140	100	n/a	0.5-0.7 mm/s
Moses Crossing (concrete bridge)	2,280	100	n/a	1.7-2.4 mm/s
330kV transmission towers:				
Tension towers	320	50	n/a	40-56 mm/s [b]
Suspension towers	-	100[e]	-	-
66 kV transmission towers: Tension towers Suspension towers	3,950	50 100[e]	n/a	0.7-1.0 mm/s
Hunter Valley Glider Club	4,860	25	133	0.5-0.7 mm/s 103-105 dBL
Warkworth Shooting Complex	4,850	25	133	0.5-0.7 mm/s 103-105 dBL
Telstra repeater	5,010	100	n/a	0.5-0.7 mm/s
Telstra buried communication cables	120	100	n/a	100-269 mm/s[b]
Wambo tailings dam	2,860	40[c]	n/a	1.2-1.7 mm/s
HVO surface infrastructure - occupied	4,960	25	133	0.5-0.7 mm/s
HVO surface infrastructure - unoccupied	4,880	100	133	0.5-0.7 mm/s
Historic buildings and structures - United				
Wambo Homestead Complex	2,530	5	120	1.1-1.5 mm/s 110-111 dBL
Former Warkworth Public School	1,000	5	133	4.9-6.7 mm/s[b] 121-123 dBL

Receivers	Distance (m)	Vibration Criteria (mm/s)	Airblast Criteria (dBL)	Maximum Predicted
Significant Historical Sites: (St Phillips Church, Piggery and Butcher's Hut, Former Queen Victoria Inn, Springwood Homestead, Montrose Property).	1,000-3,120	5	133	2.0-2.8 mm/s[d] 114-116 dBL[d]
Dog-leg Fence	150-790	n/a	n/a	102-140 mm/s
Historic buildings and structures - Wambo				
Wambo Homestead Complex	3,670	5	120	0.8-1.1 mm/s 106-108 dBL
Montrose Property	750	5	133	10-14 mm/s 126-128 dBL
Significant Historical Sites: (St Phillips Church, Former Warkworth Public School, Piggery and Butcher's Hut, Former Queen Victoria Inn, Springwood Homestead).	5,080-6,660	5	133	0.5-0.7 mm/s[d] 102-104 dBL[d]
Dog-leg Fence	250-1,520	n/a	n/a	9.8–140 mm/s

[a] Not to be exceeded for 95% of blasts
[b] Appropriate blast design required to meet the criteria
[c] Progressive from 20, 30, 40 and up to 50 mm/s
[d] Maximum values within the range of locations
[e] Mining operations in the Hunter Valley commonly undertake blasts with ground vibrations of up to 100mm/s for electricity transmission lines and the Department considers this to be acceptable, subject to reaching agreement with relevant infrastructure owners.

Residential Receivers

Air blast and ground vibration from blasting at the United open cut would impact Receiver 19, a private residence in Warkworth Village. The Applicant predicts that by managing charge mass, the ground vibration impact at Receiver 19 for 95% of blasts could be managed to meet the relevant criteria (see **Table 6**, exceedances in red text). However, the Applicant acknowledged that operationally it is not feasible to manage blasting to avoid exceedance of the 115 dB airblast overpressure level recommended for human comfort at Receiver 19.

The Department notes this property is subject to voluntary acquisition rights under the existing Wambo mine, Wambo train loading facility and Mount Thorley Warkworth development consents. The Applicant has advised it is consulting with Receiver 19 and that exceedances from blasting would be subject to a negotiated agreement. The Department considers that conditions could be applied to the Project requiring the Applicant to meet standard blast criteria at all private residences, unless an agreement has been reached with the relevant landowner and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting at the Wambo open cut could also exceed 115 dB airblast overpressure at some other residences (Receivers 28, 39 and 40). However, the Applicant considers that this could be managed by decreasing the charge mass. The Department notes that the Applicant has recently purchased Receiver 28 and that Receivers 39 and 40 would be afforded voluntary acquisition rights based on their location within the predicted noise affectation zone for the Project (see **Section 6.2**)

The Department notes that **Table 6** shows worst case predictions and that these impacts can be reduced through blast design. Additionally, as the depth of extraction increases there would be some topographical shielding provided by the pit walls which would assist in reducing impacts on receivers.

Generally, the Applicant expects to be able to manage ground vibration and airblast overpressure impacts to meet the criteria listed in **Table 6** for both the Wambo and United open cuts.

The Applicant considers that the current multi-station monitoring system at the Wambo mine is adequate to monitor vibration from future blasting at Wambo. However, in addition to the existing monitoring stations for the United open cut, onwe monitor should be established to the northeast in the vicinity of Receivers 485, 495 or 496.

The Department is satisfied that the proposed blasting activities could comply with relevant amenity guidelines for residential receivers and are unlikely to result in any material impacts on built structures

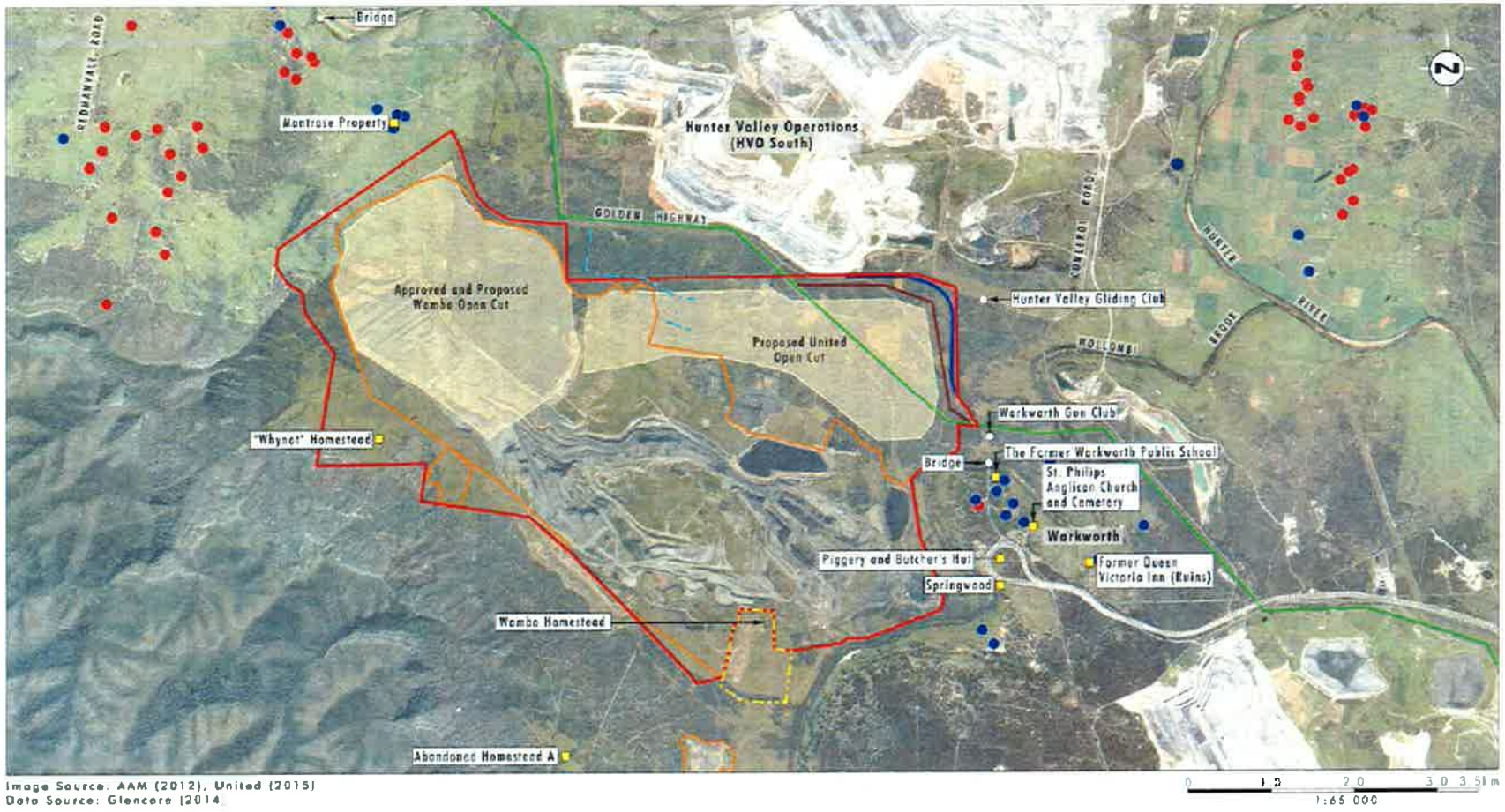


Figure 11: *Blast sensitive receivers and infrastructure*

on privately-owned residential land. The Department recommends a process to manage blast design as part of a Blast Management Plan for the Project.

Infrastructure

The BIA indicated that, in the worst-case scenario, blasting would impact the Golden Highway, electricity and communication infrastructure as shown in **Table 6** (exceedances in red text). The proposed Golden Highway realignment would move the highway within 120 m of the United open cut, closer than its current location. However, the Applicant considers that blasting at the United open cut could be managed in order to meet the 100 mm/s criterion for both the Golden Highway and electricity transmission lines. At the Wambo open cut, blast design would have to account for the proximity of the Golden Highway, electricity transmission lines and buried Telstra communication cables.

The Department notes that mining operations in the Hunter Valley commonly seek agreements with infrastructure owners regarding applicable ground vibration limits. The Applicant proposes periodic monitoring of infrastructure, including transmission towers and the Golden Highway, when blasting within a 500 m radius. The Applicant also proposes developing a road closure protocol in consultation with RMS and/or Council to manage road closures when blasting in close proximity to roads.

The Department notes that the rail infrastructure associated with the Project, including the rail spur, is owned by the Applicant. It would therefore be the Applicant's responsibility to manage any impact of blasting on rail infrastructure. The Applicant acknowledged potential impacts of blasting on the nearby Hunter Valley Gliding Club (HVGC) and Warkworth Shooting Complex. The Department notes that these clubs already operate within close proximity to existing mines, however it is recommended that communication protocols be established to notify the clubs of upcoming blasts which may impact their clubs' activities.

No impact is expected on surface infrastructure at neighbouring mines. However, though the proposed Project would be a joint venture partnership between United and Wambo, it would operate independently and therefore should account for possible interactions with the neighbouring Wambo underground mine.

The Department recommends that a Blast Management Plan is developed to address the possibility of interactions with the neighbouring underground workings, including managing the maximum instantaneous charge mass (ie explosive size) to mitigate risks to personnel safety as well as any implications for the integrity of longwalls and the efficiency of underground operations. Consistent with its recent assessment of the Mount Owen Continued Operations Project, the Department considers that the Applicant should be required to reach an agreement with Peabody, as the operator of the Wambo underground mine, concerning a personnel evacuation and safety protocol.

This protocol would need to be established prior to undertaking any blast activities that could pose a risk to the Wambo operations and would need to establish safe blasting limits for surface infrastructure, underground workings and mine workers. The Department considers that sufficient time exists prior to determination of the Project for the Applicant to confirm trigger limits for occupied and unoccupied surface sites, safety and personnel withdrawal thresholds and longwall structural integrity. The Department would then seek to reflect these safety limits in any conditions of consent.

Historic Buildings and Structures

The BIA indicates that none of the listed heritage items in the vicinity of the Project area, including the Wambo Homestead Complex, would be materially impacted by ground vibration or airblast overpressure (see **Table 6**). Three potential heritage items located outside the Project area, including the Dog-leg Fence (partially inside the Project area), Montrose Property and former Warkworth Public School, may be indirectly impacted by blasting. A summary of the proposed management measures for historic heritage matters is presented in **Section 6.10**.

The Applicant proposes to manage blasting impacts on the former Warkworth Public School to meet a ground vibration speed of 5 mm/s, unless agreed otherwise with the owner or based on a structural assessment that identifies an alternative acceptable vibration level. The house on the Montrose Property was subject to archival recording for the Historic Heritage Assessment. The Applicant proposes to include the shearing shed on the Montrose Property in a heritage archival recording prior to blasting, to mitigate impacts on the structure.

The BIA noted that there are no applicable vibration criteria for the Dog-leg Fence and that the impact on it of blasting cannot be accurately predicted due to its deteriorated state. The Dog-leg Fence,

which was assessed at a State level of heritage significance, has already suffered significant degradation due to exposure to the elements. It is expected to experience ground vibrations up to 140 mm/s and the Applicant acknowledged that the structure may suffer further deterioration, especially those sections close to the Project area. The Applicant proposes that the structure is subject to heritage archival recording and proposes to recover materials and reconstruct a section of the fence as described in **Section 6.10**.

The Applicant has indicated that the predicted airblast overpressure and ground vibration impacts detailed in **Table 6** are consistent with the existing Wambo consent and would allow for the appropriate management of blast impacts on heritage items. With respect to the Wambo Homestead, the Department's standard conditions require Applicants to ensure that their development does not cause any direct or indirect impact on identified heritage items outside the approved mine disturbance area. The Department is satisfied that the existing Wambo limits are sufficient to manage potential impacts of the Project on these items and, notes that conditions of consent would require the Applicant to protect heritage items outside the disturbance area from blasting impacts and monitor, mitigate and manage the effects of blasting on potentially affected heritage items.

6.3.2 Cumulative impacts

The Applicant acknowledged the need to manage the potential cumulative impact of blasting concurrently with neighbouring mines. The Applicant proposes to manage this by liaising with neighbouring mines to avoid concurrent blasting. The Department recommends that this procedure be documented in a Blast Management Plan.

6.3.3 Flyrock

The BIA noted that the nearest private residences are Receiver 19, located 1,070 m from the United open cut, and Receiver 40, located 1,790 m from the Wambo open cut. The nearest grazing land is located at Warkworth Village approximately 970 m from the United open cut. These distances are considered to be large enough to significantly reduce the risk posed by flyrock.

The Department notes that sections of the Golden Highway and Comleroi Road as well as parts of both the HVGC and the Warkworth Shooting Complex would be located within or at the edge of the 500 m blast exclusion zone. It is recommended that the Applicant be required to develop a road closure protocol and establish communication protocols with Council and the Clubs and notify these stakeholders of upcoming blasting activities. Other management measures include minimising the potential for the occurrence of flyrock through appropriate blast design specifications for front row holes to avoid face bursts and related flyrock incidents, appropriate blast design for identified geological features and the use of appropriate stemming material and stemming height to confine explosives and limit the possibility of stemming ejection.

The Department is of the opinion that the risk from blasting flyrock would be sufficiently mitigated by the distance from residential receivers and grazing land and the proposed management measures. These measures should be documented in a Blast Management Plan.

6.3.4 Conclusion

The Department considers that the Applicant has undertaken a comprehensive BIA and is satisfied that the Project would be unlikely to result in material impacts on most nearby residential receivers, infrastructure and historic buildings and structures.

In regard to the maximum instantaneous charges, the Department believes that the management of blasting should aim to ensure compliance with relevant criteria, without unnecessarily reducing operational flexibility and the ability of the mine to adopt best practice technologies. **Table 6** represents a conservative assessment of the worst-case blast impacts that could reasonably be expected to occur as a result of the Project.

The Department notes that other similar mining operations in the Hunter Valley have demonstrated that it is feasible to manage blasting impacts through appropriate management strategies such as blast design and monitoring in order to meet criteria. The Applicant would be required to shape and scale its blasting operations to comply with any criteria established under the conditions of consent and ensure the maintenance of public safety.

6.4 Biodiversity

The EIS included a Statement of Consistency prepared by Umwelt Pty Ltd, which provides a technical assessment of the likely ecological impacts of the Project against the *Upper Hunter Strategic*

Assessment Interim Policy (UHSA Interim Policy). This assessment refers to a range of historical flora and fauna studies undertaken at the Wambo and United sites since 2006, pays particular reference to targeted surveys undertaken as part of the Biodiversity Certification Assessment Report which was prepared by Umwelt in 2015 and identifies the type and condition of vegetation communities contained within the 1087 ha United UHSA Study Area.

To address concerns surrounding the status of the UHSA, the RTS was also accompanied by a supplementary assessment of the likely biodiversity impacts and offset requirements for the Project, prepared in accordance with the *NSW Framework for Biodiversity Assessment* (FBA, 2014). This revised approach to offsetting the biodiversity impacts of the Project is discussed in **Section 6.4.4**.

6.4.1 Existing Project Setting

Situated around 3 km north of the fringing sandstone escarpments of the Wollemi National Park, the Project site is characterised by a variable landscape, with ridgelines and undulating foothills dominating the topography to the south and west, leading down to the more gently sloping floor of the Hunter Valley in the north and east.

The vegetation communities within the Project area comprise stands of remnant woodland vegetation, regenerated forest and woodland communities on historically cleared land, and limited areas of derived native grassland. Broadly speaking, the proposed United open cut area is dominated by 30-55-year-old woodland communities that have regenerated from seedbanks within derived native grasslands. By comparison, the approved Wambo open cut disturbance footprint contains a broader variety of vegetation ranging from remnant woodland on the steeper ridgelines and slopes to younger regenerated forests and woodland. Clearance of this vegetation has already been compensated for through the provision of several large offset areas under the existing Wambo consent.

The Project site is surrounded by an extensive network of woodland corridors and biodiversity conservation areas (see **Figure 12**), including Wollemi National Park, 1,194 ha of Remnant Woodland Enhancement Areas required under the existing Wambo consent, a minimum 18.5 ha compensatory habitat area required under the existing United consent and a portion of the 2,281 ha in land-based biodiversity offsets required under the Mount Thorley and Warkworth Continuation Projects to the east.

While much of the active Wambo mine site is still subject to ongoing disturbance and mining activities, several areas across the Wambo and United sites have already been rehabilitated with woodland and grassland communities. These rehabilitated areas vary in their degree of maturity and complexity, with some areas comprising early stage grassland communities that provide stabilisation and cover crops, and other older rehabilitation areas containing woodlands that are beginning to develop more complex ecological systems with a range of over-storey, sub-storey and groundcover species.

Following the establishment of self-recruiting and ecologically sustainable rehabilitated woodland communities across the Wambo site, the approved post-mining landform would strengthen woodland connectivity in the local area by augmenting existing remnant native vegetation and offset areas.

Together these existing conservation and rehabilitation outcomes provide important fauna habitat and assist in the recovery and protection of native vegetation in the district over the medium to long term.

6.4.2 Flora Impacts

Following amendments to the proposed disturbance boundaries in the RTS, the Project would involve disturbance of 147 ha of previously cleared land and non-native vegetation and 531 ha of remnant and regenerated native vegetation communities. Of the native vegetation communities to be cleared under the Project, 210 ha conforms to the definition of an endangered or vulnerable ecological community (EEC or VEC) under the TSC Act, as follows:

- 0.29 ha of *Hunter Floodplain Red Gum Woodland EEC*;
- 29.42 ha of *Central Hunter Ironbark – Spotted Gum – Grey Box Forest EEC*;
- 1.56 ha of *Hunter Valley Footslopes Slaty Gum Woodland VEC*;
- 178.43 ha of *Central Hunter Grey Box – Ironbark Woodland EEC*;
- 174.26 ha of *Narrow Leaved Ironbark - Grey Box Grassy Woodland* (variants - not listed);
- 115.16 ha of *Bull Oak Grassy Woodland* (not listed); and
- 31.61 ha *of Swamp Oak – Weeping Grass Grassy Riparian Forest* (not listed).

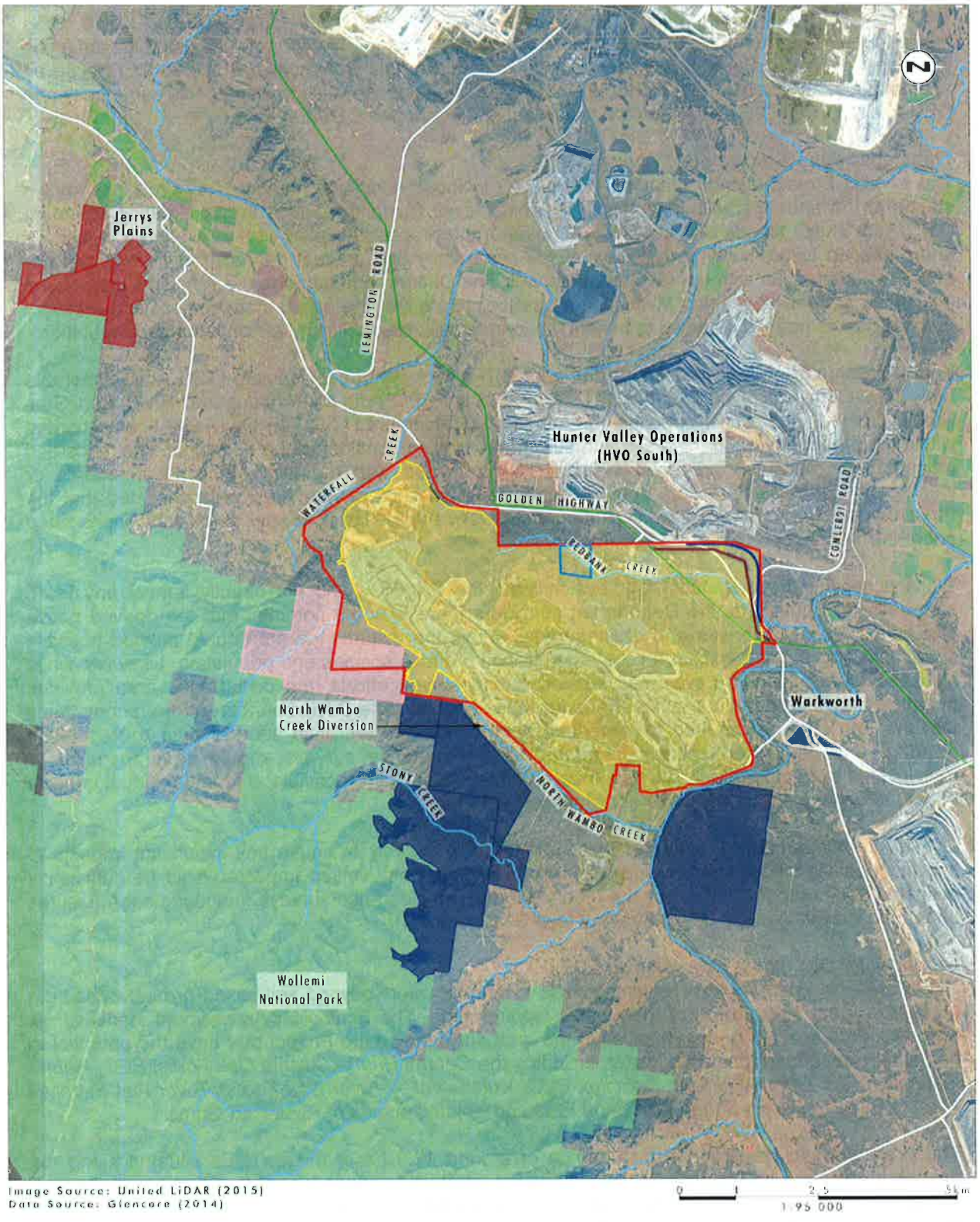


***Figure 12**: Existing biodiversity offsets near the Project area*

The Applicant has also identified that 250.21 ha of these native woodland communities conform with the EPBC Act listed *Central Hunter Valley Eucalypt Forest and Woodland (CHVEFW) CEEC.* OEH has indicated that the Applicant's responses to its requests for information have assisted in confirming the extent of this CEEC and it is satisfied the impacts on this Commonwealth-listed CEEC can be appropriately addressed. Both OEH and DoEE have attended site visits to inspect this community and OEH has reviewed GIS files to confirm the extent of the mapped CEEC.

Threatened Flora Species and Populations

The revised Project layout contained in the RTS includes additional measures to avoid two known stands of the endangered population of Weeping Myall (*Acacia pendula*) in the Hunter Catchment (TSC Act). These stands occur to the southeast of the proposed United pit and would be fenced off and managed to promote the recovery of the community and prevent degradation from grazing or accidental interaction with operational personnel. The Department supports the Applicant's proposed avoidance of known Weeping Myall stands and considers that the active management and recovery of these stands has the potential to benefit the long-term sustainability of this endangered population.

Known records of endangered Scant Pomaderris (*Pomaderris queenslandica*) (TSC Act), vulnerable Slaty Red Gum (*Eucalyptus glaucina*) (TSC Act and EPBC Act) and endangered River Red Gum (*Eucalyptus camaldulensis)* population in the Hunter catchment (TSC Act) have also been recorded within the broader Wambo mine site and surrounds. Having considered the additional avoidance and management measures proposed in the RTS, combined with the lack of historical records or identification of threatened flora species during targeted surveys, the Applicant concluded that the Project was unlikely to have a significant impact on any threatened flora species or populations listed under the TSC Act.

While accepting that vegetation surveys indicate the Project would not directly impact any listed species and populations, the Department considers there is some potential that the derived native grasslands, eucalypt forests and drainage lines within the disturbance area could provide possible seedbanks and suitable habitat for the regeneration of these species and population. Likewise, while no listed orchid species have been located during survey efforts, the disturbance area provides potential grassland habitat and host trees for these species. The Department therefore recommends that the Applicant be required to undertake appropriate pre-clearance surveys prior to vegetation clearing. Any threatened species found during pre-clearance surveys should be propagated or translocated to appropriate locations in nearby offset sites, where possible, and any residual impacts managed under a detailed Biodiversity Management Plan.

Overall, the Department is satisfied that the Project is unlikely to cause any significant impacts to known threatened flora species and populations and that any limited impacts would be sufficiently mitigated and compensated for by the recommended pre-clearance surveys, management measures and proposed Biodiversity Offset Strategy (see **Section 6.4.4**).

Groundwater Dependent Ecosystems (GDEs)

GDEs are ecosystems which require access to groundwater (beyond soil-based groundwater from rainfall) to meet all or some of their water requirements. The Ecological Assessment identified six terrestrial flora species or communities in the area surrounding the Project that have the potential to be partially dependent on groundwater, including the *Central Hunter Swamp Oak Forest* EEC, *Hunter Floodplain Red Gum Woodland Complex* EEC, *Hunter Valley River Oak Forest*, *River Flat Eucalypt Forest* EEC, *Warkworth Sands Woodland* EEC and isolated stands of River Red Gums.

The Project would result in the disturbance of around 12.9 ha of these GDEs situated along the riparian buffer zone of Redbank Creek and has the potential to cause further indirect impacts through cumulative changes in groundwater levels, shallow aquifer recharge rates and the volume of surface water flows. As the local surface and groundwater systems have already been modified by approved mining activities, it is important to consider whether the Project would materially increase these existing impacts to the extent that it would cause additional material impacts to GDEs.

The RTS confirms that the Project would have some localised effects on GDEs due to drawdown in the alluvium and shallow overburden and would contribute to the cumulative drawdown impacts of mining in the area. **Figure 13** shows two key areas within the zone of cumulative drawdown where GDEs are identified as having the potential to be present (GDE1 and GDE2).

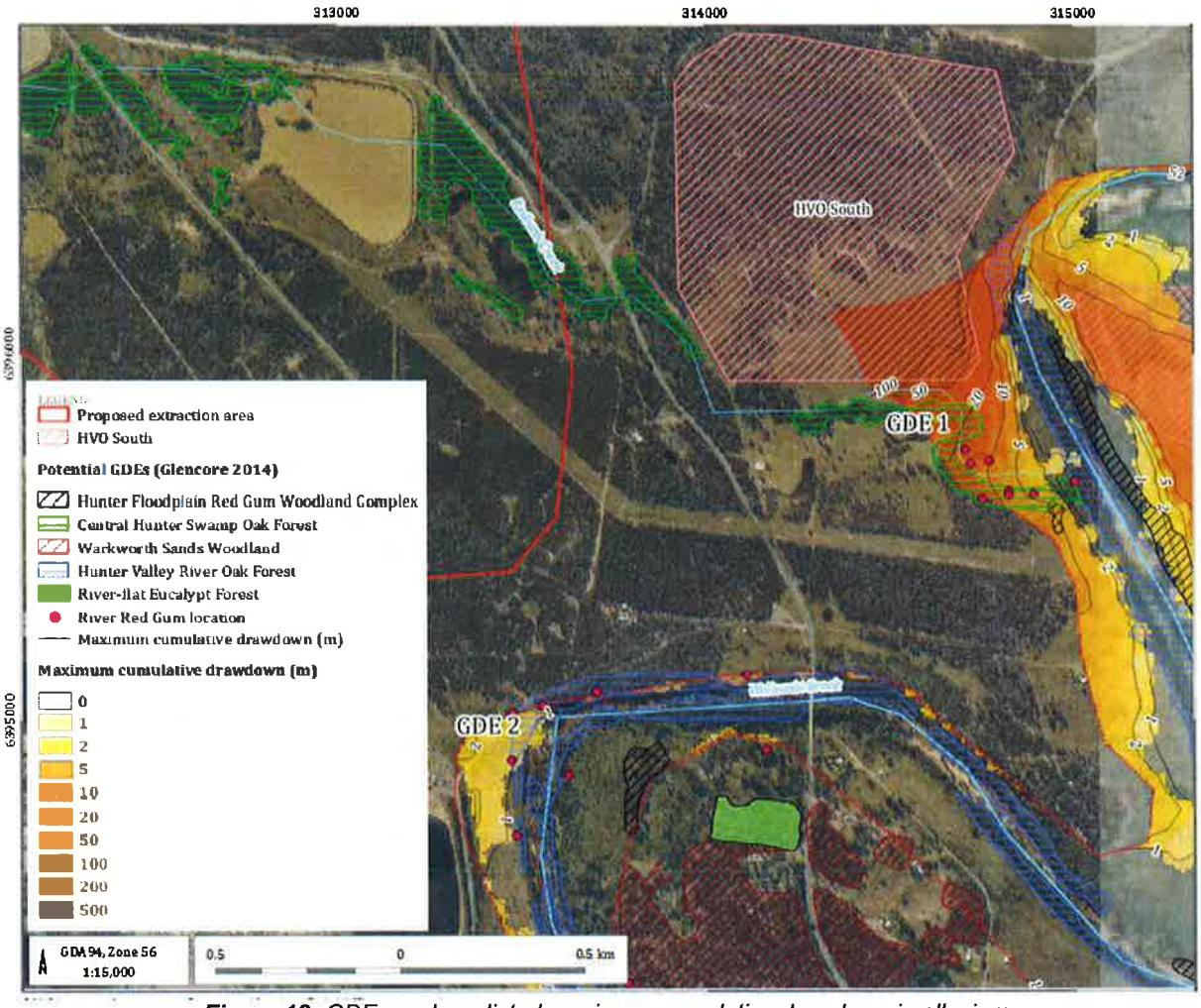


Figure 13: *GDEs and predicted maximum cumulative drawdown in alluvium*

As depicted in **Figure 13**, the Project would contribute to cumulative drawdown of alluvial aquifers beneath several stretches of GDEs that occur along the riparian corridors of Wollombi Brook and Redbank Creek. These GDEs primarily comprise *Central Hunter Swamp Oak Forest* EEC (GDE1), *Hunter Valley River Oak Forest* (GDE2) and individual River Red Gums (GDE1 and GDE2).

GDE2 is predicted to experience reduced groundwater levels of around 1 m as a result of cumulative mining operations in the area (approved mining and proposed development). The Applicant has argued that the incremental impacts of the Project would be unlikely to significantly affect the ongoing viability of this relatively drought-tolerant GDE, given the predicted cumulative drawdown is limited to the fringes of Wollombi Brook where the alluvium has a maximum saturated thickness of 10 m.

Figure 13 demonstrates that groundwater levels are predicted to decline more significantly due to mining influences (approved and proposed) near GDE1. The Applicant has argued that the Project would only contribute a small proportion of cumulative drawdown impact in this area and would be unlikely to significantly affect the ongoing viability of the GDE. This trend is shown in **Figure 14**, which depicts the predicted decline in groundwater levels at GDE1 for approved mining only (ie HVO South, Wambo and Mountt Thorley Warkworth) and for approved mining plus the proposed development.

As shown in **Figure 14**, the alluvial aquifers beneath areas of GDE1 are expected to be largely desaturated (ie alluvial groundwater levels are below the base of alluvium) as a result of cumulative impacts associated with approved mining operations. This is most likely due to direct take by mining at HVO South and reduced contributions from the underlying Permian coal measures.

The Department acknowledges that the proposed development would contribute a limited degree of additional drawdown pressure in this area and would accelerate the desaturation of this alluvium by about one year (as shown).

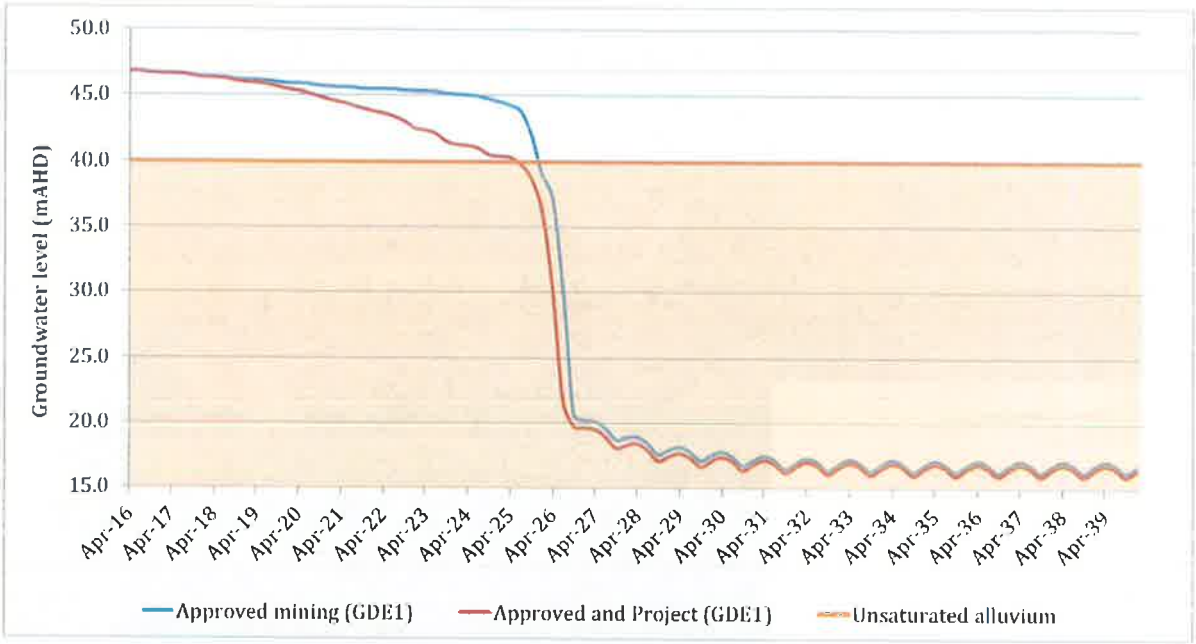


Figure 14: *Predicted groundwater level decline in alluvium at GDE1*

However, this additional pressure would only change the timing of impacts and would not result in any substantial changes to the overall magnitude of impacts already approved to occur. The Department considers this slight change in timing to be acceptable.

The EIS also considers that the Project would not result in any significant additional impacts to GDEs due to changing surface water flows, especially considering the mine plans incorporate setback distances from Wollombi Brook, the Hunter River and associated riparian GDEs. Overall, while the Project would contribute to regional drawdown, the Applicant has argued that existing approved operations in the area have a greater influence on cumulative drawdown (also see **Section 6.6**).

The combined dewatering effects of the Project, the existing Wambo underground and other mining operations in the region are likely to result in sustained groundwater depressurisation and reduced alluvial recharge rates in the locality for a long period of time. It is therefore pertinent to consider the extent and timeframe over which drought-tolerant GDEs can withstand prolonged dewatering and whether the incremental drawdown effects of the Project would augment cumulative drawdown sufficiently to affect the viability or composition of surrounding GDEs.

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

6.4.3 Fauna Impacts

The Applicant's FBA assessment included a list of potentially threatened fauna species identified in literature reviews, State and Commonwealth Government databases and historical records as having potential to occur in the vicinity of the Project. Targeted surveys were also undertaken at the site between 2010 and 2016 to confirm the presence of key threatened species.

The majority of threatened fauna species known to occur in the disturbance area and surroundings are relatively mobile. A number of these species are likely to experience varying degrees of impacts due to the removal of around 94 ha of derived native grasslands, 437 ha of mature woodland and forest and re-disturbance of 147 ha of partially rehabilitated grassland and woodland communities. This main impact arising from this clearance is the loss of habitat resources including hunting and foraging areas, habitat trees, fallen timber, rocky outcrops, feed trees and hollow-bearing trees. The reduced extent of connected woodland vegetation could also indirectly impact the home ranges of several mobile fauna species and increase competition for nearby habitat resources.

To account for these impacts, the FBA assessment identified that the Project would be required to retire ecosystem credits for 30 fauna species, comprising 23 bird, 5 bat, 1 marsupial and 1 placental mammal species. In addition to these ecosystem credits, the Project would require additional species credits to account for the clearance of 7.3 ha of potential breeding habitat for the Southern Myotis.

The Department notes that there are a number of additional threatened species that have never been recorded on the site, but are known to occur in remnant woodland and open grassland areas in the broader locality. As a number of these additional threatened species are relatively mobile, there is a reasonable likelihood that they may in future visit or utilise the woodland vegetation located in the Project area. While the Project would not directly impact on or be required to provide offsets for these species, the presence of additional threatened species in the broader region reinforces the value in re-establishing long-term connectivity and habitat corridors through effective rehabilitation.

To minimise the risk and significance of impacts to threatened species, the RTS proposed to avoid impacts on an additional 37 ha of land previously proposed to be cleared and implement management measures for the progressive clearance of vegetation that aim to minimise the extent of impacts on resident fauna. Notwithstanding these measures, the Applicant recognises that the proposed removal of foraging and habitat resources, along with a short-term reduction in regional habitat connectivity, would cause both direct and indirect impacts to threatened fauna.

In considering the significance of these impacts, the FBA assessment highlighted the mobile nature of key affected species and the presence of alternative habitat and remnant vegetation near the Project site, within the proposed biodiversity offsets and in future rehabilitation areas. Overall, the FBA assessment concluded that, with the proposed avoidance, mitigation, management and offsetting measures, the Project would be unlikely to cause significant impacts to threatened fauna in the short term or result in significant medium to long term impacts on the lifecycles or populations of threatened fauna species.

The Department recognises that the Project is likely to have short term impacts on threatened fauna species and has discussed the likely impacts on key threatened species in more detail below. However, the Department is generally satisfied that the Applicant has minimised the extent of likely impacts and that the residual impacts of the Project could be managed through strict conditions of approval, including specific requirements to focus on the establishment of threatened fauna habitat and preferred feed trees as part of the final landform and rehabilitation process.

In particular, the Department notes that the rehabilitated woodland communities proposed under the Project would be established to contemporary standards, which would provide an improvement on existing rehabilitation requirements in the Wambo consent. Following establishment of ecologically complex native woodland communities across the entire site and connection of surrounding remnant vegetation, the Department considers that the Project could provide beneficial outcomes and support the long-term recovery of regional populations of key threatened fauna species. Nevertheless, the Department considers that a suite of conditions would be required to manage short term impacts on threatened fauna and the progressive monitoring and active management of rehabilitation activities.

Impacts on Key Threatened Fauna

The FBA assessment, Commonwealth referral determination and submissions from OEH have identified that, without appropriate mitigation measures, the Project is likely to have significant impacts on three key threatened fauna species listed under the TSC Act and/or the EPBC Act, being the Swift Parrot, Regent Honeyeater and Spotted-tail Quoll. The Department has also given express consideration to the likelihood of impacts on Koala populations, in accordance with the requirements of *State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)*.

- *Swift Parrot (Lathamus discolour) and Regent Honeyeater (Anthochaera Phrygia)*

The loss of habitat and key foraging resources through land clearing are identified as key threats in the approved national Conservation Advice and Recovery Plans for the Regent Honeyeater and Swift Parrot. Accordingly, the Project has the potential to impact these species through the clearing of vegetation and associated loss of habitat, foraging resources and nest hollows. Habitat loss is the most common threat to these species in the Hunter Valley and is not unique or limited to the Project site.

Swift Parrots breed in Tasmania during the summer and would be expected to use tree hollows and foraging resources (eg nectar and lerps in Eucalyptus forests) associated with the forest and woodland communities in the Project area during their winter migrations along the east coast.

Regent Honeyeaters are known to occur between northeast Victoria and southeast Queensland, and are usually associated with Box-Ironbark and Eucalypt woodlands that have a large number of mature (ie flowering) trees, high canopy cover and an abundance of mistletoes. The National Recovery Plan for the Regent Honeyeater notes that the broader Hunter Valley district is one of four key breeding areas, where the species has been regularly recorded breeding during spring and summer months. In addition, the FBA assessment notes that Regent Honeyeaters are known to migrate large distances and are often found in the Hunter Region during winter months, particularly in response to regional Eucalyptus flowering events.

The Applicant undertook targeted winter bird surveys across the UHSA Project area over six years, during 2010, 2011, 2012, 2013, 2014 and 2016. Additional targeted surveys were undertaken in July 2016 within a 4.26 ha area associated with the originally proposed easement for the relocated electricity transmission line. This additional area is located to the east of the site, outside of the formerly surveyed UHSA Project area and comprises *Narrow-leaved Ironbark - Grey Box Grassy Woodland of the Central and Upper Hunter* regeneration and derived native grassland. Further details of these surveys can be found in **Appendix A**.

No sightings of Swift Parrots or Regent Honeyeaters (or breeding habitat) were recorded within the additional disturbance areas proposed under the Project during the six years of targeted surveys. However, both of these species are known to occur within the broader region, with three Regent Honeyeater sightings recorded within 5 km of the site during 1987,1991 and 2002. The 1991 sighting was located in riparian vegetation of Wollombi Brook, very close to the 4.26 ha 'non-UHSA' area (see Figure 3.6 of Appendix 4 to RTS - Part B). OEH's initial submission on the Project identified this woodland as being potential Regent Honeyeater habitat requiring further expert assessment. In response to this advice, the Applicant elected to amend the transmission line easement to avoid disturbance of this area and provided a revised Project layout in its RTS.

The Applicant has acknowledged that 229 ha of woodland communities to be cleared under the Project have the potential to provide habitat and foraging resources for one or both of these threatened bird species. To address this impact, the Applicant has confirmed that the proposed Wambo, Highfields and Mangrove biodiversity offset areas contain a minimum 931 ha of mapped vegetation that would provide suitable upfront alternative habitat areas for Regent Honeyeaters. In addition, the Applicant has recently purchased a fourth biodiversity offset area near Jerrys Plains that is also likely to contain additional compensatory habitat and foraging resources (see **Section 6.4.4**).

Given the mobile nature of these threatened bird species and the absence of known breeding habitat, the Applicant considers that these species are capable of seeking alternative foraging habitat in the surrounding national park, remnant woodland, offset sites and rehabilitation areas. The Applicant has also argued that the relatively young (30-55 years old) nature of regenerated woodland present in the United open cut area would provide less habitat and foraging resources per hectare than an equivalent mature woodland complex, meaning that it would be quicker and easier for the Project to establish alternative vegetation communities and equivalent resources to replace these communities.

While the Department acknowledges this argument, it considers that detailed conditions should be developed to monitor and enforce timely rehabilitation schedules and require the incorporation of preferred foraging and habitat resources in these areas. The Department is satisfied that such measures could be developed as part of a Biodiversity Management Plan for the site.

Following the amendments made in the RTS, OEH has advised that, from a State perspective, potential impacts on Swift Parrots and Regent Honeyeaters from clearing of potential foraging and habitat resources could be adequately addressed through retiring the proposed ecosystem credits. However, both OEH and DoEE indicated that further offsets may be required to meet the EPBC Act's offset requirements for Regent Honeyeaters. The Department is confident that sufficient time exists, prior to determination, to allow the Applicant to clarify the extent of its shortfall in credits and identify additional offset areas and measures that would satisfy the Commonwealth's offset requirements under the EPBC Act.

Notwithstanding the need to resolve Commonwealth offsets, the Department considers that there is sufficient information available to inform the State's assessment of TSC Act-listed species. The

Department considers that the Biodiversity Offset Strategy is appropriately focused on compensating for impacts on listed threatened bird, bat, marsupial and placental mammal species, including Swift Parrot and Regent Honeyeater. Finally, the Department notes that the woodland rehabilitation to be established under the Project would provide a net increase in long-term future habitat and foraging areas, and may assist in reversing the long-term population decline of these threatened bird species.

- *Spotted-tail Quoll (Dasyurus maculatus)*

Given the presence of Spotted-tail Quolls in the broader region, the FBA assessment identified that there is a reasonable likelihood that the Project disturbance area falls within the home ranges of Spotted-tail Quolls and that habitat in this area may be used by Quolls from time to time. Approximately 356.5 ha of forest and woodland vegetation within the Project disturbance area is considered to be suitable habitat for the Spotted-tail Quoll.

Spotted-tail Quolls are known to occur in the surrounding landscape, as evidenced by a recorded sighting to the east of the Project footprint during a remote camera baiting survey in 2013. Targeted surveys undertaken in 2013 and 2014 failed to identify Spotted-tail Quolls or confirm the presence of den sites or signs of breeding within the Project area, however the loss of 356.5 ha of potential forest and woodland habitat, derived native grasslands and foraging resources could cause some limited impacts by increasing competition over home ranges and disrupting dispersal pathways.

To address these potential impacts, the Applicant has proposed a biodiversity offset package that includes the conservation of the Wambo biodiversity offset area, located adjacent to the Project area and contiguous with large tracts of remnant vegetation. The RTS identifies that the Wambo, Highfields and Mangrove biodiversity offset areas contain 1,021.2 ha of mapped vegetation that would provide suitable upfront alternative habitat areas for Spotted-tail Quolls. In addition, the Applicant has committed to establish rehabilitated woodland and habitat features across the final landform and has acknowledged that it needs to identify and conserve further biodiversity offset areas, including the 250 ha Jerrys Plains Offset Area, to account for its residual ecosystem credit offset obligations.

The Applicant has also committed to actively enhance its offset areas to increase the likelihood of them being used by threatened species through installing habitat structures (eg timber stockpiles, nest boxes and water bodies). The Department acknowledges that the Applicant has been successful in recreating den structures and habitat features for Spotted-tail Quolls in other areas of the Hunter Valley and is satisfied that similar measures could be implemented under the Project.

Overall, the Department is satisfied that the proposed offset areas and ancillary measures would satisfactorily address any impacts on Spotted-tail Quoll populations. The Department considers that improving the connection and habitat features present in the post-mining rehabilitated landscape would increase the likelihood of future use by local Quoll populations as a dispersal corridor and habitat area. The Department considers that the proposed mitigation measures should be reflected in any recommended conditions of consent and that any residual impacts on this species could be effectively managed through a Biodiversity Management Plan for the site.

- *Koala (Phascolarctos cinereus)*

As the Project is located in the Singleton local government area, the provisions of SEPP 44 apply and the Department must consider the possible presence of core or potential Koala habitat in its assessment. The Statement of Consistency in Appendix 13 of the EIS identifies that, despite a single historical record, resident Koala populations are unlikely to occur in the Project disturbance area and that the proposed clearance of 233 ha of Eucalyptus-dominated woodlands would be unlikely to have any significant impacts on Koala populations or the recovery of this vulnerable species.

The RTS assessment likewise emphasised the lack of Koala sightings during targeted surveys of the disturbance area and noted that it was unlikely that Koalas would use the forest and woodland communities in this area on a resident or long-term basis. This assessment concluded that the Project would not impact on any core or preferred Koala habitat or populations, due to the scarcity of recorded Koala sightings and the results of detailed flora studies of the site. These flora studies indicate that only a limited amount of preferred Koala feed trees, as listed in SEPP 44, occur across the site, including a 0.29 ha area of Forest Red Gum comprising a canopy dominated by *Eucalyptus tereticornis*.

Despite this classification as non-core habitat, Koala scats were recorded in the disturbance area during surveys in 2006. Subsequent monitoring and targeted field surveys undertaken between 2009 and 2015 did not locate any additional evidence of Koala habitation.

In assessing the likely Project impacts on Koala populations, it is noted that SEPP 44 aims to conserve and manage Koala habitat to reverse the current trend of Koala population decline. Overall, the Department is satisfied that the Project is unlikely to have any significant impacts on Koala populations and would eventually lead to improved long-term habitat outcomes. This is due to the presence of three species of preferred feed trees across the proposed offset sites and the proposed establishment of woodland vegetation corridors under the proposed rehabilitation plan.

The woodland areas in the proposed rehabilitation plan would constitute a number of different communities, including EECs. The Department believes that there is merit in establishing diverse woodland communities across the final landform and considers that preferred Koala feed trees should be integrated into the species mix, for instance through reinstating Forest and River Red Gums along gully environments and drainage lines. This approach could be appropriately managed under a Rehabilitation Strategy for the site. This would not only ensure that important Eucalyptus species are reinstated, but would also provide beneficial outcomes for Koala populations by providing preferred feed tree species and protection from predation as these populations move across the post-mining woodland landscape.

Stygofauna

The Ecological Assessment also considered the combined effects that predicted changes to the presence or duration of persistent pools and decreases in groundwater levels and/or groundwater pressures would be likely to have on aquatic fauna and stygofauna. Studies undertaken for the EIS and RTS indicate that stygofauna populations near the Project area are generally localised to saturated alluvium associated with watercourses and riparian zones, with evidence of low-diversity stygofauna populations associated with the Hunter River alluvium and an absence of identified stygofauna populations associated with Wollombi Brook.

The Applicant emphasised that the majority of groundwater drawdown associated with the Project would be expected to occur at some distance from major watercourses, with no additional incremental drawdown likely to occur in the Wollombi Brook alluvium and less than 2.5 m drawdown predicted to occur in the alluvium south of the Hunter River. Given the connectivity of alluvium to the Hunter River, the RTS considers that the loss of stygofauna habitat as a result of groundwater drawdown would represent a low risk of threat to broader stygofauna populations and that these areas would be able to be recolonised in the long term. As noted above, the Department considers that the Project would benefit from the adoption of detailed monitoring and response plan to track and manage potential impacts to GDEs over time.

Conclusion

The Department is satisfied that the proposed ecosystem and species credits for the Project adequately account for potential impacts on threatened bird, bat, marsupial and placental mammal species, including the Swift Parrot, Regent Honeyeater, Spotted-tail Quoll and Koala. The proposed biodiversity offset package provides an acceptable pathway to retirement of these credits, using a combination of upfront land-based offsets and future retirement of credits at key Project stages.

However, considering that the Applicant still needs to confirm how it would secure residual biodiversity offset areas and given the reliance on rehabilitation to provide ecosystem credits, the Department considers that detailed conditions would need to be developed to manage the staged clearing and retirement of offsets for the Project. With these measures in place, the Department considers that the Project would result in acceptable impacts to threatened species and may even assist in improving the long-term recovery of these species by reinstating key habitat and foraging resources.

6.4.4 Biodiversity Offset Strategy

The EIS included a Statement of Consistency which sought to address the biodiversity impacts of the proposal, in line with the permitted biodiversity assessment approaches recognised by OEH in its advice on the SEARs for the Project. The SEARs had regard to two permitted assessment pathways, being a 'Path 1' assessment under the 2012 UHSA Interim Policy or assessment under the 2014 *NSW Biodiversity Offsets Policy for Major Projects* and associated FBA.

The Applicant chose to undertake its biodiversity assessment in the EIS in accordance with the UHSA Interim Policy, on the assumption that the draft UHSA Biodiversity Plan would be publicly exhibited and finalised prior to determination of the proposal. However, delays in the public exhibition of the draft UHSA Biodiversity Plan have meant that this process is yet to be finalised.

While there is still potential for the UHSA process to be completed prior to determination, reliance on the UHSA alone would result in residual uncertainty over the adequacy of biodiversity offsets for both the Applicant and broader NSW community. To address this uncertainty, the RTS not only included a complete response to issues raised in relation to the UHSA, but also provided a stand-alone alternative assessment of biodiversity impacts undertaken in accordance with the FBA.

While all information provided in relation to potential biodiversity impacts has been considered in this assessment, the Department has based its consideration of the adequacy of the proposed biodiversity offset package on the information provided in the stand-alone FBA assessment. The Department has also relied on OEH's expert advice regarding the classification of vegetation communities, Biobanking Assessment Report data requirements and appropriateness of the offset package under the FBA.

Biodiversity Offset Package

The Applicant identified the need to provide a biodiversity offset package for the Project, to compensate for the clearance of 531 ha of native vegetation and the associated impacts on threatened fauna habitat and resources, including 7.3 ha of vegetation comprising breeding habitat for the Southern Myotis (listed under the TSC Act).

The Applicant proposed a biodiversity offset package comprising upfront land-based Biobanking sites, rehabilitation of threatened vegetation communities across the final landform and retirement of residual credits by securing additional Biobanking sites, contributing money towards supplementary conservation measures and recovery actions or contributing funding to established biodiversity offset funds. This package would be delivered in three stages as the Project progresses.

The EIS and RTS proposed three land-based biobanking offset sites (see **Figure 15**), comprising the:

- Wambo offset area, a 338 ha property located adjacent to the Project site and contiguous with the Wollemi National Park and existing Wambo biodiversity offset areas;
- Highfields offset area, a 428 ha property located in the Manobalai region, adjacent to the Manobalai Nature Reserve and within the UHSA - Great Eastern Ranges priority area; and
- Mangrove offset area, a 259 ha property also located in the Manobalai region and within the UHSA - Great Eastern Ranges priority area.

Each of these three offset sites comprises a mix of native vegetation communities and derived native grassland areas that the Applicant has identified as capable of being restored to a state containing suitable canopy species conforming with various Eucalyptus-dominated woodland EECs/CEECs. The FBA assessment identified that some of the vegetation communities in these land-based conservation areas are similar to those to be cleared under the Project and that these offset areas would also provide alternative habitat for a number of affected threatened species.

The Applicant has also recently purchased a 250 ha property near Jerrys Plains as an additional biodiversity offset area for the Project (see **Figure 12**). While the Applicant is yet to provide a full biobanking assessment report for this site, preliminary surveys indicate that the site contains around 240 ha of CHVEFW CEEC and would generate around 3,442 additional ecosystem credits. Following preliminary verification of these inital survey results by OEH, the Department is satisfied that the four offset sites would deliver significant regional benefits for threatened flora and fauna species and populations, and would go a long way toward addressing the Project's ecosystem credit requirements.

The Department endorses the location of these four offset areas and notes their proximity to a range of significant landscape features, existing conservation areas and strategic offset corridors. The Highfields and Mangrove sites are both located within OEH's Greater Eastern Ranges priority area and would assist in establishing a strategic vegetation corridor connecting the elevated ranges to the west of the Hunter Valley. They would also complement the extensive amount of remnant vegetation in this region, including the Manobalai Nature Reserve and several in-perpetuity biodiversity offsets established by other Hunter Valley mining operations (see **Figure 15**).

The Wambo and Jerrys Plains sites are well located in close proximity to the Project and would provide immediate alternative habitat in the local area. Both sites adjoin the Wollemi National Park. The Wambo offset area also provides for habitat linkages with the existing Wambo conservation areas.

These habitat linkages would not only increase the resilience of the existing offsets, but would provide improved habitat linkages and protect a larger area of contiguous woodland in the future.

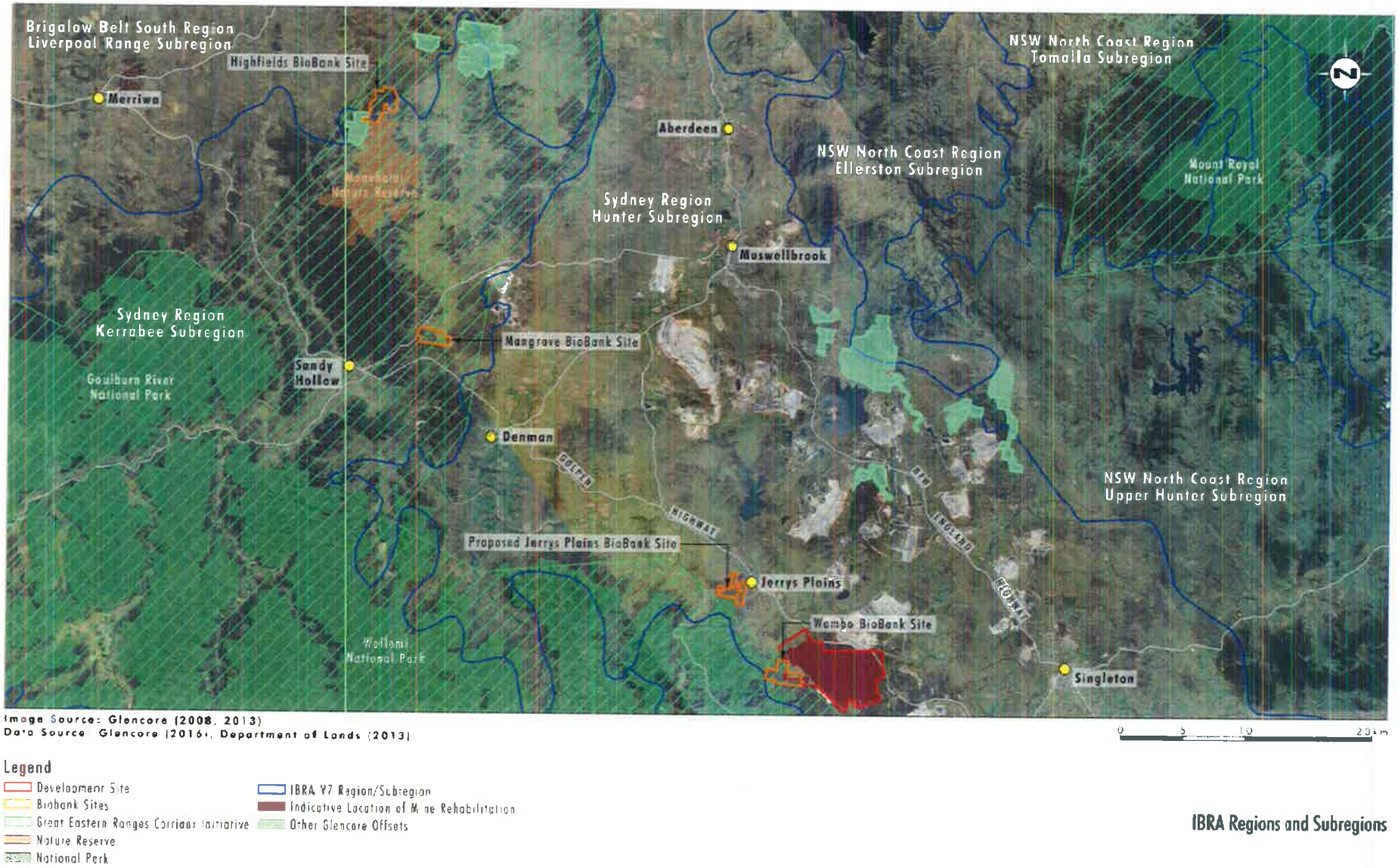


Figure 15: *Location of proposed biodiversity offset areas for the Project*

Peabody has lodged a separate application for the Wambo Underground Mine (the South Bates Extension modification, DA 305-7-2003 MOD 17), to extend its underground longwall mining operations beneath a portion of the Wambo offset area. The Department's assessment of this proposal concluded that, subject to conditions, the modification could be carried out with limited and acceptable environmental impacts. Accordingly, the Department considered the modification to be approvable and has recently referred the matter to the Commission for determination.

In reaching this conclusion, the Department acknowledged that the additional South Bates longwall panels underlie a portion of the Wambo offset area and that the overlying land may be indirectly impacted through surface cracking of soils. However, observations of subsidence effects of longwall extraction at similar depths in adjacent underground mining areas has not led to any observable changes in vegetation condition or health as a result of surface soil cracking.

To address any uncertainty over the potential for subsidence impacts to affect the composition of woodland communities in the Wambo offset area or inhibit the ability of this area to generate ecosystem credits, the Applicant has made a commitment to recalculate the credits generated by the Wambo offset area following underground mining and, if any impacts are identified, work together with Peabody to provide additional suitable offsets to compensate for them. The Department is satisfied that this commitment provides an enforceable method to ensure that the biodiversity impacts of the Project are fully offset.

Rehabilitation

Consistent with the approach taken for Hunter Valley projects, the Department has considered the ecosystem credits proposed to be achieved through woodland rehabilitation discretely, as against land-based offsets. This attention is required due to the time needed to achieve biodiversity outcomes on rehabilitated land and the inherent risks of establishing a high quality, diverse ecosystem on rehabilitated land.

In similarly recognising these risks and timeframes, the FBA applies a significant discount to ecosystem credits generated by rehabilitation. In accordance with the FBA provisions, the Applicant proposed that 878 ha of the total 2,448 ha of rehabilitated native woodland communities to be established in the post-mining landform are restored to a suitable quality to generate ecological benefits and provide ecosystem credits. These areas of 'credit-generating' rehabilitated woodland include 258 ha of *Bull Oak Grassy Woodland of the Central Hunter Valley* that would contribute 23% of the ecosystem credits for this community, and 620 ha of woodland conforming to CHVEFW CEEC and contributing 25% of the ecosystem credits for impacts on *Narrow-leaved Ironbark-Grey Box Grassy Woodland of the Central and Upper Hunter*.

The Applicant has identified that a large proportion of woodland to be cleared has recovered from seedbanks over the past 30-55 years, meaning that the establishment of alternative habitat resources and structures to replace this 'young' regeneration could be achieved relatively quickly and effectively. The RTS describes several additional measures to mitigate the extent of impacts on threatened flora and fauna, including establishment of anthropogenic habitat features, early and progressive rehabilitation of exposed lands and retiring biodiversity offsets at key stages as mining progresses. The Department accepts that well-implemented rehabilitation can play an important role in promoting the recovery of local and regional biodiversity over the medium to long-term and forms an important component of many contemporary biodiversity offset packages for State significant developments.

The Department also accepts that younger regenerated woodlands would contain fewer habitat features than equivalent remnant woodlands. Establishing suitable complex habitat and foraging resources on rehabilitated land requires substantial time to allow for the development of tree hollows and flowering of rehabilitated Eucalyptus species. Therefore, while the adjacent national park and biodiversity offset areas provide alternative habitat and foraging resources over the near term, timely rehabilitation and the installation of supplementary habitat features should be pursued as far as possible to minimise the effects of delays in restoring removed habitat features.

When rehabilitation and offsets are considered together, the existing and proposed Wambo and United operations would provide for the establishment and conservation of over 4,917 ha of native woodland over the medium to long-term. As most of these areas are close to existing national parks and existing offsets, the Department considers that they offer substantial benefits.

Adequacy of Biodiversity Offsets

In response to requests for further information from both OEH and the Department, the Applicant provided updated mapping of its proposed vegetation impacts and a revised calculation of the biodiversity credits required under the FBA to compensate for the impacts of the Project.

This revised calculation identified that the Applicant would need to retire 26,625 ecosystem credits to account for clearing native vegetation and associated fauna habitat and foraging resources. The Project would also need to retire 562 species credits to account for the proposed clearance of 7.3 ha of potential breeding habitat for the Southern Myotis.

Together the Wambo, Highfields and Mangrove offset areas have the potential to provide 14,821 ecosystem credits associated with native vegetation communities. The Mangrove biodiversity offset area also contains suitable breeding habitat (ie hollow-bearing trees) for the Southern Myotis, which would generate 21 species credits. This biodiversity offset also contains 1,114 known individuals of the Pine Donkey Orchid, which equates to the generation of 7,909 species credits. Given that the Project would not impact any Pine Donkey Orchids, the Applicant has identified that these credits would not be used for the Project, but would instead be retained by Glencore as surplus species credits for use in offsetting the impacts of other future projects.

The Applicant is seeking to retire its offset credits in three stages, each linked with the progress of mining operations and progressive disturbance of native vegetation. The first phase of disturbance would require retirement of 82% of the total credits for the Project, comprising 21,752 ecosystem credits and 208 species credits. Stage 2 would involve retirement of a further 13% of total credits, comprising 3,411 ecosystem credits and 354 species credits. Stage 3 would involve retirement of 1,462 ecosystem credits, which would account for the final 5% of credits required under the Project.

Having completed its biobanking assessment reports for the Wambo, Highfields and Mangrove offset sites, the Applicant has identified vegetation communities and habitat features that would generate 9,264 ecosystem credits and 21 species credits for use in offsetting its Stage 1 impacts. In addition, the Applicant's preliminary flora surveys indicate that the newly proposed Jerrys Plains offset site would generate approximately 3,442 ecosystem credits for use in offsetting the Stage 1 impacts.

Subject to OEH's verification of the final Jerrys Plains biobanking assessment report, the four identified offset sites would be expected to account for 58% of the ecosystem credits and 10% of the species credits required for Stage 1. These sites provide upfront land-based offsets that can be used to account for the impacts of the Project, however the Applicant has recognised that it still needs to locate a number of residual credits to account for the impacts of the development and has identified that it is pursuing options to secure additional biodiversity offset sites to address this shortfall.

The Department is confident that sufficient areas of native vegetation and fauna habitat exist in the greater Hunter Valley region to enable the Applicant to identify and retire these residual offset credits. However, as it stands, the four currently identified offset sites would only provide upfront security for around 47% of the total ecosystem and species credits required across all three stages of the proposed retirement. The Department therefore considers that conditions should be drafted to ensure that the staged clearing of native vegetation does not occur prior to the Applicant obtaining and demonstrating ownership of sufficient credits to account for each stage of mining operations.

Following the successful rehabilitation of woodland communities, the Applicant would be able to retire a further 4,230 ecosystem credits. When considered alongside upfront offset areas, these additional credits mean that the Applicant has identified the source of 62% of the ecosystem and species credits required under the Project. However, the Department notes that the successful establishment of woodland rehabilitation requires substantial lead times and that different areas of rehabilitation will reach completion criteria at different times, based on their maturity and the progression of mining. The Department considers that conditions could be developed to specify the minimum credits to be provided through rehabilitation and include measures to monitor and verify the quality of final rehabilitated woodland, such that any shortfall in the number of credits generated can be addressed through the retirement of additional offsets prior to relinquishing of the consent.

Having considered the proposed biodiversity offset package, OEH has advised that, if effectively implemented, the direct offset areas, proposed rehabilitation, conservation funding and retirement of residual ecosystem and species credits would be sufficient to compensate for the proposed biodiversity impacts under relevant NSW policies. To address the risk that rehabilitated areas fail to achieve the completion criteria required to demonstrate resilient, self-sustaining and functional

vegetation communities, OEH also recommended that any performance indicators and completion criteria be developed in line with the *NSW Biodiversity Baseline Assessment Methodology.*

The Department supports OEH's position on establishing robust completion criteria and considers that periodic milestones and triggers for further active management or the provision of alternative offsets could be developed through the Rehabilitation Strategy and Rehabilitation Management Plan. These measures would provide certainty that the proposed rehabilitation would improve the extent of woodland on the Hunter Valley floor and contribute to beneficial long-term biodiversity outcomes.

Notwithstanding the consideration of NSW matters, OEH advised that further consideration is required to determine whether the proposed biodiversity offsets package would be sufficient to meet the Commonwealth requirements for impacts on the CHVEFW CEEC and Regent Honeyeaters. The Department will continue to consider the Applicant's response to these Commonwealth matters before making a final recommendation on the adequacy of Commonwealth offsets in its final assessment report. Importantly, both the Department and OEH are satisfied that any additional upfront offsets that may be warranted could be required under relevant conditions of consent.

6.4.5 Conclusion

The Project would result in clearing around 531 ha of established native woodland and forest communities, 210 ha of which conforms to the definition of a State-listed EEC or VEC.

The Applicant has demonstrated that it has considered and sought to mitigate the Project's biodiversity impacts by designing the mine plan to avoid two stands of endangered Weeping Myall and committing to the in-perpetuity protection of at least 2,153 ha of additional biodiversity offset and rehabilitation areas. In line with its staged mine plans, the Applicant has proposed to secure and retire 81% of the ecosystem and species credits required within one year of commencing the clearance of native vegetation, with the remaining 19% of credits to be retired over two subsequent stages.

The Department recognises that the proposed offset package still requires a number of residual credits to be obtained and is partially reliant on the successful rehabilitation of post-mining areas to native woodland communities. Consequently, the Department considers that detailed conditions would need to be developed to ensure the ongoing monitoring, adaptive management and successful establishment of rehabilitated communities and the in-perpetuity protection of biodiversity offsets.

Overall, the Department is satisfied that the Project has been designed to avoid, mitigate and manage biodiversity impacts where practicable, that the required ecosystem and species credits could be obtained and that the retirement of these credits would sufficiently compensate for residual biodiversity impacts. The Department is confident that subject to conditions, the Project could be undertaken in a manner that would result in acceptable short-term impacts on biodiversity and result in a net improvement in the biodiversity values of the locality in the medium to long-term.

6.5 Final Landform and Rehabilitation

As an integral part of its proposal to expand and integrate open cut mining operations across the Wambo and United sites, the Applicant is seeking a number of material changes to the approved post-mining landforms at the Wambo mine (see **Figure 8**, above).

In addition to a new open cut pit at the United mine, the Applicant is seeking to marginally extend the Wambo open cut pit to the north, integrate its overburden emplacement areas (OEAs) to establish tiered landscapes behind the two progressing mine fronts, backfill the two approved Wambo final voids, retain two larger final voids near the centre of the Project site, amend the distribution of woodland rehabilitation and make consequential changes to the contouring and relief of the final landform.

6.5.1 Optimised Mine Sequencing

The proposed mining plan would allow for a seamless transition in operational responsibility from the existing Wambo open cut mine to the Project. Following commencement of operations under the Project, the Applicant would continue mining in a manner broadly consistent with the mine sequence detailed in the Wambo mine's 2015-2020 Mining Operations Plan. The key difference between these plans is that the Applicant would reduce extraction rates in this area and increase the exposed area being actively mined and increase the depth of mining by 75 m. Ongoing production rates in the Wambo and United Pits pit would be continuously adjusted to optimise and balance throughput at the CHPP.

In addition to rehandling some areas of previously emplaced overburden, the proposed increase in depth and reduced extraction rate at the Wambo pit would slow the progression of the mine front. These changes in mine sequencing result in commensurate changes to the scheduling of rehabilitation under the Wambo approval, mainly in the centre of the site where OEAs would not reach their full height until later in the mine life. The proposed progress of the Wambo pit towards the southeast does however offer some opportunities to preferentially establish and rehabilitate the outer faces of OEAs facing Moses Crossing and Jerrys Plains.

While mining operations are already approved to occur in the elevated Montrose and Montrose East areas of the Wambo Pit, the extended mine life would mean that limited activities would be visible offsite for a longer period of time. With the additional development of the United open cut, the Department considers that the effects of two active mining areas would result in some increased visual and amenity impacts at nearby private receivers and along the Golden Highway (see **Sections 6.1, 6.2** and **6.11**). However, the preferential emplacement and rehabilitation of landforms towards the northwest of the Wambo pit represents an opportunity to minimise the visibility of the operation. In proportion with their increasing height, these shaped and rehabilitated landforms would increasingly shield the visibility of the majority of mining activities from offsite locations and provide a degree of acoustic and air quality attenuation for properties located to the northwest.

Given the history of disturbance and mining activities at United, the design and establishment of a new open cut pit can be effectively thought of as a brownfield extension to the Wambo open cut. The proposed United open cut would commence with establishment of a new box cut to the east of the United site (see **Figure 16**), initially progressing north toward the Golden Highway, before wrapping around the existing Hunter Pit Tailings Dam and OEAs to progress in a northwesterly direction. The operational management of this new open cut area would need to be careful controlled to manage interactions with the former United MIA and Arrowfield underground workings.

6.5.2 Final Landform Designs

The Project provides several opportunities for improved final landform outcomes and integration with surrounding natural landform features. This is partially achieved by emplacing overburden against the steeper slopes of the existing Wambo OEAs, to create a final landform with gentler slopes. A convex landform on top of the central OEA would fan out and create gentler concave slopes that tier down toward the natural valley floor. At a macro scale, this additional overburden emplacement provides both stability and visual amenity improvements over the currently-approved final landform, as well as returning much of the United open cut to a reasonable approximation of pre-mining topography and land use capability.

The Department recognises these beneficial aspects of the proposal and supports the Applicant's stated commitment to establish a naturalistic post-mining landform that contains reinstated watercourses and post-mining surface water catchments, grassland communities adjacent to existing grazing lands and extensive areas of native woodland rehabilitation. As discussed in **Section 6.4**, these rehabilitated woodland areas would provide for habitat linkages with adjacent biodiversity offsets and the Wollemi National Park and additional foraging resources for threatened fauna over the medium to long-term.

Despite these positive design features, the initial description of final landform features in the EIS left several opportunities for improvements and/or clarifications around rehabilitation, biodiversity and beneficial future land use outcomes. These matters were reflected in several submissions on the Project, which raised concerns over the proposed final land use capabilities, landform design characteristics and retention of two large final voids. The Department reinforced these matters in its request for a RTS, by requesting further justification of the proposed landform design and noting that it considered that opportunities remained for improvements to post-mining outcomes.

The RTS responded to this request by firmly arguing that the complete removal of the proposed voids from the final landform would be impractical at an increased cost of around $450 million. Creation of a single consolidated void would also be unfeasible and of no substantive environmental benefit. The Applicant did however identify several treatments that could be implemented to improve the shape and integration of the proposed final voids in the surrounding landscape, including partial backfilling of the Wambo void, battering and curving highwall slopes to reduce the geometric (ie angular) appearance of the United void and increasing the bench widths of the final highwall to improve the geotechnical stability and visual aesthetics of the final landform.

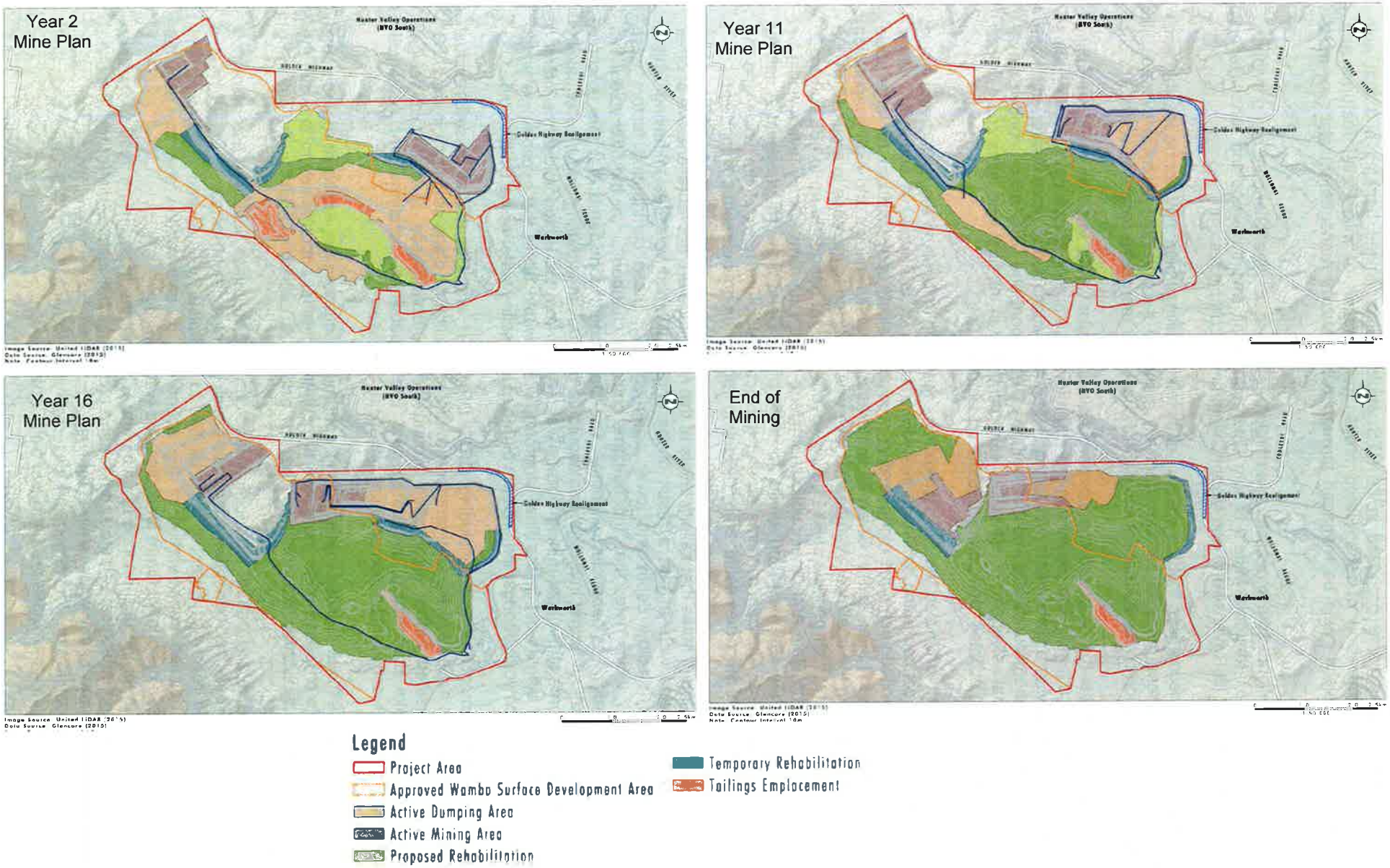


***Figure 16**: Staged mining plans for the Project*

Given the limited visibility of final voids from public viewpoints and residences, the Applicant argued that any works beyond those proposed in its RTS would deliver limited benefits and that any refinement to the composition of rehabilitated areas, incorporation of micro-relief features and finalisation of void designs could be managed through post-approval management plans or mine closure strategy.

The Applicant also highlighted the successful use of micro-relief features that Glencore has previously implemented under the Mangoola Mine's Mining Operations Plan and the woodland rehabilitation activities undertaken at its Ravensworth and Mount Owen mining complexes.

While the Department recognises that the costs of completely refilling voids may not be feasible and that a range of operational aspects can be effectively managed through post-approval avenues, it sought further information concerning options to partially backfill or merge the proposed voids.

The RTS also stated that the proposed final void groundwater sinks would serve an environmentally beneficial function by capturing and preventing the migration of salts to surrounding alluvial aquifers and downstream receiving environments. While the Department accepts that groundwater sinks can serve to mitigate adverse groundwater impacts, both the Department and DRG raised concerns over the Applicant's claim that saline and hyper-saline water contained in the final void lakes could deliver "high ecological value outcomes" and potential future aquaculture use.

In particular, the Department noted the EIS's predictions that salinity levels in the United void would steadily increase to a concentration similar to seawater (around 35,000 mg/L) in about 500 years. This would place the United void at the higher end of predicted salinity concentrations for large scale mining operations in the Hunter Valley. Given its limited surface water inflows and high evaporation rates, the salinity level in the shallower Wambo void lake was predicted to increase to around 300,000 mg/L in about 500 years, with periodic spikes during severe drought periods of up to 465,000 mg/L. As identified by Lock the Gate and other public submitters, these long term salinity levels would be over 10 times saltier than sea water and similar to those of the Dead Sea. These elevated salinity levels conflicted with the Applicant's claims around the potential future uses of the voids and the beneficial environmental outcomes achieved by mitigating impacts on downstream environments.

Importantly, the Department notes that salinity levels of this magnitude are not representative of other Hunter Valley mines and were in part a result of the original Wambo void design having limited surface water inflows, shallow depth and lower water volume. These contributing factors were recognised in the RTS, which noted that "this outcome could be changed ... for the final void if this was determined to provide a beneficial outcome." The Department considered that this outcome should be pursued and that further investigations should be undertaken into achieving a lower salinity level, by redirecting some of the post-mining surface water runoff from the United void to the Wambo void or by creating a single void in the final landform, which would dilute the hyper-saline water captured by the Wambo void amongst the greater volume of less saline water of the United void.

Several other government agencies, including DRG, DPI, OEH and Council, all raised residual concerns over specific aspects of the final landform and/or rehabilitation plans contained in the RTS. These agencies requested further clarification around the appropriateness of final void design, licensing of water take post-mining, reinstated land use capabilities, certainty over ecological rehabilitation outcomes and identification of future beneficial land uses.

To adequately address these residual matters, the Department requested the Applicant to undertake a detailed review of its proposed mine plans and investigate potential opportunities to improve the final landform and rehabilitation outcomes for the site and, at a minimum, address the following objectives:

- create a safe, stable and natural looking final landform that optimises final land use outcomes and promotes the balanced reinstatement of free-draining natural catchments;
- provide a detailed review of potential opportunities to minimise the size and number of final voids, including detailed consideration of the economics of each option and the potential implications of these options for future land uses and water quality;
- provide justification for the unsupported claims in the RTS that the hyper-saline final void waters would support "high ecological value outcomes" and provide further justification for the identified post-mining land uses of any voids retained on site;
- provide further justification for reinstating disturbed land having Class 3-5 Land and Soil Capabilities to much lower Class 6-8 Land and Soil Capabilities;

- provide further justification for the mass balance movement of overburden and management of topsoil resources, with the aim of optimising final land use opportunities and justifying any area that would not be returned to a land use capability comparable with the pre-mining environment;
- provide more detailed final landform maps to demonstrate how the Project would incorporate micro-relief and consider hydrologically and geomorphologically designed landform features;
- provide a map showing the location of woodland community types to be reinstated across the site, including consideration of how these communities align with the reinstated topography; and
- consider any opportunities and constraints to the feasibility of potential future land uses.

6.5.3 Revised Landform Outcomes

In response to this request, the Applicant provided a further review of several methods to optimise the final landform and made a number of material amendments to the mine plans to deliver improved final landform outcomes for the Project. As part of this response, the Applicant reiterated the cost-to-benefit focus of its approach to landform design, emphasised that the approved Wambo open cut final landform allows for the retention of two final voids and asserted that, without the joint venture, a standalone project at United would result in the creation of three final voids across the two sites.

This analysis reviewed the final void options considered in the EIS and defended the Applicant's decision to not completely backfill all voids (at an estimated cost of $450 million) backfill one void (at an estimated cost of $120 million), retain three voids across the Wambo and United sites or retain two voids with the United void located near Wollombi Brook. However, the review led to several amendments to the proposed mine plan that provided greater clarity around the vegetation communities to be established in rehabilitation areas, detailed microrelief commitments, revised final void salinity modelling and engineering treatments to reduce predicted final void salinity levels (see **Appendix C**).

To address the material concerns raised by agencies and the community in relation to the predicted void salinity levels, the Applicant reviewed its original EIS modelling and identified several erroneous assumptions and unrealistically conservative parameters (such as saline rainwater runoff) that reduced the accuracy of the EIS's modelling and artificially inflated the expected long-term salinity levels in the final void lakes. Consequently, the Applicant remodeled its predicted salinity levels using more refined model inputs and consideration of the amended final landform and void designs. Given the significance of this review, the Applicant also engaged a peer reviewer to validate the reasonableness of its remodeled water and salt balance calculations.

In summary, these changes in modelling inputs and improved final landform features resulted in material changes to the predicted salinity levels after 500 years, reducing the United Void by 63% (from 35,000 mg/L to 13,000 mg/L) and the Wambo void by 94% (from 300,000 mg/L to 17,000 mg/L). The revised modelling was more aligned with the salinity levels typical of final voids associated with other large-scale Hunter Valley coal mines.

The Applicant's review also considered a range of mine design options to further reduce void salinity levels, particularly in the Wambo void. These options included:

- increasing the catchment area for one or both voids to direct additional surface water runoff into the void to increase the volume and dilute the salinity of the final void lake;
- constructing a pipeline or channel (eg a trench backfilled with coarse material) to connect the Wambo and United void and allow water levels and salt concentrations to equilibrate;
- increasing final void catchment areas and establishing a connection between the two voids;
- increasing final void catchment areas and engineering the landform to 'fill and spill' or 'flush' the voids by redirecting high water flows in North Wambo Creek into the Wambo void, which spills into the United void, then spills into Redbank Creek and flows to Wollombi Brook; and
- increasing final void catchment area for the United void only and engineering the landform to include a flood channel to redirect flood flows from Wollombi Brook into the United void, to 'fill and spill' back into another part of the Wollombi Brook catchment.

Having considered the potential environmental effects, construction costs and engineering limitations of each approach, the Applicant asserted that its proposed final landform shown in **Figure 17** provides the most effective and efficient method of managing void salinity levels.

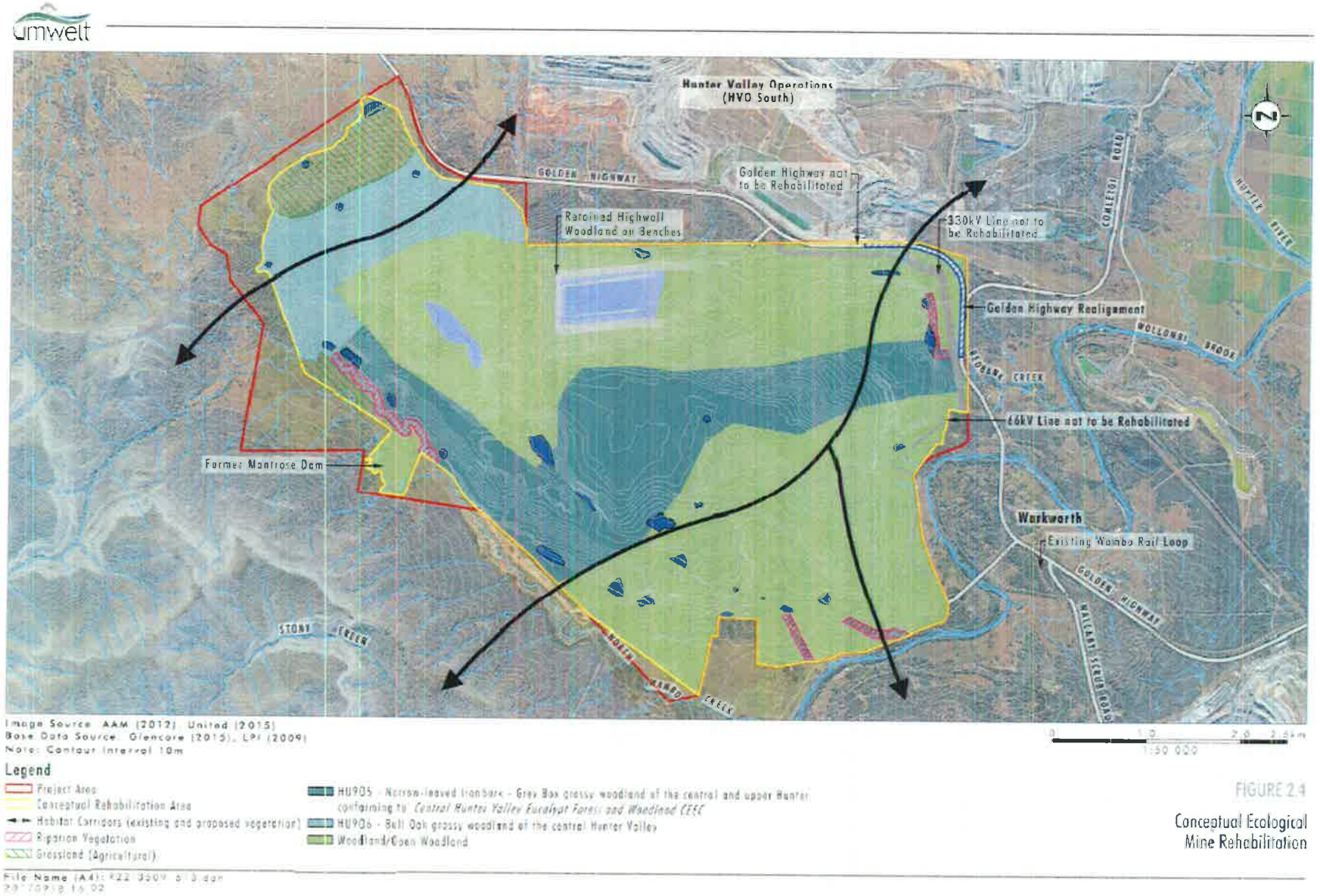


Figure 17: *Proposed final landform*

6.5.4 Consideration of Landform Outcomes

The Department acknowledges that DA 305-7-2003 does permit two final voids in the Bates South and Montrose pits, albeit that these voids are smaller than those proposed under the Project. The Department also agrees with the Applicant that opportunities to consolidate final voids and locate these voids away from sensitive environmental features and watercourses should be pursued where practicable.

Having considered the mass balance of mining in the Wambo and United open cuts, the Department notes that the Project would move a significant volume of overburden, tailings and rejects material over the proposed mine life, including rehandling of some former OEAs and emplacement of large volumes of material in the former Wambo mining areas. Given the approved Wambo mine already needs to rehandle significant volumes of overburden over the remaining years of its operations to achieve the approved final landform shown in its 2015-2020 Mining Operations Plan, the Department considers that the proposed consolidation of the approved Wambo voids in the east of the Montrose Pit would not only improve the final landform, but may represent a more efficient approach to mine closure.

With the development of the United pit, the Project would see the retention of two larger final voids in the landscape. It is noted that the progression of the Wambo and United pits would bring these mining areas within 100 m of each other in the later years of mining, with an approximate 190 m difference in elevation between the floor of the two final voids. The Department considers that the proposed mine plan allows for a variety of future land use opportunities identified by the Applicant, including but not limited to pumped hydroelectricity generation, equilibrating water quality in the final void lakes or establishing the Wambo void as a free-draining catchment flowing into the United void.

However, as the final void lakes are now expected to achieve salinity levels typical of other mines in the Hunter Valley, the Department is satisfied that the proposed final landform would deliver an acceptable environmental outcome and assist in preventing the off-site migration of salt to downstream receiving environments. Consequently, the Department does not consider that any further void treatments or mine plan changes are required at this time and that any further opportunities to optimise the use of final voids can be investigated as the mine progresses and assessed in detail as part of the mine closure process.

The revised mine plan now incorporates gentler slopes and micro-relief features and provides specificity around woodland communities to be established across the site. To improve the integration of this landform with the surrounding landscape, the final highwalls would be shaped to include sloping and curving landform features that reduce the geometric appearance of the mine. Clear design principles would be implemented to deliver a geotechnically stable and safe final landform.

The Department is satisfied with the Applicant's response to DPI's concerns over the management of land and soil resources. This response clarified that, relative to the approved Wambo operations, the major change in land capabilities associated with the Project would be 164 ha reduction in Class 5 land and an associated 123 ha increase in Class 6 land. The Department notes that pre-mining land use capabilities in this area have already been substantially modified by existing Wambo operations and considers the balance of proposed land use capabilities to be reinstated under the Project to be acceptable for an open cut mine of this scale. Further, considering the low agricultural potential of the existing Class 5 land and the intended ecological use of this land as a rehabilitated woodland area, the Department is satisfied that these matters do not require further attention.

6.5.5 Rehabilitated Woodland

The Applicant's proposed mine plan involves rehabilitation of the post-mining landform with a mixture of native woodland communities and grasslands. The Project has been designed to minimise re-disturbance of previously rehabilitated land, however some formerly rehabilitated areas of the Wambo and United sites would be disturbed. Woodland communities would dominate the post-mining landscape, with two smaller areas of pastoral grassland to be established contiguous with existing productive agricultural lands.

A key component of the Project's Biodiversity Offset Strategy relies on the successful establishment of several native woodland communities (see **Section 6.4**). The proposed rehabilitation strategy therefore provides not only important habitat features and linkages with remnant vegetation in the surrounding landscape, but also compensates for the clearance of listed threatened species. It is therefore imperative that woodland communities to be re-established under the Project are monitored and adaptively managed to meet strong completion criteria.

At a landscape level, the Project would deliver important vegetation corridors that directly link remnant vegetation and biodiversity offsets to the north and east near the HVO South and Warkworth mine sites, with the existing Wambo biodiversity offset areas and Wollemi National Park to the southwest.

The Department acknowledges the additional detail provided in relation to the composition and location of rehabilitated woodland communities, particularly riparian vegetation to be re-established along drainage lines and areas designated for the establishment of vegetation communities conforming to CHVEFW CEEC and Bull Oak Grassy Woodland. The Department is satisfied that this information clarifies the proposed final rehabilitation outcomes and that further detail concerning rehabilitation objectives, completion criteria and incorporation of preferred feed trees and habitat features for threatened fauna could be included in a Rehabilitation Strategy for the Project.

6.5.6 Conclusion

Having carefully considered the proposed mine plans and final landform design, the Department accepts that the Applicant has sought to develop a landform that complements existing landform features at the Wambo and United sites, incorporates both micro and macro-relief features, considers relevant safety and stability requirements, contributes to the rehabilitation of woodland communities, provides complementary future uses for pastoral lands adjacent to existing agricultural properties and maintains the same number of final voids as currently approved for the Wambo open cut. The Applicant has also committed to further refine and improve its final void management and final landform designs throughout the mine life, to reasonably minimise the extent of final voids and deliver a more natural appearance to the final landscape.

The Department is aware that the Applicant has successfully implemented a range of landform and rehabilitation outcomes at other mine sites in the Hunter Valley and is confident that the proposed mine plans can be achieved. The Department therefore considers that the conceptual final landform plan provides a reasonable basis to inform its preliminary assessment of the Project's likely mine closure and rehabilitation outcomes. The Department considers that any further refinements to the final landform design can be strengthened and effectively managed through the development of appropriate rehabilitation objectives and other conditions of consent.

6.6 Water Resources

The EIS includes Surface Water and Groundwater Assessments investigating the potential impacts of the Project on water resources, the environment and downstream water users. The Applicant responded to submissions from the public, EPA, OEH and CLWD that raised issues relating to water licensing, flood modelling, water quality, groundwater drawdown, loss of flows to Wollombi Brook and the Hunter River, catchment sizes and impacts on tributaries. In addition, the Applicant provided a response in its RTS to the IESC's advice on providing greater certainty about the predicted impacts, especially on groundwater modelling and systems.

6.6.1 Surface water

The Project is situated within the catchments of Wollombi Brook and Waterfall Creek, both of which are tributaries of the Hunter River (see **Figure 18**). Wollombi Brook, a major tributary of the Hunter River is located to the east of the Project and flows into the Hunter River approximately 5 km northeast of the Project area. Waterfall Creek is a minor tributary of the Hunter River and flows into the Hunter River approximately 4 km northwest of the Project area. The majority of the Project is located within the catchment area of Wollombi Brook, which includes the sub-catchments of Wambo Creek, North Wambo Creek and Redbank Creek. The tributaries within these sub-catchments are generally ephemeral in nature. The Department notes that the catchment area of Wollombi Brook is substantial (approximately 1850 km^2) and that about 99% of the catchment area lies upstream of the Project. The existing United and Wambo Water Management Systems (WMSs) are also located within the Project area (see **Figure 18**).

It is important to note that the existing catchment areas have been significantly modified, mainly due to historic mining operations, which are not limited to current operations at either United or Wambo. This includes diversions to North Wambo Creek and reductions in catchment areas and changes in flow volumes. Consequently, many of the tributaries are already considered to be highly modified watercourses.

Existing Water Management Systems

Separate surface WMSs are currently in place at United and Wambo. The WMSs include, but are not limited to, clean and dirty water diversions and storages, monitoring, and licensed take and discharges.

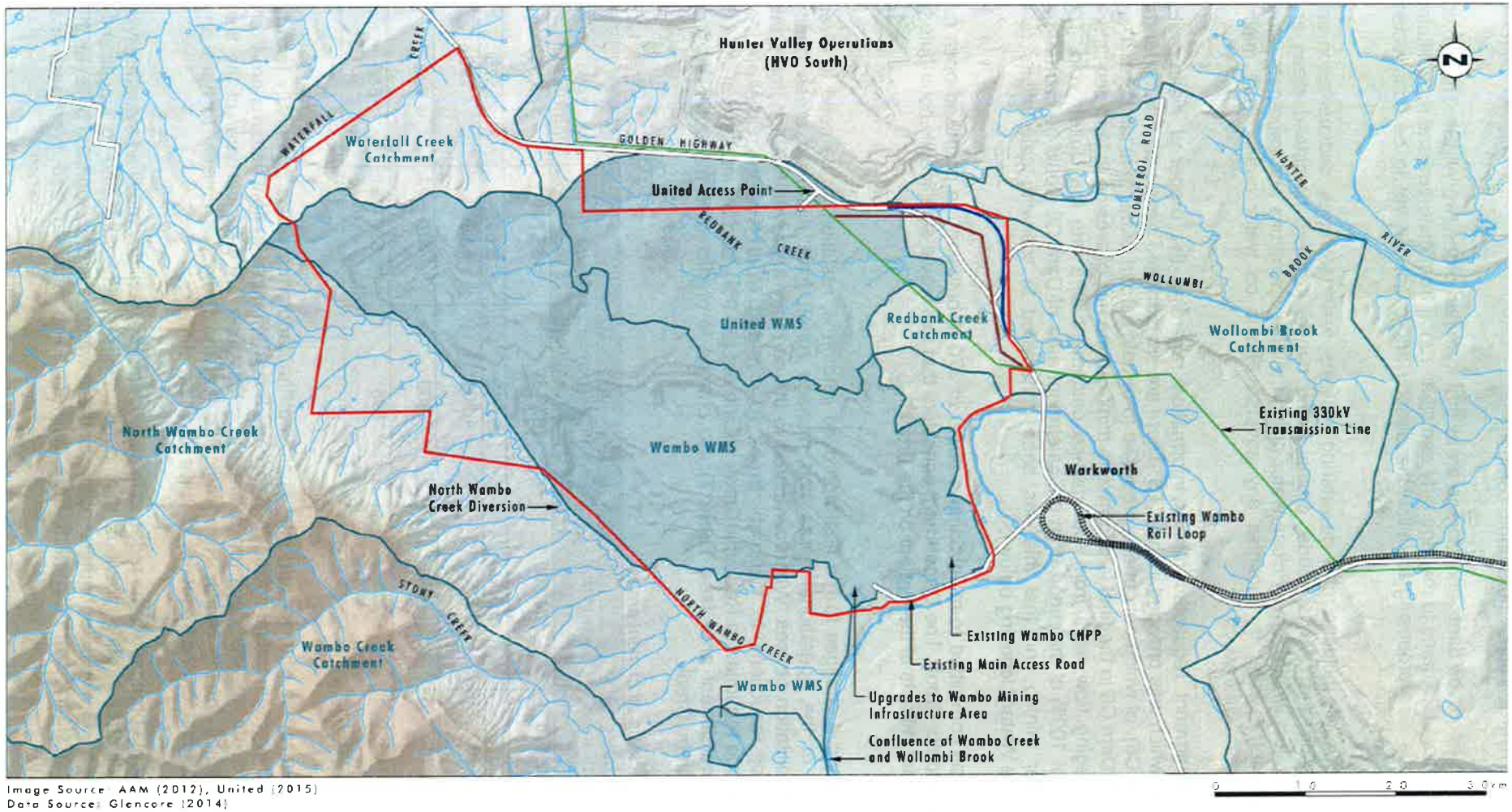


Figure 18: *Surface water catchment context and site Water Management Systems*

The monitoring programs measure a range of water quality parameters from the operational areas and both upstream and downstream of existing operations, including pH, EC, TSS and TSD, along with a suite of metals, hydrocarbons and organic compounds.

There are currently 15 approved dams and storage areas that form part of the two WMSs. The Project would require an additional 29 dams to manage dirty and clean runoff from disturbed and rehabilitated areas. The Applicant is also proposing to utilise the already approved, but yet to be constructed, Montrose Water Storage Dam.

The proposed Project WMS includes mine dewatering systems, water storages, sedimentation and retention basins, settling and tailings ponds, drains, levee banks, laydown hardstand areas and fuelling areas. The Project would convey clean water around mining operations and segregate, store and reuse mine-impacted water to minimise any adverse effects on water quality from mining operations to downstream waterways.

CLWD and the Department requested further information regarding the proposed clean water diversion measures, which was provided in the RTS. There are six proposed clean water dams for the Project (Dams C1 to C6), of which only one is proposed to remain as part of the final landform (Dam C6). The retention of Dam C6 in the final landform is to minimise the risk of erosion to land downslope by assisting in managing flow rates from the upslope catchment area into the United void. The Department notes that 100% of the runoff from the catchment area of Dam C6 would be captured in the United void after mining and that this has been considered in licensing calculations (see discussion on Surface Water Licensing below).

Importantly, United has committed to maintaining a buffer of 370 m between the proposed open cut mining area and Wollombi Brook. The Department considers that this would significantly contribute to minimising the potential impacts of the Project on the Brook.

Catchment Areas

The Project would involve changes to the final approved landforms, resulting in the need to divert runoff from upslope of the operational areas and manage runoff from disturbed areas during operational and rehabilitation phases. When compared to the currently approved final landform, this would result in minor reductions to Wollombi Brook (0.3%) and North Wambo Creek (6.9%) catchments, a moderate reduction to Redbank Creek catchment (33.9%), and an increase of 26% in the Waterfall Creek catchment area (see **Table 7**). No change is predicted to the approved final catchment area of Wambo Creek.

Table 7: *Predicted impacts on catchment areas*

Watercourse	***Catchment Areas***				
Name	***Pre-mining (ha)***	***Current* (ha)***	***Current approved final landform (ha)***	***Area in Year 16 (ha)***	***Proposed final landform (ha)***
Wollombi Brook	***187,175***	***184,860***	***187,180***	***185,740***	***186,560***
Wambo Creek	5,575	5,550	5,575	5,575	5,575
North Wambo Creek	5,260	3,830	4,605	4,090	4,290
Redbank Creek	1,285	440	1,300	440	860
Waterfall Creek	***705***	***705***	***695***	***520***	***880***

**does not include WMSs catchment areas*

Smaller final catchment areas than for currently approved final landforms would potentially lead to correspondingly lower average annual flows. For Wollombi Brook, changes to flow patterns are likely to increase the number of 'no flow' days (on average) by less than 0.4 days per year at the final landform stage. Modelling for the Hunter River indicates that the Project is unlikely to have any impact, other than negligible, on the frequency of flows for all durations.

The other sub-catchments proposed to be reduced in size already have highly modified systems, with creeks having been diverted around previous mining operations and/or subjected to significantly reduced catchment areas. Given the ephemeral nature of these waterways, the Applicant believes the proposed reductions in long-term catchment area between the approved and proposed final

landforms represent relatively small incremental impacts. Predictions show that changes in flows would be less than seasonal and annual variations.

The Department acknowledges that the Project would reduce the Wollombi Brook, North Wambo Creek and Redbank Creek catchment areas relative to currently approved final landforms, but accepts the findings of the Surface Water Assessment (SWA) that the Project is unlikely to cause unacceptable impacts to these systems over the long term.

In addition, the Project is considered unlikely to result in measurable impacts to flows or detrimental impacts on downstream surface water users (see discussion on Downstream Surface Water Users below).

Flooding

OEH reviewed the SWA's flood assessment against a more recent flood study commissioned by Singleton Council, the *Wollombi Brook Flood Study (*BMT WBM, July 2015, here after referred to as the BMT study). While pointing out differences between the two approaches, OEH noted that the outputs of the SWA study generally indicated a higher degree of flood affectation in the catchment areas than the BMT study and can therefore be considered an appropriate and conservative basis to assess the Project's potential flooding impacts.

Modelling results indicate negligible Project flooding impacts on Wollombi Brook, including:

- no impact on flood depths within Wollombi Brook or Warkworth Village (<5 mm); negligible impacts on flow velocities in Wollombi Brook (<0.01 m/s) and minor increases in flow velocities in North Wambo Creek (< 0.2 m/s);
- no changes to flood hazard categories within Wollombi Brook or on adjacent private land, including the township of Warkworth; and
- no impact on accessibility during floods or flood evacuation routes in Warkworth Village.

For the Wollombi Brook catchment area, the modelling indicated that the Project is unlikely to impact on flood hazard categories and associated accessibility along either the Golden Highway or private access roads/driveways.

The proposed increase in long-term catchment area for Waterfall Creek is expected to result in minor increases in flood flows and related flood elevations and velocities during the 10%, 5% and 1% AEP and Probable Maximum Flood (PMF) events, with likely implications for road crossings. However, increases in flow velocities are minor and unlikely to impact on erosion and/or scouring of the creek bed or banks.

The Golden Highway crossing over Waterfall Creek would remain flood free up to and including the 1% AEP flood event. However, modelling indicates that the road is impassable to vehicles and pedestrians during the PMF event and also likely subject to structural damage and potential wash out. The Project would not change the existing flood hazard category of 'structural damage likely' for this crossing. However, the Project would increase the duration of flooding over the Golden Highway during a PMF event by an additional 25 minutes. The Department considers this change to be negligible, when compared to the potential impact of a PMF event regardless of the Project. The Department also notes that the changes in peak elevations all occur on land owned by mining operations.

The Department notes that a flood levee is proposed to be constructed on Redbank Creek upstream of the Golden Highway to protect the United open cut from flood inundation during major flood events in Wollombi Brook. Furthermore, a water management dam is proposed to be constructed on the unnamed 1st order tributary of Wollombi Brook.

To further minimise potential impacts, OEH recommended several conditions which mainly relate to updating flood modelling (to consider more recent data from the BMT study) and design parameters at the time of construction of the Golden Highway diversion and flood levee. The Department is satisfied that these recommended conditions are appropriate and could be incorporated into any consent.

The Applicant has also proposed to implement mitigation measures, including scour protection and erosion and sediment controls. With these measures in place, the Department is satisfied that the

proposed changes to catchment areas and construction of the proposed Highway diversion and flood levee would not impact on flood levels on privately-owned properties.

Water Balance

The WMS for the Project would manage the proposed open cut operations and be integrated with the WMS for the continued Wambo operations. As such, the Department notes that the water balance for the Project has been modelled as an integrated system including both the Project and the Wambo underground, CHPP and rail facility. However, the use and management of water within the Wambo underground, CHPP and rail facility do not form a part of this development application and would continue to be managed pursuant to existing development consents. The average predicted water balance for the Project is outlined in **Table 8**.

Table 8: *Average predicted water balance*

Component	***Project (ML/year)***
Inflows	
Site Rainfall Runoff	2,391
Tailings Decant Water	2,788
Groundwater Inflows (open cuts)	175
Groundwater Inflows (underground)	575
Hunter River Extraction	64
Wollombi Brook Extraction	323
Total Inflows	***6,316***
Outflows	
Evaporation	360
Storage Spill	5
CHPP Supply	4,286
Haul Road Dust Suppression Supply	1,210
Total Outflows	***5,861***
HRSTS Discharge	550
Total average predicted balance	***-96***

Overall, average inflows are predicted to total 6,316 megalitres/year (ML/year), while average outflows total 5,861 ML/year combined with an average Hunter River Salinity Trading Scheme (HRSTS) discharge of 550 ML/year, indicating a net average water deficit of approximately 96 ML/year.

The modelled water balance predicts that the volume of water stored on site would range between 4,500 ML and 3,500 ML during the first two years of the Project and then decrease to approximately 2,000 ML over the remaining life of the Project. The Department notes that this would remain within the available storage capacity.

Water deficits during the Project can be met through licensed extraction from Wollombi Brook and the Hunter River. Modelling indicates existing Water Access Licences (WALs) are sufficient to meet the future predicted water extraction requirements. In the event of surplus water, water could be discharged under an EPL and the HRSTS (see discussion on Water Licensing below). Overall, the Department is generally satisfied that the Project would have a high level of water supply reliability.

Impacts on Surface Water Quality

The Department notes that monitoring data for the site shows highly variable results for most water quality parameters and that this is to be expected within ephemeral drainage systems. Wollombi Brook exhibits notably less variation due to its more perennial nature. Water quality parameters are more variable and consistently higher in the WMSs (ie current operational areas – see **Figure 18**) when compared to upstream and downstream water quality in Wollombi Brook. This indicates that the existing WMSs are successfully mitigating the potential impacts on surrounding watercourses and that Wollombi Brook is not exhibiting any measurable impact due to current operations.

The likely sources of potential impacts to surface water quality as a result of the Project include discharge of mine water, overflow/failure of sediment ponds (ie dirty water) and spillage of tailings. The Department considers that the risks from these potential sources of impact is low.

Mine water storages are proposed to have sufficient freeboard to contain runoff for events up to and including the 1% 24 hour AEP storm event. Any surplus water would be used in Wambo underground

operations, stored in the United underground or open cut pits or discharged according to EPL and HRSTS requirements. The overflow/failure of sediment ponds is mitigated by the number of sediment dams required for the Project and their management in accordance with the 'Blue Book', which requires design of dams to manage runoff from the 5 day, 95th percentile rainfall event. In addition, several sediment dams have, or are proposed to have, secondary containment measures. Tailings are and would be disposed of on-site within in-pit tailings storages. Risk would only occur during extreme events and overtopping. Existing management measures which are proposed to continue include limiting the water volume within the pits, meaning overtopping is unlikely to occur.

The Department notes that, in addition to any EPL requirements, all mines discharging into the Hunter River system also need to operate in accordance with the HRSTS. The HRSTS is a cap-and-trade system administered under the POEO Act and designed to facilitate saline discharges into the Hunter River, without compromising sustainable water quality. Under the HRSTS, salinity targets and river flow categories are defined by river sector. 'Lower sector' limits are applicable to the Project.

For these reasons, the Department considers that the existing and proposed WMSs would effectively manage risks to surface water quality. Nevertheless, the Department recommends that conditions are established to ensure that the Applicant continues to design all dams to appropriate standards (ie in accordance with the 'Blue Book') so as to avoid any unnecessary discharges of sediment-laden water to the environment. The Department is satisfied that, with the incorporation of appropriate monitoring and response measures in a Water Management Plan, the Project has a low risk of causing off-site water quality impacts.

None of the proposed final voids are predicted to result in the flow of poor quality groundwater to nearby alluvial aquifers or downstream surface water environments. No inter-aquifer flows are predicted and ongoing monitoring would continue to be undertaken to manage any potential risks to surface water quality.

Geomorphological, Hydrological, Riparian and Ecological Values

The SWA indicates potential changes to the geomorphological, hydrological, riparian and ecological values of the creek systems near the Project. The Department and CLWD generally consider the geomorphological and hydrological changes to be negligible to minor. It is both agencies' opinion that these values can be conditioned via the requirement for Water, Biodiversity and Rehabilitation Management Plans which outline monitoring and management measures, and provide triggers for requiring rehabilitation.

Downstream Surface Water Users

The Project is located within a well-regulated system (see discussion on Surface Water Licensing below) that has been designed for the sustainable management of the State's water resources. Mining companies own much of the land immediately downstream of the Project and adjacent to Wollombi Brook. Similarly, the land adjacent to Wambo, North Wambo and Redbank Creeks is mostly owned by mining companies. However, there are several parcels of Crown land as well as land held by Council, Wanaruah Local Aboriginal Land Council and private landholders around Warkworth Village.

There are no known licensed water users on waterways directly downstream of the Project area (ie along Wollombi Brook or Waterfall Creek). Regardless of this, the Project would have minimal impact on annual flows in Wollombi Brook compared to the currently approved final landform. In the case of Waterfall Creek, an overall increase in catchment size is proposed. Therefore there would be no decrease in water availability to downstream users.

The Project would have no impact on Wambo Creek. The proposed 7% reduction in the North Wambo Creek catchment is considered to have negligible impact on future basic landholder rights. The catchment area reduction of ~34% for Redbank Creek is unlikely to affect downstream water users as all land adjacent to the creek is owned by mining companies.

The Department notes that there are licensed water users downstream of the Project on the Hunter River. Due to the regulated nature of this river and the predicted negligible flow impacts, the Department is satisfied that downstream water users on the Hunter River would not be adversely affected.

Surface Water Licensing

The Water Sharing Plan (WSP) for the *Hunter Unregulated and Alluvial Water Sources 2009* applies to all watercourses and alluvial groundwaters near the Project. The Wollombi Brook catchment is located within the Lower Wollombi Water Source and the Waterfall Creek catchment is located within the Jerrys Water Source if this WSP. The Hunter River, including the Hunter River alluvials, is managed under the *Water Sharing Plan for the Hunter Regulated River Water Source 2004* (Hunter Regulated WSP).

The Applicant proposes to source water for its operations from on-site rainfall runoff, groundwater inflows to mining areas, transfers between the site's dams and supplementary supplies from Wollombi Brook and the Hunter River. Redbank Creek flows through the centre of the United site and into a clean water dam, with United holding a licence to use water from this dam for mining operations. In its comments on the EIS, CLWD requested further information pertaining to licensing, which was provided in the RTS. No additional surface water licences are required for the Project.

United currently holds WALs to extract up to 300 ML/year of water from the Hunter River and up to 100 ML/year of water from Wollombi Brook. It also holds a WAL for extraction of up to 200 ML/year from Dam 1, located on Redbank Creek.

Wambo currently holds WALs to extract up to 1000 ML/year of High Security water from the Hunter River. It also holds two licences for extraction from Wollombi Brook: 350 ML/year under any flow regime and up to 400 ML/year when flow is greater than 38 ML/day (ie a total of up to 750 ML/year).

United holds two credits to discharge water under the HRSTS. However, the Department notes that there is currently no licensed discharge point at United's operations, or in its EPL. Wambo holds 61 credits to discharge water from its site under the HRSTS. The Department and CLWD sought confirmation that the Project would use the existing Wambo HRSTS discharge infrastructure and controls, which was confirmed. The EPA does not predict any issues for this proposal and is satisfied that the EPL can be amended to incorporate any future conditions and requirements.

The Department recommends a standard condition reflecting the need for the Applicant to hold sufficient water licences to account for the Project's water take.

Cumulative Impacts

Many community submissions (by way of a form letter) raised concern over the '*wholesale destruction of surface water catchments for the Hunter River and Wollombi Brook tributaries*'. This letter expresses community concern that the Project may cause and/or worsen mining impacts on the Hunter River, local watercourses and aquifers. Within the submissions, there was a consensus that open cut coal mines in the Hunter Valley are a threat to water resources.

As noted previously, the watercourses within the vicinity of the proposed modification are highly modified and have been previously impacted. However, this is not only due to mining operations. Agriculture and other industries have also contributed to the current state of these watercourses.

The Department is bound by legislation to assess each project before it on its merits. The Project is not predicted to result in significant impacts on downstream water quality, flows, flooding or water users. The Department is satisfied that the Project's WMS has been designed in accordance with relevant Government standards to limit potential impacts (including cumulative impacts) on downstream water quality by containing mine water; managing runoff from disturbed areas and undertaking discharges in accordance with licence provisions.

Performance Measures, Monitoring and Management

The Department recommends that the Applicant update and revise the existing WMSs under a new consolidated Water Management Plan for the Project.

These updated plans would need to include continued monitoring of pH, EC, TDS and TSS in sediment dams and downstream creeks. To minimise potential risks to surface water quality, the Department recommends a performance measure requiring all sediment dams to be designed in accordance with the 'Blue Book'.

CLWD requested that, if the Project is approved, the Applicant be required to consult with it regarding the content of the Water Management Plan, which should include an expansion to the existing water monitoring network, TARPs and rehabilitation measures for watercourses. The Department notes that these requests are CLWD's general requirements for all open cut coal mines in the Hunter Valley, and as such, would be included in any future consent for the Project. Furthermore, the Applicant has already committed to prepare and implement a TARP which would identify when rehabilitation measures are required.

Conclusion

The Project would result in some incremental changes to existing catchment areas; however, the associated changes in flow volumes would remain within existing seasonal variations and are expected to have negligible environmental effects. While the increased catchment area and flow volumes in Waterfall Creek would see a small increase in downstream flood event durations, these increased flows are not excessive and would not impact on privately-owned properties.

The Project is predicted to experience an overall average water deficit. Supplementary water would be sourced as necessary from mine storages or else extracted from Wollombi Brook and/or the Hunter River under existing WALs. Both CLWD and the Department are satisfied that water supplies would be manageable over the life of the mine.

Overall, the Department believes that the Applicant has proposed a range of suitable mitigation, management and monitoring measures. With these measures in place, the Department considers that the risk of impacts to surface water resources and quality is low and that the Project could be suitably managed through recommended performance measures and conditions of consent.

6.6.2 Groundwater

The EIS's Groundwater Impact Assessment (GIA) was undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE), and peer reviewed by Dr Noel Merrick. CLWD raised some concern over potential conflicts of interest for Dr Merrick. At the Department's request, the Applicant commissioned a second independent peer review, by Dr Frans Kalf of Kalf and Associates Pty Ltd. No significant issues were raised as a result of either peer review.

The groundwater environment surrounding the Project is characterised by two main aquifer systems, comprising the Quaternary alluvium (including 'highly productive' and 'less productive' alluvium), and a less productive, deeper and more saline Permian porous rock aquifer system. Most Permian groundwater is present within the coal seams, reflecting secondary porosity through cleats and fractures.

Water quality in the 'highly productive' shallow alluvial aquifers is generally classified as being fresh. Areas of 'less productive' alluvium are generally considered to be brackish due to the ephemeral nature of creeks and reduced recharge. Conversely, the fractured and porous rock water source (and associated interburden units) associated with the deeper hard rock aquifers are generally moderately saline, with results ranging from fresh to saline.

Existing Water Management System

Together, United and Wambo have a groundwater monitoring network that comprises 77 bores and 24 vibrating wire piezometers (VWPs), of which 27 bores and 11 VWPs (55 sensors) are currently monitored under Groundwater Monitoring Programs. This network, combined with data from past and current mining operations, provides a sound understanding of the local groundwater environment.

The Applicant proposes to continue managing groundwater beneath and adjacent to the Project, including the ongoing implementation of a robust groundwater level and quality monitoring program. Additional monitoring bores would also be installed to ensure a long-term groundwater monitoring network in all key groundwater bearing units. The monitoring program would also include a program of periodically sampling stygofauna in consideration of the recommendations of the EIS's Stygofauna Assessment (see **Section 6.4.3**).

The Department notes that these commitments should be formulated via the requirement for a Water Management Plan, to be prepared in consultation with CLWD and to include trigger levels for water quality and water levels, as per CLWD's recommendation.

Drawdown in Hard Rock Aquifers

Historical and current mining at United and Wambo, as well as other nearby mining operations, have affected the Permian aquifers by intercepting and depressurising target coal seams. Over 55 years of mining in the area has already significantly altered the groundwater environment near the Project, with some coal seams now proposed for mining already being significantly depressurised.

The zone of depressurisation from the proposed extraction area is predicted to extend up to 2.5 km southwest in the Wambo Seam; 2.5 km west and up to 2 km south in the Glen Munro Seam; and 3.5 km from the edge of the proposed extraction area in the Arrowfield Seam.

The Department notes that, for all coal seams, the magnitude of depressurisation is generally less than 10 m at a distance of 1.5 km from the edge of the extraction area, and is largely restricted to the west of the Project. Furthermore, the extent of drawdown is generally within the existing area of drawdown from currently approved mining to the north, east and south (see Cumulative Impacts below).

Within the shallow weathered coal measures, one non-active privately-owned bore (GW060780) is likely to experience drawdown. The modelling predicts that this bore would experience a maximum 6.7 m decline in groundwater levels, with the Project predicted to account for 6.1 m of this. The Applicant advised that this bore is currently not serviceable and is located on a property that has recently been purchased by United.

Drawdown in Alluvial Aquifers

Depressurisation of the hard rock aquifers is predicted to also result in drawdown in the alluvial aquifers adjacent to Wollombi Brook and the Hunter River. The Applicant has sought to minimise impacts on the Wollombi Brook and Hunter River alluvium through Project design, including a 370 m setback from Wollombi Brook, which significantly exceeds the minimum 200 m setback required under the AIP.

The most significant modelled drawdowns within the Quaternary alluvium are predicted to occur east of the United open cut and north of the Wambo open cut, along relatively small sections of Wollombi Brook and Redbank Creek, as well as north along the edge of the Hunter River alluvium. The Department understands that there are privately-owned groundwater bores within the alluvial aquifers that would be impacted by the Project. The groundwater model shows the theoretical potential extent of drawdown assuming a largely homogeneous alluvial zone. As the alluvial zones have variable properties, the actual drawdown may be less than predicted. Accordingly, the Department is of the view the predicted drawdown impacts to alluvial aquifers are acceptable.

Changes in Groundwater Flux

The groundwater modelling assessed the potential change in flow from the Permian aquifers to the Wollombi Brook alluvium for currently approved mines (ie HVO South, HVO North, Ravensworth and Mount Thorley Warkworth) with and without the Project. As can be seen in **Figure 19**, the assessment indicates that the Wollombi Brook alluvium is gaining flow from the Permian.

Figure 19 indicates that the Project would reduce flow from the Permian to the Wollombi Brook alluvium by up to 40 ML/year (in Year 8). The Applicant contends that this is a relatively small increase to the cumulative impacts of currently approved mines (ie 175 ML/year in Year 24). The Department does not accept to this claim, and considers that the loss of up to 40ML/year (or 23%) would be a 'moderate' impact. Nevertheless, as the Permian strata become depressurised, flow from the Permian to the alluvium would progressively decrease. This can be considered beneficial as it reduces the inflow rate of saline groundwater from them to the overlying alluvium, thereby leading to a gradual improvement in water quality in the alluvium.

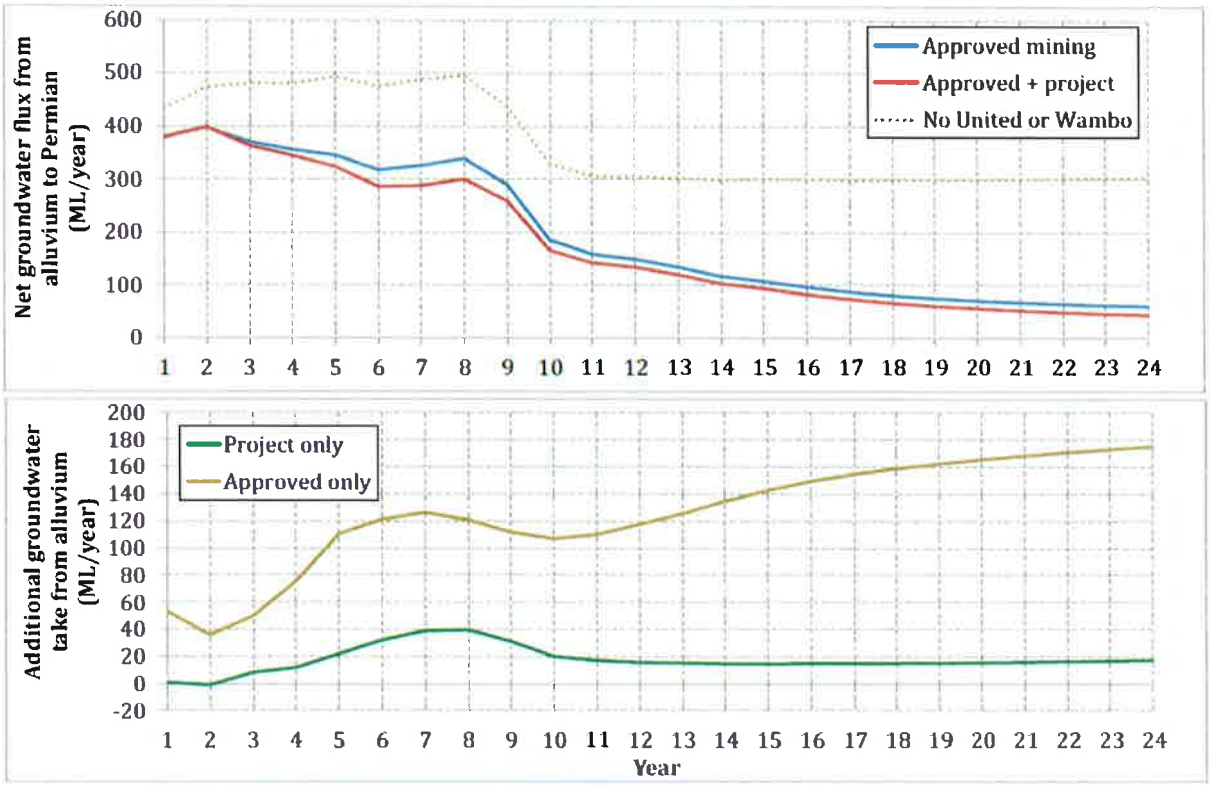


Figure 19: *Net change in flow from Permian to Wollombi Brook alluvium due to mining*

The negative fluxes seen in **Figure 20** indicate that the Hunter River alluvium is naturally leaking into the underlying Permian coal measures and is therefore a losing system. Most of the loss from the alluvium is naturally occurring. The Department notes that, while cumulative impacts are evident in with an increasing loss over the Project life, this is a relatively small additional impact.

Figure 20 also indicates that the rate of alluvial groundwater leaking into the Permian would increase by up to 58.2 ML/year, due to depressurisation of the Permian strata by Year 9 of the Project. While there is a net change in the annual amount of groundwater leaking into the Permian, the Hunter River is a naturally losing system and would remain so regardless of the Project. The Department notes that groundwater take in Year 24 is similar to that of currently approved mines.

The Department notes that the predicted impacts do not significantly exceed those already approved for other coal mines in the area. It is also noted that any change to flow in the alluvium because of the Project must be licensed (see Water Licensing below).

Final Voids

Groundwater modelling indicates that the proposed final voids and associated in-pit overburden emplacements would gradually fill with rainfall infiltration and/or groundwater over time. The voids are predicted to reach a final pit lake level of approximately 55 m AHD in the Wambo pit and 20 m AHD in the United pit. The Department notes that these pit lake water levels are predicted to be about 30 m to 50 m below pre-mining groundwater levels, indicating that the voids would act as sinks in perpetuity, with no escape of contained void water.

It is noted that there is no predicted interception of groundwater in the proposed Wambo final void due to the proposed rehabilitated and shallow final landform. As a result, groundwater would instead be drawn towards the deeper final void within the United pit (see **Sections 6.5** and **6.6.3**).

Groundwater Licensing

The predicted annual groundwater volumes required to be licensed over the life of mining at United and Wambo for currently approved and foreseeable mine plans (open cut and underground) and the Project are summarised in **Table 9**.

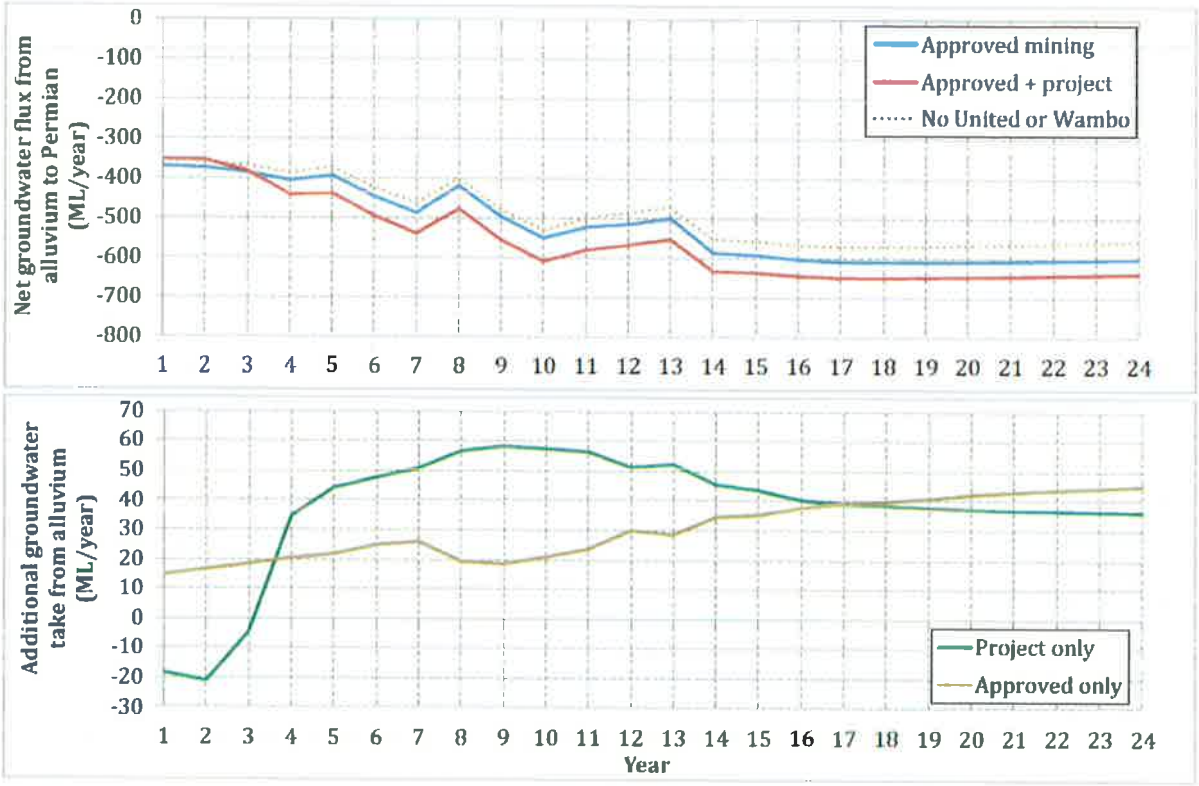


Figure 20: *Net change in flow from Permian to Hunter River alluvium due to mining*

Based on **Table 9** and the information provided in the EIS and RTS, the Department and CLWD are satisfied that the water licences required for both existing operations and the Project are within currently held entitlements.

Table 9: *Groundwater licensing summary – during mining*

Water Sharing Plan/ Management Zone	*Source*	*Predicted maximum annual inflow volumes requiring licensing during mining (ML/year)*			*Maximum volume required to be licensed for Project (ML/year)*	*Currently held entitlements (ML/year)*
		Approved	*Approved & Project*	*Project only*		
Hunter Unregulated and Alluvial Water Sources WSP - Lower Wollombi Brook Water Source	Wollombi Brook (surface water)	180	(197)	(37)	40	920
	Wollombi Brook (alluvium)	(175)*	260	40		
	Hunter River (alluvium)	(45)	(81)	(58)		
Hunter Regulated River Water Source - Glennies Creek Management Zone	Hunter River (surface water)	46	84	58	58	1300
North Coast Fractured and Porous Rock WSP	Coal measures (porous rock)	1287	1778	633	633	1947

**Brackets denote predicted take not included in the licence requirements as the volume is captured within either surface water or alluvial licensed volume*

Cumulative Impacts

Many community submissions (by way of form letter) raised concern over the potential cumulative impacts of groundwater drawdown due to mining in the area. The Department notes that approved coal mines in the region operate below the water table and therefore extract groundwater and create a cumulative drawdown on groundwater systems.

Overall, the Department is satisfied that cumulative drawdown impacts on the Permian aquifers are not significantly greater than those already approved. However, there is an increase in extent (ie up to 2.5 km from the currently approved drawdown area) at which groundwater drawdown would be experienced. Nevertheless, the Department notes that the Permian aquifers are generally saline and not beneficially used by anybody other than other mining companies. Which use such water for coal processing, dust suppression or other on-site purposes.

Cumulative drawdown within the Quaternary alluvium already extends along Wollombi Brook and the Hunter River, adjacent to other mining operations (ie Wambo, HVO South, HVO North, Ravensworth, Mount Thorley Warkworth). The most significant additional modelled drawdowns within the Quaternary alluvium are visible east of the United open cut, along Wollombi Brook and Redbank Creek.

Loss of groundwater from the alluvium would also induce some loss of surface water from both Wollombi Brook and the Hunter River (also see **Section 6.6.2**). **Figures 21** and **22** show the predicted net river baseflow over the proposed Project life for Wollombi Brook and the Hunter River, respectively.

As shown in **Figure 21**, cumulative impacts from approved mining (ie HVO South, Mount Thorley Warkworth and at Wambo) reduce the net baseflow to Wollombi Brook from 1,450 ML/year to 1,000 ML/year. The Project accounts for a minor contribution of between 0.5 ML/year and 37.4 ML/year (Year 8) of the cumulative impact on baseflow in Wollombi Brook, which equates to around 3% of the total.

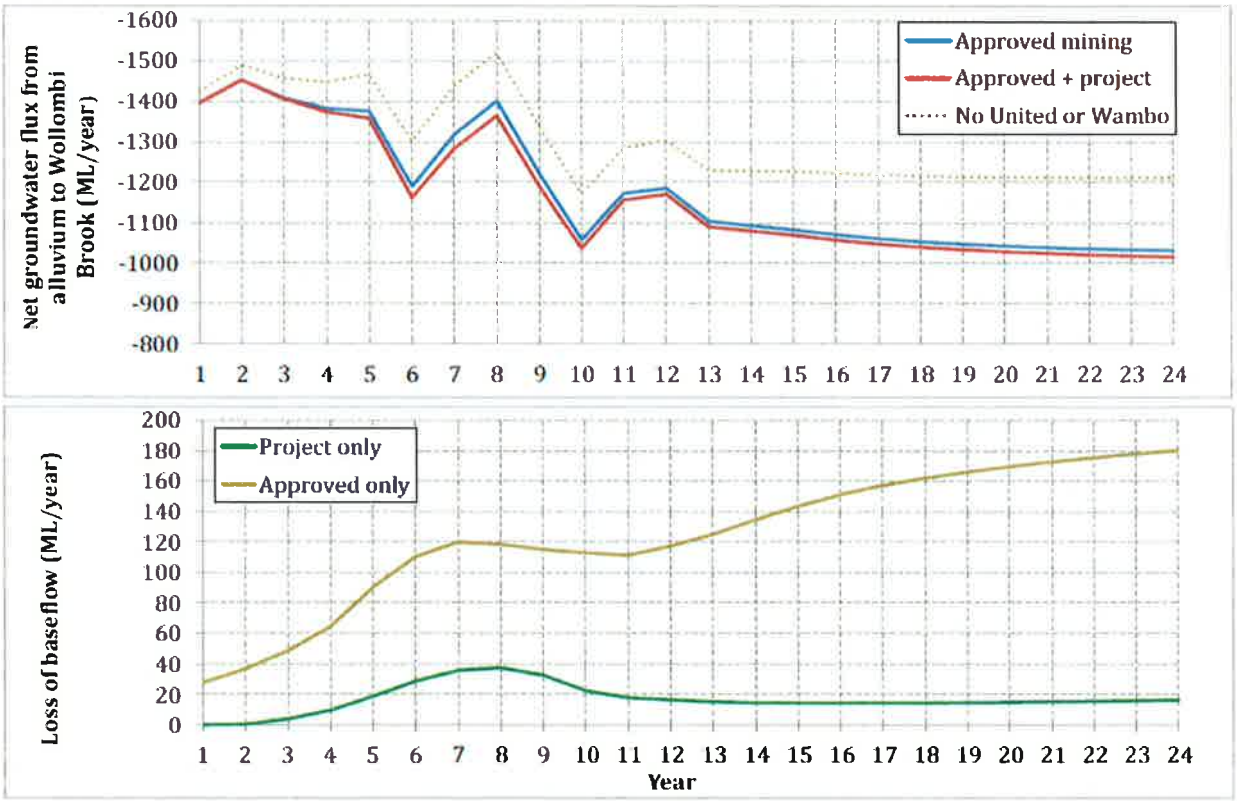


Figure 21: *Wollombi Brook baseflow change*

Figure 22 indicates that there would be a gradual reduction of flow from 3,300 ML/year to 2,900 ML/year on Hunter River baseflow. However, the Project only contributes up to 57.7 ML/year to this cumulative impact, which equates to around 2%.

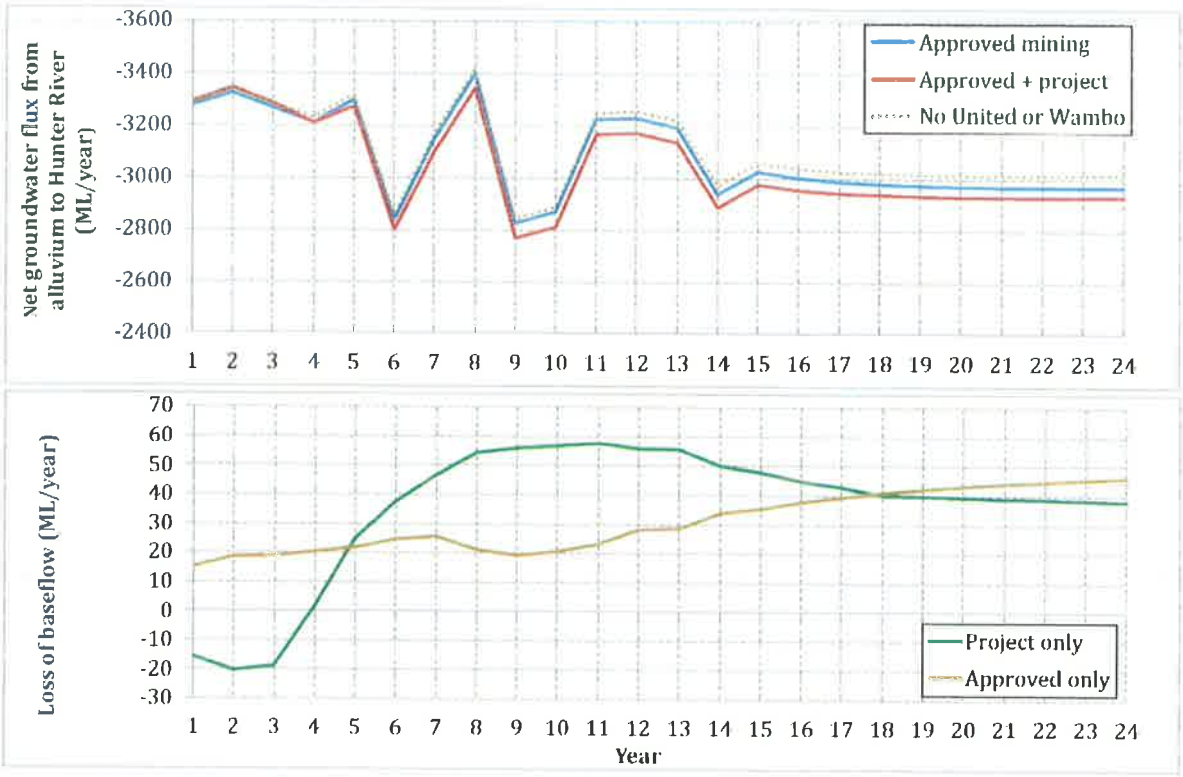


Figure 22: *Hunter River baseflow change*

Performance Measures, Monitoring and Management

The following standard conditions are also recommended to be included in any consent:

- preparation and implementation of a Water Management Plan, including a program to monitor groundwater levels and quality;
- installation of additional monitoring bores; and
- provision of compensatory water supplies for any affected groundwater user.

Conclusion

The shallow alluvial and hard rock groundwater aquifers have been and continue to be affected by mining undertaken at United, Wambo and a number of other nearby mines. The Project would result in the continued depressurisation of the hard rock aquifers in the coal seams. However, this impact is of very limited significance, since the water is generally saline and unsuitable for domestic or agricultural purposes.

Overall, the Department is of the view that the Project would not result in significant groundwater impacts. The Applicant should be required to develop a Groundwater Management Plan, incorporating appropriate groundwater monitoring of the Project area, TARPs to manage any additional groundwater take and any unforeseen interactions between the hard rock aquifer and nearby alluvial systems.

6.6.3 Matters of National Environmental Significance

Following its review of the Applicant's referral documentation, DoEE determined that it was likely that there would be significant impacts on a water resource in relation to large coal mining development. Specifically, DoEE determined that the proposal would be likely to have significant impacts on nearby ground and surface water.

The Commonwealth's 'controlled action' is the proposed extraction of a total of 176 Mt of ROM coal at a rate of up to 10 Mtpa over 21 years from a single open cut mine that combines existing operations at Wambo with a new mine on leases held by United.

In considering whether to approve the action, the Commonwealth Minister must consider advice received from the IESC. The IESC has adopted the approach of considering *all* potential impacts,

rather than the increase in impacts over those currently approved. The IESC provided comment on several issues, including the Applicant's:

- use of relevant data and information, including:
  - limitations in spatial and temporal representation of water quality data for both surface water and groundwater;
  - comparison to site-specific trigger values;
  - downstream impacts;
  - lack of geochemical assessment; and
  - groundwater dependent ecosystems; and
- application of appropriate methods and interpretation of model outputs, including:
  - uncertainty in the surface water modelling results due to a lack of information on the construction, parameterisation and calibration of the individual models;
  - influence of geological faults on groundwater modelling;
  - final voids and TSFs; and
  - underground water storage.

In response to the IESC's advice, the Applicant provided detailed technical clarifications and undertook additional work (see **Appendix C**). Additional information was provided regarding the representation of water quality data, site-specific trigger values and modelling. The Department considers that the response provided clarification on the IESC issues and a sound basis for a comprehensive assessment of the Project. Importantly, the Department notes that the additional information provided did not change the overall water resource assessment outcomes as presented in the EIS.

In addition to the information provided in the RTS, the Department notes that there is a detailed understanding of the existing water resources within the Project area and surrounds based on the long history of mining and the existing water monitoring programs, which provide a long-term water quality monitoring data set and a sound basis for developing site-specific trigger values. The monitoring program is regularly updated and results analysed and provided to Government. The water models are also updated regularly, with the groundwater model having been peer reviewed several times recently.

The Department has addressed the IESC's primary concerns in its assessment of water resources above, specifically potential impacts on downstream users (see **Sections 6.6.1** and **6.6.2**) and Groundwater Dependent Ecosystems (see **Section 6.4.2**). The residual issues relevant to the IESC's advice include concerns regarding final voids, TSFs, underground water storage and the lack of a geochemical assessment. These are addressed below.

Tailings and Water Storages

The IESC raised concern regarding the potential for the Wambo void lake and the TSFs to become recharge sources for the Permian groundwater system and subsequently the alluvial aquifers and surface waters through upwards leakage.

As noted above, extensive existing and proposed depressurisation of the Permian coal measures would draw groundwater towards and into the active mining areas. The United final void would act as a dominant groundwater sink, drawing in groundwater from the Permian strata and all saturated spoils at the site. The Department is satisfied that the final void would not become a recharge source to any aquifer (see **Section 6.5**).

The Department notes that only one new TSF (Bates South TSF) is proposed; however, the Project would also utilise two other TSFs already approved (Homestead TSF and Main TSF). The proposed Bates South TSF maximum fill level would be approximately 50 m below the final land surface and 40 m below the base of the alluvium. The TSF would only be used during active mining, therefore current groundwater conditions (ie depressurised Permian strata) are expected to be maintained over the life of the TSF, with tailings to be capped at the completion of mining. The Department considers it unlikely that water associated with the TSF would interact with the alluvium along North Wambo Creek following capping of the tailings, as there would be no rainfall or surface inflows to the TSF and therefore no recharge opportunity.

The existing United underground mine is already approved as an underground water storage facility and would continue to serve in this regard as part of the Project. Excess water would be pumped

underground and then extracted as needed for use on the site. The Department considers underground workings to be a good option for storing mine water, as underground workings would naturally fill with water from coal seams over time and would therefore have a similar water quality.

Geochemical Assessment

The IESC raised concerns regarding the lack of a geochemcial assessment in the Project's EIS. In its RTS, the Applicant provided a geochemical assessment undertaken by GeoTerra: *United Wambo Open Cut Coal Mine Project Waste Rock/Tailings Geochemical Characterisation and Acid & Metalliferous Drainage Assessment 2017*.

Recovery modelling demonstrated that, post-closure, water surrounding the South Bates TSF and in-pit spoil would flow towards the final voids and remain contained within the mine area. The Department is satisfied that there is minimal risk of groundwater within the in-pit spoil and proposed final voids influencing stratigraphy outside of the mine area, post-closure.

The geochemical report further supports this conclusion and found that during operations, the waste rock and tailings are unlikely to cause adverse changes in groundwater quality, due to low acid mine drainage (AMD) potential.

The IESC also provided a number of recommendations regarding management and monitoring of the Project. The Department has given strong focus and consideration to these recommendations below.

Monitoring and Management Strategies

The IESC recommended several monitoring and management strategies which the Department has addressed in **Table 10**.

Table 10: *IESC recommendations on monitoring and management strategies and Departmental consideration*

IESC recommendation	***Applicant's Response and Department's consideration***
Groundwater:	
Design and implementation of monitoring programs (including installation of additional monitoring bores) capable of early detection of groundwater and surface water contamination from the Wambo void lake, the TSFs and the final landforms.	To provide greater assurance of early detection of any groundwater quality changes due to waste rock leachate and tailings storage, the proposed monitoring program has been updated by the Applicant to include additional bores within the regolith and spoil (see **Appendix C**). Accordingly, any recommended Groundwater Monitoring Program would address the proposal and allow for collection of baseline data prior to commencing mining in the proposed area.
Additional groundwater monitoring bores to the north and northwest of the proposed project site both in the Hunter River alluvium and between the mine and the alluvium, and to the southwest of the proposed project, near Wollemi National Park. These bores would allow potential impacts to be better monitored near these sensitive locations and would provide further data for model calibration.	To provide greater assurance of early detection of any impacts within the Hunter River alluvium and shallow overburden north of the Wambo open cut, a series of additional monitoring points has been proposed by the Applicant. The Department notes that this would expand the existing and proposed network to the southwest of the Project to detect changes in groundwater level and quality at the southern extent of the project plan.
Refinement of the proposed trigger schemes for surface water and groundwater quality and groundwater levels to improve the ability of these schemes to promptly detect change. This includes: i. discussion of the derivation of the surface water quality triggers and confirmation that these are consistent with the ANZECC methodology; ii. groundwater quality data should be compared with trigger values when data becomes available rather than annually as currently proposed and the temporal scale of sampling increased to three-monthly. The proposed use of a control chart approach to developing triggers would require considerable baseline data and a high sampling frequency. It may	Existing water management triggers already exist for mining operations at Wambo and United. The Applicant proposes to review and update site-specific water triggers during development of a Water Management Plan, should the Project be approved. Regarding groundwater, specific trigger levels for each bore are proposed by the Applicant as this would provide good indications of groundwater change on a localised level. The Department notes that development of a Water Management Plan for the Project would occur in consultation with CLWD and EPA.

also lead to issues with gradual changes not being detected if a moving baseline is used. Derivation of triggers based on the ANZECC methodology (ie 80th percentile from reference conditions for physiochemical parameters) could be more appropriate. Proposed control charting may be a useful tool during the investigative phase following trigger initiation. iii. The trigger for groundwater drawdown outside the predicted zone of impact needs to consider that using a moving 24-month average as currently proposed may allow a gradual decline in water levels to go undetected. Management measures would then not be implemented.	
Measurable triggers, based on robust statistical analyses, should be developed in advance for identifying significant deviations in groundwater levels from baseline or model predictions. These should be used in addition to the judgement of an expert independent hydrogeologist.	The Applicant proposes to review and update site-specific water quality trigger levels in the event of a development consent being granted.
Automated loggers should be downloaded more frequently, currently proposed to be six-monthly, to reduce the potential for data loss and to improve the capability of the proposed trigger system. Three-monthly sampling of groundwater quality would improve the ability to detect and address changes in water quality.	The Department notes that the Applicant has committed to three-monthly data downloads. This would be reflected in a requirement for a Groundwater Monitoring Program.
GDEs:	
Further monitoring of surface water and groundwater levels, and ecosystem health at the location identified as GDE1. These measures would improve the understanding of this ecosystem, and allow a management plan to be formulated to monitor and manage drawdown and prevent complete dewatering of the alluvial aquifer at this location. These actions could be done in co-operation with HVO South.	To address potential impacts to GDEs, the Department has recently recommended that a Groundwater Dependent Ecosystem Study is completed within 12 months of the approval of Wambo Coal Mine Modification 17. The Department would look to either apply information obtained from this study to further inform its final assessment and/or require a similar condition for the Project.
Surface Water:	
Monitoring of metals in the surface water management system (currently only undertaken by United Collieries annually) should be increased in frequency (eg monthly). The proposal to only sample for metals when a pH trigger is initiated would require in-depth knowledge of potentially leachable metals and their solubility characteristics under a range of conditions, which has not been demonstrated in the assessment documentation. Additionally, exceedances of the ANZECC guidelines for metals have been observed in the water storages, highlighting the need to monitor for metals as this water may be discharged to adjacent waterways, potentially impacting water quality and possibly GDEs. Metals and organics (as toxicants and stressors) monitoring should also be undertaken in receiving waterways as proposed in the EIS.	In response to the IESC recommendation, the Applicant noted that monitoring of rejects, overburden and water quality would be undertaken to enable assessment and management of any potential downstream water quality impacts. Monitoring of water quality would include pH, EC, TSS, TSD, oil and grease, and a suite of metals, metalloids and ions, within, downstream and (where possible) upstream, on a regular basis.
Commitments for surface and groundwater monitoring should be presented as part of a water monitoring plan and should be consistent with the *National Water Quality Management Strategy*.	Noted. The Department would include the requirement for surface water and groundwater monitoring programs in any recommended consent.
The Northern Sydney Basin, which includes the Hunter Subregion, has been identified as a Bioregional Assessment priority region. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and related research projects.	Noted.

Generally, the Department is satisfied that the Applicant's proposed monitoring and remediation measures are adequate to mitigate potential impacts. The Department would also recommend several other conditions for surface water and groundwater resources (see Performance Measures, Monitoring and Management).

Conclusions Concerning IESC Advice and MNES

The Department has carefully considered the advice provided by the IESC regarding the Project and is satisfied that it can be undertaken:

- using the existing surface water and groundwater models, and future revisions, which are considered appropriate and fit for purpose;
- without causing significantly greater impacts regarding depressurisation, drawdown, stream leakage and flows, GDEs and other vegetation, fauna (including aquatic biota) and flooding; and
- without causing significant additional impacts to the significant water resources of Wollombi Brook, the Hunter River and their associated alluvium.

The Department is satisfied that there would not be significant impacts on water resources in relation to the Project, above and beyond those already approved. The proposed action is unlikely to have significant impacts on ground and surface water near the proposed mine and any impacts are able to be appropriately licensed, monitored and managed.

6.7 Transport

The Applicant provided a Transport and Traffic Assessment (TTA) for the Project based on the *Guide to Traffic Generating Developments, Austroads Guide to Road Design* and *Guide to Traffic Management.*

6.7.1 Existing Transport Environment and Proposed Project

The existing United and Wambo mines are located on the southern side of the Golden Highway, near Warkworth Village and directly opposite HVO South (see **Figure 23**). Mine access for the Project would be via the existing Wambo mine access road, off the Golden Highway. To accommodate the progression of the United open cut, the Applicant would realign a 2 km section of the Golden Highway. This section of the Golden Highway is also intersected by minor local roads including Wallaby Scrub Road and Comleroi Road (see **Figure 23**).

Product coal from the existing Wambo operations is dispatched from the site via the on-site Wambo train facilities (see **Section 1.1**). It is proposed to transport all Project product coal to market via the existing train loading facilities and rail loop and within existing product coal limits of 15 Mtpa. The concurrent modification to the Wambo rail consent proposes to increase the operational life of the rail facilities to match the life of the Project and an increase in train movements per day from six to eight (see **Section 2.3**).

Golden Highway

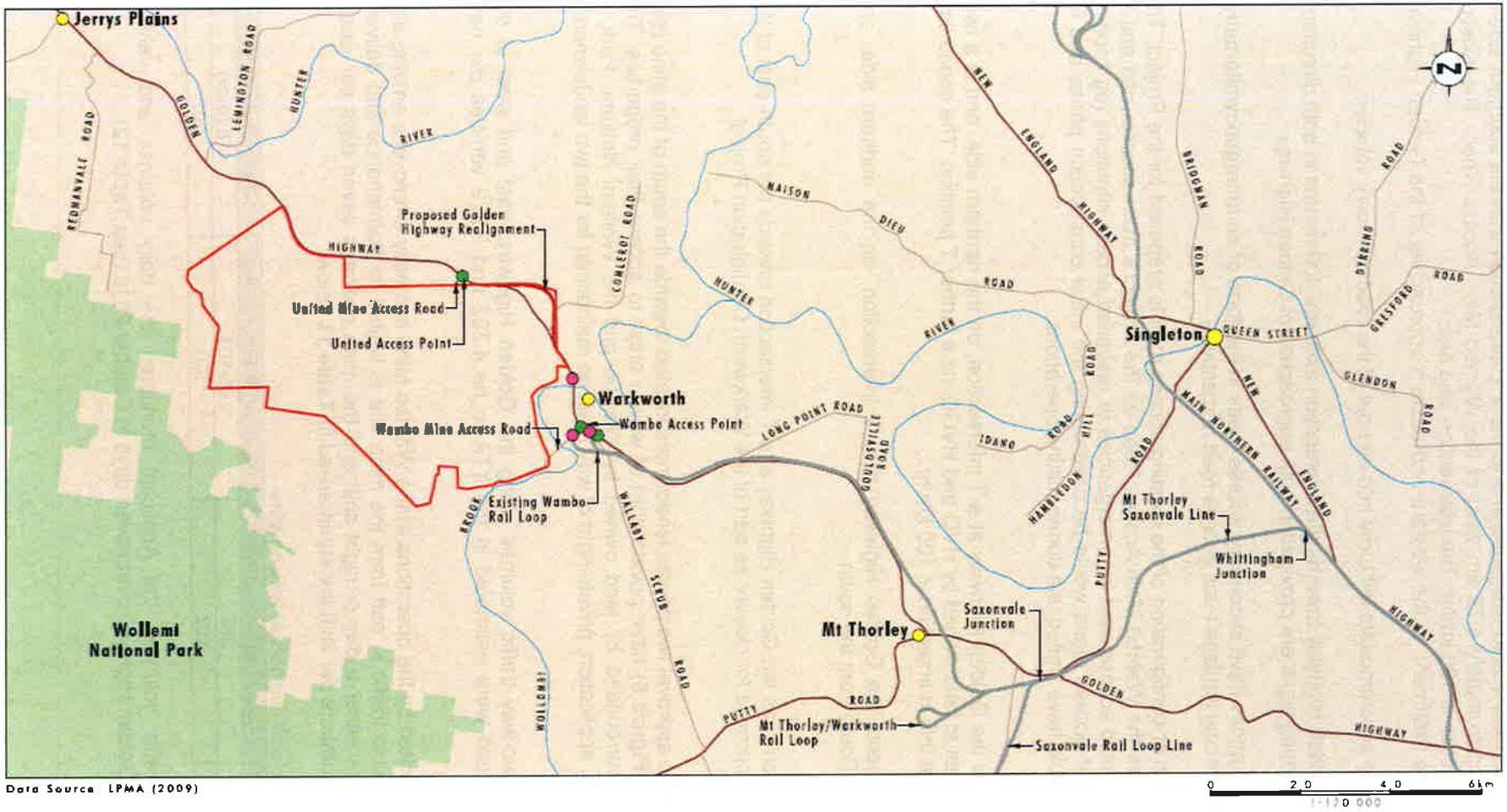
Close to the Project site, the highway is a mixture of straight sections and large radius curves and is generally flat with sections of modest grades (see **Figure 23**). The Golden Highway has a speed limit of 100 km/hr in the vicinity of the site, except for a section 300 m east of Wallaby Scrub Road and 900 m east of Comleroi Road, where the speed limit is reduced to 80 km/hr. The highway is a two-lane rural road with a minimum seven metre sealed road carriageway. The lanes are defined by centreline and edgeline road markings in addition to raised reflective pavement markers and guideposts.

Mine Access Roads

Wambo mine is accessed via the Wambo Main Access Road, which forms a seagull T intersection off the southern side the Golden Highway approximately 400 m east of Wallaby Scrub Road (see **Figure 23**). This road is two-lane and would continue to be used as the main access road for the Project and the existing Wambo underground mine.

The Wambo Mine Access Road and Golden Highway intersection has lighting and advance warning signage in both directions. Other intersection features include:

- right and left turn lane treatments, at the western and eastern approaches of the Golden Highway; and
- a right turn acceleration lane that is 230 m long, including taper in the eastern approach of the Golden Highway for the right turn out of the mine.



Legend

- Project Area
- National Park
- Main Road
- Minor Road
- Railway
- AM & PM Peak Hour Traffic Counts at Intersections
- Daily Volumes and Vehicle Classifications

FIGURE 6.60

Road and Rail Network

Figure 23: *Local road and rail network*

Sight distance from the intersection exceeds 300 m to the east but is limited to 270 m to the west, with the curve of the Golden Highway restricting sight distance.

The United Main Access Road is also two lanes and forms a T intersection with the southern side of the Golden Highway, approximately 4.75 km west of the Wambo Mine Access Road. The existing speed limit at this intersection is 100 km/hr. The intersection also has:

- right and left turn lane treatment, in the western and eastern approaches of the Golden Highway; and
- large radius corners to accommodate left turns into and out of the road by heavy vehicles.

Sight distance on the Golden Highway towards the intersection exceeds 300 metres in both directions. Advance intersection warning signs are provided in both approaches of Golden Highway.

Both Wambo and United mines have secondary access roads in the form of an emergency/alternative access road and a former coal haulage truck access road respectively.

No change to the location or configuration of the existing access road is proposed for the Project. The Applicant proposes to use the Wambo Main Access Road as the Project's main access road and to retain the secondary Wambo access road for emergencies or restricted access situations (eg flooding or accidents). The United access roads would be used during the initial construction phase and for ancillary services but would have limited use during mining operations.

Local Access Roads

Comleroi Road intersects the Golden Highway at a T intersection, on the northern side, and is a two-lane road providing access to land owned by HVO and HVGC via a further T junction. The speed limit on the Golden Highway at this intersection is 100 km/hr.

An unsealed road intersects the Golden Highway at a T intersection, on the northern side, and provides access to HVO South from the south.

Wallaby Scrub Road

Wallaby Scrub Road which joins the Golden Highway at a T intersection towards the south-east of the Project area, has been approved for closure as part of the Warkworth Continuation Project.

Private Right of Way

Under the current Wambo approval two private landowners located towards the south of the mine (see Receivers 25 and 35 in **Figure 5**) have private right of way in order to access their properties. The properties are entirely surrounded by land owned by Wambo and the Wollemi National Park. If consent is granted for the application, private right of way must be maintained for the two landowners.

Existing Road Traffic

The existing weekday two-way traffic volumes along the Golden Highway, east and west of the Wambo Mine Access Road were estimated in the TTA to be 4,392 and 3,229 vehicles per day, respectively.

Light vehicle traffic generated by the operations at the Wambo Mine is mostly employees arriving and leaving work. Heavy vehicle traffic to and from the mine site is limited to maintenance and delivery vehicles. Employees work either a day or night shift and the mine operates seven days per week. Approximate employee numbers per shift are summarised in **Table 11** below.

***Table 11**: Existing employee shift numbers at Wambo Mine*

	Day shift Employees	Night shift Employees	Employee Total
Weekday	282	98-103	418 (max)
Weekend	102	100	202

To establish existing traffic volumes, the Applicant monitored the daily volumes and vehicle classifications along the Golden Highway over seven days in October 2016 (see **Table 12**).

Table 12: *Traffic volumes, broken down by Austroads Vehicle Classification*

Road Location	5 Day Average (Weekday)			7 Day Average (ADT)		
	Light	Heavy	Total	Light	Heavy	Total
Golden Highway, East of Wambo Access Road	3,606	786	4,392	3,351	641	3,992
Golden Highway, West of Wambo Access Road	2,583	646	3,229	2,515	537	3,052
Wambo Access Road	1,014	144	1,158	827	107	934

Traffic volumes are highest during weekdays, with traffic flows peaking between 5.30 am and 6.30 am and again in the afternoon between 3.30 pm and 4.30 pm. The vehicle count shows that light vehicles make up the highest proportion of traffic travelling in both directions, at 82.1 % (east) and 79.9 % (west), respectively, over the 5 day weekday average.

The following intersections were monitored for turning traffic volumes during shift change periods:

- Golden Highway/Wallaby Scrub Road;
- Golden Highway/Wambo Mine Main Access Road; and
- Golden Highway/United Mine Main Access Road.

The left turn into the Wambo Mine Main Access Road from the Golden Highway numbered 156 and 104 vehicles per hour, during the morning and afternoon peaks respectively. The right turn into the mine from the Golden Highway numbered 16 and 10 vehicles per hour during the morning and afternoon peaks respectively.

Rail

The project proposes to use the existing Wambo rail infrastructure including the rail spur, rail loop, coal reclaim area, product coal conveyor, train load-out facilities and refuelling infrastructure. Operation of this infrastructure was approved under a separate development consent (see DA 177-8-2004). The rail facilities are approved to transport up to 15 Mtpa of coal until 2025, and can support a maximum of six train movements per day. The Main Northern Railway Line, located approximately 17 km to the southwest, connects the Project to the Port of Newcastle via the Whittingham Junction.

6.7.2 Assessment

Realignment of the Golden Highway

The Project proposes the realignment of a 2 km section of the Golden Highway along the northeast of the Project area in order to access additional coal resources (see **Figure 24**). Three local access roads would be impacted by this realignment. Comleroi Road provides access to the HVGC and to land owned by HVO via an unsealed road from a nearby T junction. A third unsealed road provides access to the HVO South operations from the south and is unsealed.

The realignment would bring a section of the Golden Highway closer to the HVGC and HVO South. The HVGC expressed concern over the potential impacts of increased visibility from the Golden Highway. The proposed visual mitigation measures are discussed in **Section 6.11**. The alignment would not bring the road closer to HVO South than at present but the realignment would increase the length of the road at this distance to that mine. The Department notes that HVO South has demonstrated that it can manage blasts at this distance but also recognises that the realignment may have operational implications for HVO South such as possibly requiring more frequent temporary road closures due to blasting.

An increase in traffic associated with road works is expected during the Project's construction phase. The TTA indicated approximately 60 heavy vehicles and 100 light vehicles travelling in and out of the site during construction. Construction traffic is mainly expected from 6 am to 6 pm on weekdays and from 8 am to 1 pm on Saturdays, with only limited construction works outside of these hours. The largest impact is expected from 5.30 am to 6.30 am and 6.00 pm to 7.00 pm on weekdays, associated with worker trips.

The TTA noted that road works are expected over a period of 12 months. In order to minimise traffic disruptions through road closures, the Applicant proposes to complete construction of the realigned section, and establish the junction with the existing Golden Highway, prior to decommissioning the obsolete section of the Highway.

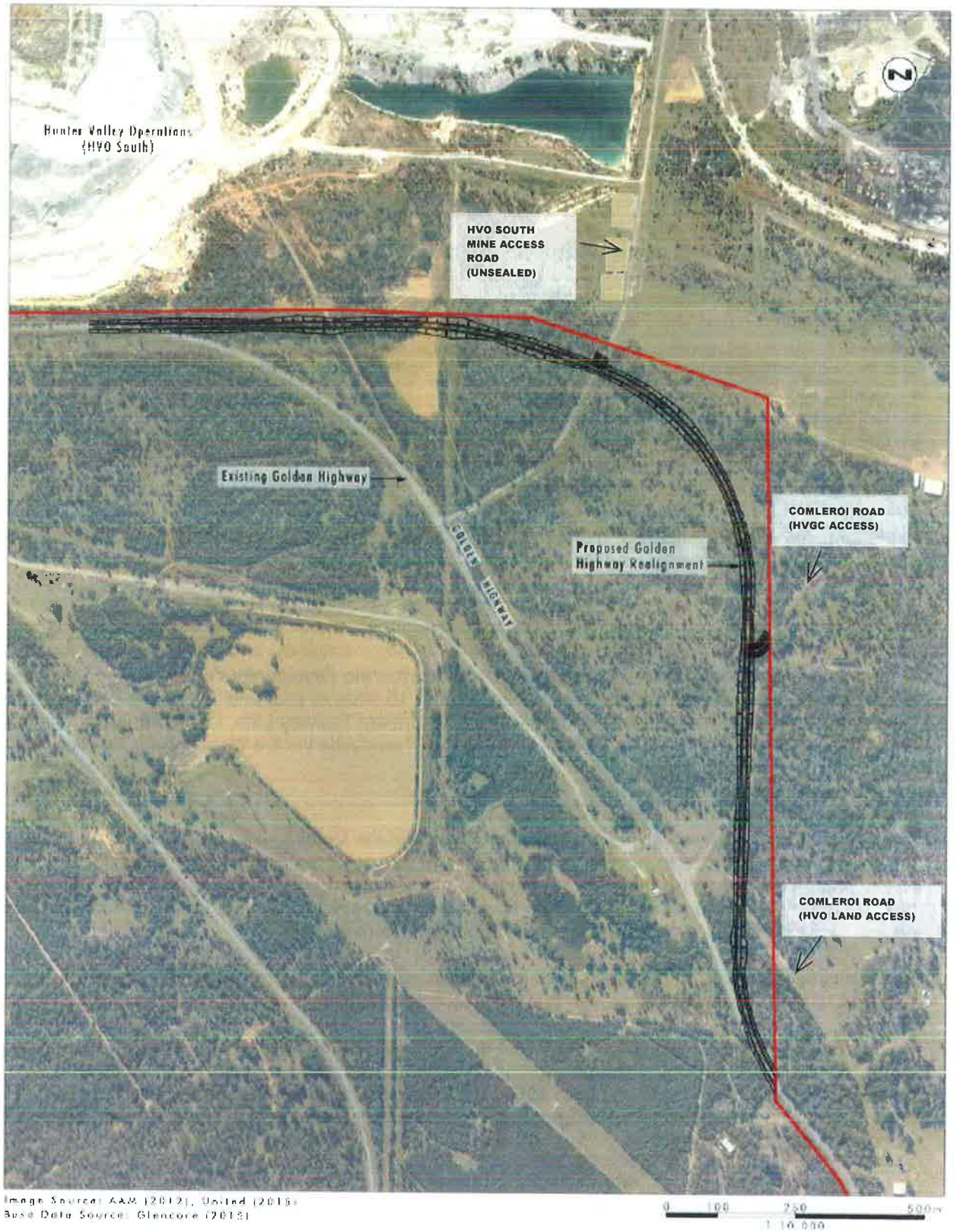


Figure 24: *Proposed realignment of the Golden Highway*

In its RTS, the Applicant addressed concerns regarding the design of the realigned road, particularly the potential impact of the curvature of the realigned road on travel time and safety, geotechnical stability, and impacts on road users at local intersections.

The Applicant proposes to design the realignment in accordance with the *Austroads* standard. To date, a number of meetings with RMS have taken place to develop a conceptual design, including a road corridor with sufficient width for potential future duplication, if required. A study by engineering specialists confirmed that the geotechnical rock stability along the proposed alignment would be acceptable but recommended implementation of management actions to mitigate any impact of the pit slope and blasting on the integrity of the road. The submission of detailed designs should continue through a Works Authorisation Deed with RMS.

Should the current speed limit of 100 km/hr be retained along this part of the Golden Highway, the proposed increase in length of the Golden Highway of approximately 800 m is expected to result in an increase in travel time of 30 seconds. The realigned road would include two 3.5 m wide lanes with 2.0 metre shoulders. If constructed to specification, the impact of the realignment on intersections with local access roads should be mitigated.

The Golden Highway realignment would not be affected by underground mining at United or Wambo open cuts but would be located near the former Lemington underground workings. The old workings are not expected to have subsidence impacts on the realigned road, however the Applicant would confirm this with SA NSW once the detailed design is completed.

The Department is satisfied that the design and construction of the realigned section of the Golden Highway, if undertaken to specification, would address these concerns.

Mine Construction Traffic

The average construction workforce over the first two years, when most construction activity is expected, is approximately 100, peaking at approximately 120 in the second year. The most significant impact associated with mine construction would occur on weekdays from 5.30 am to 6.30 am and from 6.00 pm to 7.00 pm when existing traffic flows along the Golden Highway coincide with peak traffic flow due to construction. Modelling undertaken for the TTA indicated that the impact of construction traffic on the intersections of the Golden Highway with Wambo Mine Main Access Road and Wallaby Scrub Road would be satisfactory, given that the intersections are predicted to retain Service Level A.

As noted before, the United Mine Main Access Road would be used by construction vehicles during the early stages of construction. This intersection with the Golden Highway has a high level of traffic management, including left and right turn lanes and good sight distances. The TTA noted very low traffic movement at present along this intersection, thus its capacity to accommodate an increase in traffic.

Operational Traffic

During the operational phase of the Project, traffic impacts along the Golden Highway would be most likely during weekdays from 6.30 am to 7.30 am, due to the shift change around 7.00 am. The Project is estimated to generate 238 (148 in/90 out) worker trips and approximately two additional heavy vehicle trips (either entering or exiting the mine) during the initial peak construction period.

However, not all worker trips would be new trips as approximately 250 of the Project's expected operational workforce of up to 500 would be drawn from the existing workforce at Wambo's open cut operation. The majority of these workers currently arrive or depart around the current Wambo shift changes between 5.30 am and 6.30 am and 3.30 pm to 4.30 pm. The reduction in number of new worker trips and the change in shift hours for those workers should spread the morning peak over a longer period. The afternoon peak would be spread over an even longer period, with personnel from the two operations arriving or departing between 3.30 pm and 7.30 pm.

Cumulative Traffic Impacts

The TTA assumed background traffic growth of 2.6 %/year along the Golden Highway to account for the impact of future commencement of other local projects. This is a conservative estimate, as the recent annual growth has been in the order of 2.0 %/year. The TTA found that, over the period from 2015 to 2028, the principal intersections near the Project have sufficient capacity to absorb these projected higher traffic volumes.

Rail Traffic

The Project does not propose to increase the approved volume of coal transported from the rail facilities nor change the layout of the existing infrastructure. The impacts of rail traffic to the Wambo mine were assessed during the approval process for the Wambo mine (refer DA 177-8-2004). DA 177-8-2004 allows up to six train movements per day and operation of the rail facilities until 2025.

The only changes proposed by the concurrent modification application to DA 177-8-2004 would be for the extended use of the Wambo rail infrastructure for a period of 14 years beyond 2025 (ie until 2039) and an increase in the maximum daily number of train movements to eight to allow greater flexibility in managing rail movements on the line. The maximum annual number of train movements would remain unchanged. The main impact of an increased number of trains per day would be in the form of rail noise. Noise impacts, including rail noise, are considered in **Section 6.2**.

Other potential impacts include congestion on the rail network affecting other rail users. The Applicant noted that the extended life of the Project had already been factored into planning for the rail network. In its submission, ARTC confirmed the availability of capacity on the NSW rail network. As the total annual number of rail movements would not change, this impact should be minor.

6.7.3 Conclusion

The Applicant considered an alternative mine design which would not require realignment of the Golden Highway. However, this would result in resource sterilisation and the estimated loss of 20 Mt of coal. It would also require investment in a bridge or tunnel to connect the existing Wambo mine with a small open cut pit to the east of the Golden Highway. The separation of operations and landforms would result in a poorer final landform design and the reduced mine life would have a negative impact on employment and economic benefits.

The Department is of the opinion that the benefits of the realignment of the Golden Highway exceed the potential impacts which, if properly managed, should be largely mitigated. It is recommended that Construction and Traffic Control Management Plans are required as conditions of consent and that the final design and construction of the realigned section of the Golden Highway is undertaken in consultation with RMS.

As an alternative to the use of existing rail infrastructure at Wambo mine, the Applicant considered constructing a separate rail loop at the United mine which would operate in parallel with the rail infrastructure at Wambo mine. This option would result in extensive vegetation clearance, sterilisation of coal resources and additional noise impacts. Furthermore, it would result in inefficient use of rail facilities already constructed and approved for operation at the Wambo mine.

The Department is satisfied that the continued operation of the Wambo rail infrastructure until 2039, including a maximum of eight train movements per day but no increase in annual number of train movements, would not present significant additional impacts over those already approved.

6.8 Economics

The Applicant provided an EIA prepared by DAE, including a cost benefit analysis (CBA) and local effects analysis (LEA) prepared in accordance with the *NSW Guidelines for the economic assessment of mining and coal seam gas proposals (2015)*. The EIA considers the economic costs and benefits of the Project relative to baseline operations. Baseline operations assumes closure and rehabilitation of the United mine and cessation and rehabilitation of the Wambo open cut after 2020, with remaining Wambo operations continuing as recently approved under MOD 12 (see **Section 2**).

The Applicant estimates that the Project would generate an overall benefit to the NSW community of $414 million NPV assuming a discount rate of 7% which includes $369 million NPV in royalties over the 25-year Project life. DRG has reviewed the Applicant's estimated royalties in light of its assumptions about future coal prices for semi-soft coking and thermal coal, and has confirmed that it would expect the Project to deliver around $40 million/year in royalties, equating to around $352 million over the life of the Project.

The Applicant also estimates that 'other benefits' of $68.9 million NPV would be generated in the form of company tax, net producer surplus and economic benefits to landholders, workers and suppliers. The EIA includes a qualitative analysis of additional non-quantifiable external costs that the Project would need to generate in order to result in a net cost to the NSW community. This analysis indicates

the Project would need to result in $39 million of additional non-quantifiable costs for each year of operation, in order to reduce and offset the predicted net benefits of the Project.

The Department commissioned CIE to undertake an independent expert review of the Applicant's EIA and CBA (see **Appendix F**). Generally, CIE's review identified that the CBA had been undertaken in a reasonable manner and was broadly consistent with relevant guidelines. However, CIE identified some aspects of the estimated benefits and residual environmental and social impacts that required further consideration, including differences in the estimates for royalties, other benefits and GHGEs, when compared to DAE's assessment (see **Table 13**).

Table 13 presents the Applicant's predicted net benefits alongside CIE's lower-bound estimates.

Table 13: *Comparison of differences in the Applicant's CBA and CIE's review*

Aspect	***EIA*** ***$ million (present value)***	***CIE's review*** ***$ million (present value)***
Benefits to NSW		
Royalty payments	368.6	304-359
Other benefits*	68.9	Assumed to be zero
Costs to NSW		
Residual value of land	-	-
Air quality - particulate emissions	5.1	5.1#
Ambient noise	0.3	0.3
GHGEs	11.1**	35
Traffic and Transport	7.4	7.4
Net Benefit to NSW	**413.4**	**256.8**

* *Other benefits include company income tax, net producer surplus and economic benefit to exiting landholders*
** *32% of the total $35 million, representing the proportion of costs attributable to NSW*
\# *Further information required to test DAE's estimates*

In terms of residual environmental costs, CIE noted the concerns raised by several government agencies (see **Section 5**) and considered that any material changes in the assessment of these impacts should be reflected in the CBA. The Applicant provided additional information in its RTS to address agency concerns. The Department is satisfied that the scale of these impacts has not materially changed from those presented in the EIS. The Department's assessment of these environmental impacts is discussed in **Section 6** of this report.

DAE estimated the Project's total GHGE cost to Australia at $35 million, which includes Scope 1 and 2 emissions and an estimate of carbon prices per tonne. However, DAE only attributed 32% of the total GHGEs cost to NSW ($11 million), based on the assumption that this percentage of the Australian population lives in NSW (see **Table 13**). CIE notes that this approach is inconsistent with the 2015 draft guidelines and considered that the full GHGE cost of $35 million should be attributed to the Project.

DAE also considered carbon prices, estimating a maximum GHGE cost of $137 million. CIE considered a range of GHGE costs, including the maximum costs considered by DAE, and noted that the Project would still result in a net benefit to the NSW community, even if the full GHGE costs were attributed solely to NSW. The Department accepts CIEs conclusion that the full cost should be allocated to NSW ($35 million) and notes that, even if the maximum estimated costs are allocated to NSW, the Project still delivers a net benefit (see **Table 13**).

CIE commented that there is debate regarding whether it is appropriate to apply global social costs of GHGEs (ie Scope 3 emissions) in CBAs. DAE did not include Scope 3 emissions in its CBA. The Department is satisfied with DAE's approach and notes that including Scope 3 emissions could potentially result in 'double counting' of GHGEs that must also be considered in the GHGE inventories of other countries.

The CBA considered variations in the coal price over the life of the Project based on the requirements of anticipated consumer markets in China, Japan and Korea. CIE noted that, while there is uncertainty regarding how future production from the Project would be affected by changes in international markets, it is expected there would be sustained demand for the product over the life of the Project.

Forecasting coal prices is a key factor influencing the royalties generated by the Project. To address this uncertainty, CIE completed a sensitivity analysis of coal prices to observe how royalties could be affected by different price and quantity assumptions, assuming 100% of the coal is exported. Based on this analysis, royalties could range from $304 million to $359 million (see **Table 13**). This analysis highlights that a net benefit to NSW is expected even under conservative (low) coal price assumptions.

CIE assumed that there are no 'other benefits' generated by the Project. This demonstrates that even if there are no other benefits (ie in the form of tax payments or economic benefits to workers) besides royalties, the Project would still deliver a net benefit to NSW.

CIE concluded that, even if 'very conservative' assumptions are adopted, the Project would still generate a material net benefit to NSW. CIE noted that the quantum of expected net benefits may need to be revised prior to determination, to reflect any Project amendments to address residual matters raised by NSW Government agencies or the community and associated changes in predicted impacts (or benefits).

The Department considers that the majority of these matters have now been addressed and that conditions can be imposed to ensure these impacts are appropriately mitigated and managed. With these measures in place, the Department is confident the Project could deliver a material net benefit to NSW. It will finalise its assessment of the Project's net benefits prior to determination.

6.8.1 Employment

The existing Wambo Mine has an approved workforce of 670 FTE employees, comprising up to 230 underground personnel, 290 open cut personnel and 150 CHPP, management, administration and support personnel. With current operations in the Wambo open cut scheduled to cease in 2020, the open cut personnel and a number of CHPP and support staff would need to seek alternative employment beyond that date.

With a peak operational workforce of up to 500 employees, the Project represents an opportunity for long term continuity of employment for these existing Wambo open cut, CHPP and support services staff. The Applicant has stated that the approximately 250 employees currently working at the Wambo open cut would be preferentially retained under the Project, meaning that the Project would create an additional 250 jobs over the first six to seven years operating at full production, before reducing to an operational workforce of 450 personnel for the remainder of the Project life. Further to this, the Project is expected to generate temporary employment for up to 120 additional construction jobs, with these individuals being employed during the three year construction phase, expected to peak in Years 1 and 2 of the Project.

6.8.2 Local Effects Analysis

The LEA considers the employment and broader economic effects of the Project on its immediate locality, the Lower Hunter Statistical Area 3 (LHSA 3), which includes the centres of Cessnock and Dungog. Mining employs 13.5% of the population in LHSA 3. Unemployment within the LHSA 3 is 11.3%, compared with a Statewide average of 5.9%.

As discussed above, DAE estimated that on average, 250 additional persons would be directly employed per year during the establishment phase of the Project. During the operational phase, approximately 456 people per year would be employed on a full time basis, incremental to the baseline. The local share of employment is estimated at 50% during both establishment and operational phases (ie 130 and 228 employees respectively). These employees would earn the average income expected for the local mining industry, which is double the average income in this location across all industry sectors (ie $76,476 per year compared to $38,897 per year). This would increase the local net income by around $5 million per year during the establishment phase and around $9 million per year during the operational phase (assuming that, if the Project did not employ these workers, then the average wage would be earned). CIE considered this to be a conservative estimate as it essentially assumes there is no net additional (ie indirect) employment resulting from the Project.

DAE estimates that the Project would spend $66 million per year during establishment and $89 million per year during operations on non-labour inputs.

The Applicant considers the Project would be unlikely to have any material negative effect on tourism and business travel or displacement of specific land use, as the Project is located within an existing mining area and on land primarily owned by the Applicant.

6.8.3 Conclusion

The Department is satisfied that the Applicant's EIA is broadly consistent with the relevant Government guidelines. CIE's review confirms that the Project would generate a net benefit to the NSW community. However, the exact quantum of that benefit cannot be accurately determined in part because of the inherent uncertainty in forecasting coal market demand and prices. CIE's review shows a benefit around $256.8 million is a conservative expectation. Furthermore, the Project would offer continued employment for workers whose jobs would mostly like cease at the end of 2020 if the Wambo open cut closed. The additional jobs the Project would create, both short term (through 120 construction jobs) and long term (through 250 operational jobs), would also have a substantial local impact, given the relatively high percentage of unemployment in the area.

6.9 Social and Cultural

The EIS includes a Social Impact and Opportunity Assessment (SIOA) prepared by Umwelt (Australia) Pty Limited to consider costs and benefits of the Project in non-monetary terms.

The SIOA addresses perceived impacts and opportunities of the Project on nearby communities. Stakeholders within the Singleton LGA, including the nearby communities of Warkworth Village, Jerrys Plains, Maison Dieu and Bulga, provided information about existing operations, perceptions of potential impacts and improvements in communication and interactions between the Applicant and the community. However, the Department notes that around 60% of the 665 participating stakeholders were either United or Wambo employees or suppliers. While it is likely that this reflects the nearby community as employees and suppliers would live and work locally (ie in 2011, 25% of the Singleton LGA were employed in the mining industry), this approach may overestimate the perceived benefits of the Project.

Singleton and its surrounds has supported a coal industry since 1850 when mining began at Rix's Creek and Glendon and remains an area whose growth and economy is encouraged by the presence of mining. For the past 20 years Singleton has seen a growing mining industry, which has brought economic benefits to the town. Similarly, agriculture has a long history in the Hunter Region, primarily comprising a mix of grazing and cropping. The dairy industry has reduced in size significantly but has maintained similar production volumes. Beef cattle production also remains high but with far fewer producers than previously.

The potential benefits from the Project identified in the SIOA include:

- *economic benefits* - through generation of local employment, opportunities for local commercial contracts and social investment (see **Section 6.8** for further discussion);
- *incoming workforce* - anticipated increase in participation in community life through volunteering, schools, sporting and community groups and informal social networks; and
- *sense of community* - largely limited to Jerrys Plains, perceptions that the Project may improve the sense of community.

Locally, economic benefits are focused on continued and additional employment directly attributable to the Project and indirect flow on benefits. In regard to demand for community services and infrastructure, the key impacts of the Project would be the temporary increase of up to 120 construction workers and a more long-term increase of around 250 operational employees (bringing the total operational workforce to 500). Particularly in Jerrys Plain, many residents are familiar with mining impacts, have worked or know someone in the mining industry, or were hopeful of gaining employment within the industry.

Overall, within each of the nearby localities there is a differing sense of community. The perception that the Project may improve the sense of community is largely driven by opportunities in Jerrys Plains. Stakeholders indicated that there is no current cohesive sense of community within Warkworth Village. This is likely the result of previous land acquisitions by mining companies (with most of those houses now rented out), and general reductions in population and services that many small rural areas and communities are experiencing. Warkworth Village still holds nostalgic significance to many previous residents and their families who now live elsewhere. It is not anticipated that the Project would impact this significance.

The Applicant has proposed to negotiate a Voluntary Planning Agreement (VPA) with Singleton Council, which would include public benefit contributions to maintain or improve local facilities and services. The SIOA includes several suggestions from stakeholders about potential opportunities for such projects in the key localities. The Department notes that these VPA negotiations are ongoing between the Applicant and Council.

Stakeholder consultation identified that potential impacts perceived by the local community mainly relate to those affecting social amenity, including:

- *air quality* – a key issue raised in submissions, and by local and regional stakeholders. Perceived health impacts from dust emissions are a recurrent concern, despite very few formal complaints via the Wambo community hotline;
- *noise* – consistently raised as a concern by the community, the most frequent complaint received by the Wambo mine and identified as an issue in submissions;
- *blasting* – concerns relate to vibration, air quality, structural damage and inconvenience from road closures. Blasting was also the second most common complaint made through the Wambo mine community complaint line between 2011 and 2014;
- *visual impacts* – concerns relate to decreased amenity and impacts on rural outlook; lighting from night operations is also a concern; and
- *final land use and rehabilitation* – identified as both an opportunity and potential risk, with concerns about weeds and pest management raised. The community's preference is for the area to be returned to grazing and pastoral land.

Air quality and noise impacts were some of the most frequent concerns raised by objectors in public submissions on the Project (see **Section 5**). An analysis of existing Wambo mine complaints between 2011 and 2014 again identifies similar concerns, with noise and air quality regularly the subject of complaints. Community stakeholders previously expressed dissatisfaction with the level of engagement from Wambo, although the SIOA notes that steps to improve engagement have been taken.

The EIS provides specialist studies to assess the Project's impact on each of these matters. However, community perceptions of these impacts contrast with these specialist assessments. The Department has carefully considered all impacts in **Section 6** of this report. Generally, these impacts are within the relevant criteria or mitigation and remediation strategies are proposed to reduce the impact to acceptable levels set under NSW Government policy. This includes 31 properties predicted to be subject to voluntary mitigation or acquisition rights. While acknowledging that there are differing community perceptions, the Department is satisfied that the specialist assessments and additional information provided by the Applicant appropriately address the environmental impacts of the Project.

On 8 September 2017, during assessment of this Project, the Department released its Social Impact Assessment Guidelines. The transitional arrangements for projects already under assessment allow the Department to request additional information, consistent with the guideline, if reasonably required to consider the application. At this stage, the Department has not requested further material to inform its preliminary assessment.

Conclusion

The Department recognises that the Project would have a social impact on the local community and that social dynamics and community cohesion has experienced changes as a result of other mining projects in the area. The Department notes some benefits have also been identified.

The Project's social impacts are directly linked to the Department's consideration of the range of issues in **Sections 6.1** to **6.11** of this report, including amenity and health impacts, water, rehabilitation, agriculture, biodiversity, traffic, heritage and visual impacts. While the Project would largely meet relevant criteria and acceptable impact levels set under NSW Government policy, particularly given the acquisition of land within and around the Project area, the Department acknowledges that there would be residual social impacts borne by the local community.

The Department considers that social amenity impacts identified by stakeholders can be managed to acceptable levels through management plans and standard conditions that require:

- independent review, if a private landowner considers the relevant criteria has been exceeded on their land;

- an Environmental Management Strategy that keeps the local community and relevant agencies informed about the Project's operation, including making information publicly available on the Applicant's website;
- protocols for managing and responding to complaints; and
- operation of a Community Consultative Committee.

The Department encourages proactive engagement with nearby landholders and the wider community. Stakeholders requested regular updates via email or phone and regular community information sessions to provide information on:

- employment opportunities and processes;
- anticipated and actual impacts experienced locally;
- meeting notices; and
- updates on general operations.

6.10 Aboriginal and Historic Heritage

6.10.1 Aboriginal Heritage

Introduction

An Aboriginal Cultural Heritage Assessment (ACHA) and an Aboriginal Archaeological Values Assessment (AAVA) were prepared for the Project during 2015 to 2016. The ACHA was undertaken in collaboration with the Registered Aboriginal Parties (RAPs) and Knowledge Holder groups, including consultation with 83 RAPs and three Native Title claimant groups. Important contributions were also made by a large number of Aboriginal people who were not RAPs for the Project but are traditional owners in the Hunter Valley area.

The Project area is situated within the traditional country of the Wonnarua people and the Wanaruah Local Aboriginal Land Council (LALC). It is also located within the boundaries of Native Title claims by the Plains Clans of the Wonnarua People (PCWP) and the Wonnarua Traditional Custodians (WTC). The area surrounding the Project area has been significantly modified by historic land clearing for agricultural, mining and forestry activities. Land disturbance activities which have been undertaken in the past within the proposed disturbance footprint include land clearing for grazing and mining activities, construction of dams and creek diversions and revegetation measures.

Assessment

The ACHA considered 128 archaeological sites, all of which are stone artefact sites, including artefact scatters, isolated finds and extensions to previously recorded sites (see **Figure 25**). The Project would directly impact 127 sites, including 80 artefacts scatters, 45 isolated finds and two potential archaeological deposits. One site (Wambo 202; #37-5-0343) would be partially impacted by the Project. 122 sites were assessed to be of low scientific significance and 6 were assessed as of low-moderate scientific significance.

The overall scientific significance of sites within the ACHA's survey area has been diminished due to a combination of wide-spread gully erosion and consequential soil loss; major disturbances from approved mining activity and related infrastructure, farming and civil infrastructure; fragmentation of the archaeological landscape between these disturbances; and varying degrees of archaeological salvage undertaken within the survey area.

The ACHA found that the area surrounding the Project is of high significance to the Wonnarua community but the sites and places located within the Project area were considered to be of lower significance.

The Project would also result in indirect impacts on Aboriginal cultural heritage values and add to the cumulative loss of cultural heritage in the Hunter Valley. To manage these indirect impacts, the Applicant consulted with the RAPs to determine appropriate mitigation and management measures, including on-site and off-site cultural heritage management and conservation measures.

The Applicant proposes to undertake a number of mitigation and management strategies when disturbing and salvaging sites, including:

- updating the existing United Aboriginal Cultural Heritage Management Plan (ACHMP) to reflect the Project, including a dispute resolution process for engagement with the RAPs;

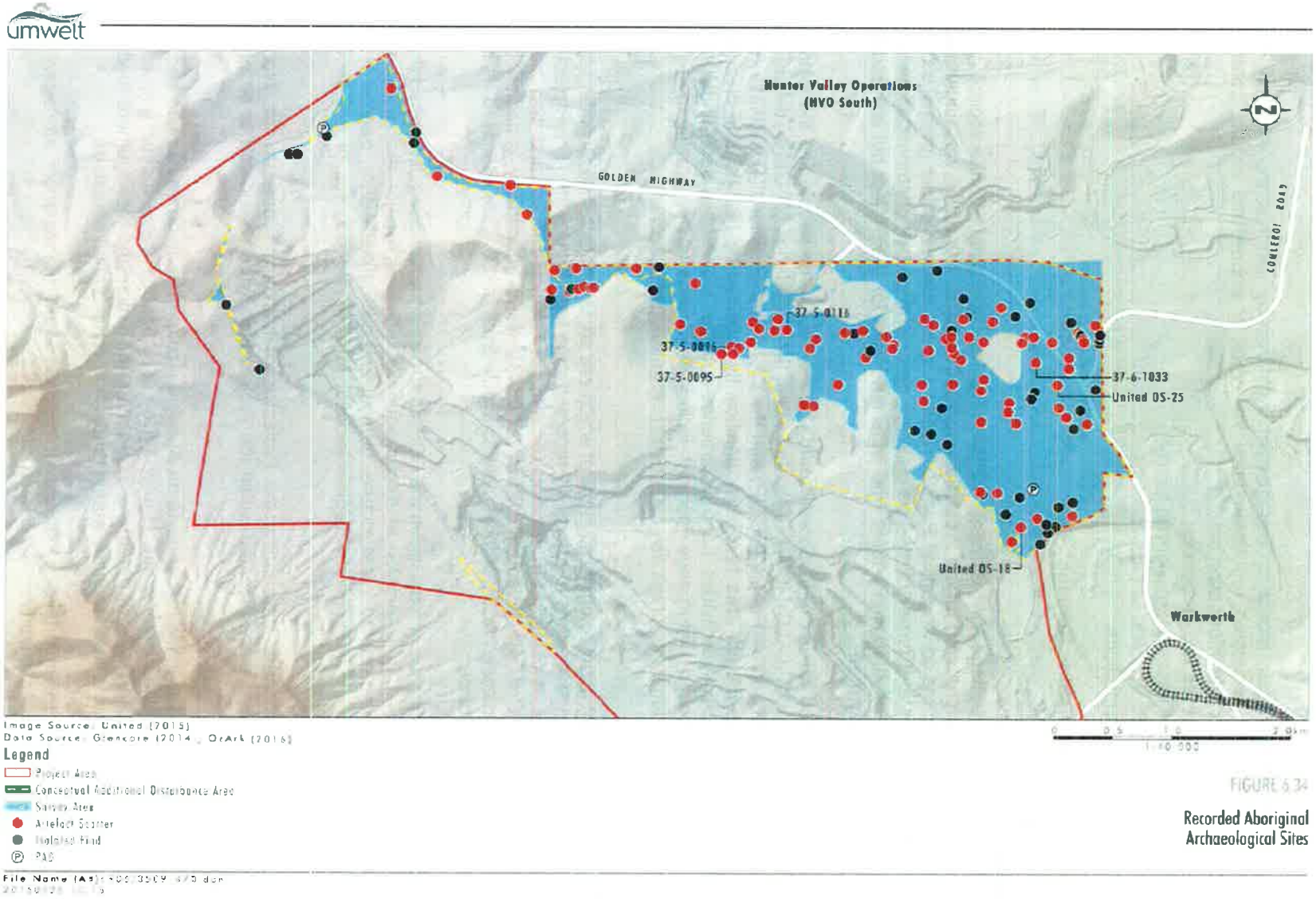


Figure 25: *Identified Aboriginal archaeological site*

- salvaging (excavation, analysis and collection) of directly impacted (or harmed) Aboriginal cultural heritage sites in accordance with the AAVA's recommendations;
- applying the precautionary principle to the development of management measures in the event of discovery of previously unknown cultural heritage items;
- care and control measures for recovered Aboriginal objects;
- storing recovered artefacts at the Wollombi Brook conservation area at Bulga Coal Operations unless a regional Wonnarua Keeping Place is developed in consultation with the Wonnarua community; and
- implementing an Aboriginal archaeological management measures program as recommended by the AAVA for sites which would not be impacted by the Project.

The Applicant also proposed to fund research projects related to 'Caring for Land', 'Bringing People Together' and 'Cultural Awareness/Education'. The research projects stem from feedback received over the course of consultation with the Wonnarua community. The Applicant proposes that programs are established that would be accessible to applications from the Wonnarua community for a period of 2 years from the commencement of the Project. The research projects would be undertaken in accordance with OEH's *Aboriginal Community Wellbeing Toolkit*.

The Department is of the view that extensive archaeological and survey work has been undertaken, including consultation with RAPs and Knowledge Holder groups. Aboriginal heritage sites identified within disturbance areas have been classified as being of generally low significance, with some sites of low to moderate significance.

Conclusion
The Department and OEH support the proposed mitigation measures and conservation measures. It is recommended that, should the Project be approved, conditions of consent be developed and the United ACHMP be revised to reflect the mitigation and conservation measures. With conditions and an updated ACHMP in place, the Department believes that the Project would have acceptable impacts on Aboriginal cultural heritage.

6.10.2 Historic Heritage

Introduction
The EIS includes a Historic Heritage Assessment (HHA) which focused on the potential impacts of the Project on historic heritage sites within and near to the Project area. The HHA was developed in consultation with key stakeholders including the Heritage Division, OEH and community stakeholders. In particular, a heritage fence expert was consulted regarding a Dog-leg Fence located in the Project area. A Statement of Heritage Impacts was also prepared to assess the indirect impacts of the Project on the Wambo Homestead Complex, located outside the Project area.

The area where the Project is located has been predominantly used by graziers, agriculturalists and the mining industry. The HHA demonstrates settlement by Europeans in the early to mid-nineteenth century and the subsequent use of the land for pastoral and agricultural activities. With the exception of the former Warkworth Royal Australian Air Force (RAAF) Landing Ground – Satellite Airstrip, the historical heritage resource is considered to be typical of the surrounding area, ie former house sites, sheds, yards and rural structures associated with the pattern of land use.

Grazing, farming and horse breeding in the Hunter Valley dates from the early 1820s. The development of coal resources commenced in the early 1900s, followed by rapid expansion in the 1950s. Electricity generation became an important contributor to the regional economy with the establishment of major coal fired power stations in the Singleton area in the 1950s.

Assessment
The HHA identified no heritage sites/items listed in the NSW State Heritage Register (SHR) and State Heritage Inventory, Australian Heritage Database or Singleton LEP 2013 located within the Project area (see **Figure 26**). However, three listed items were identified within 3 km of the Project area. The SHR listed Wambo Homestead and Outbuildings is located adjacent to the Project area towards the south. Two heritage items of local significance were also identified, ie St Philips Church in Warkworth Village 1.2 km east of the Project area and the Queen Victoria Inn Ruins 1.8 km to the east of the Project area.

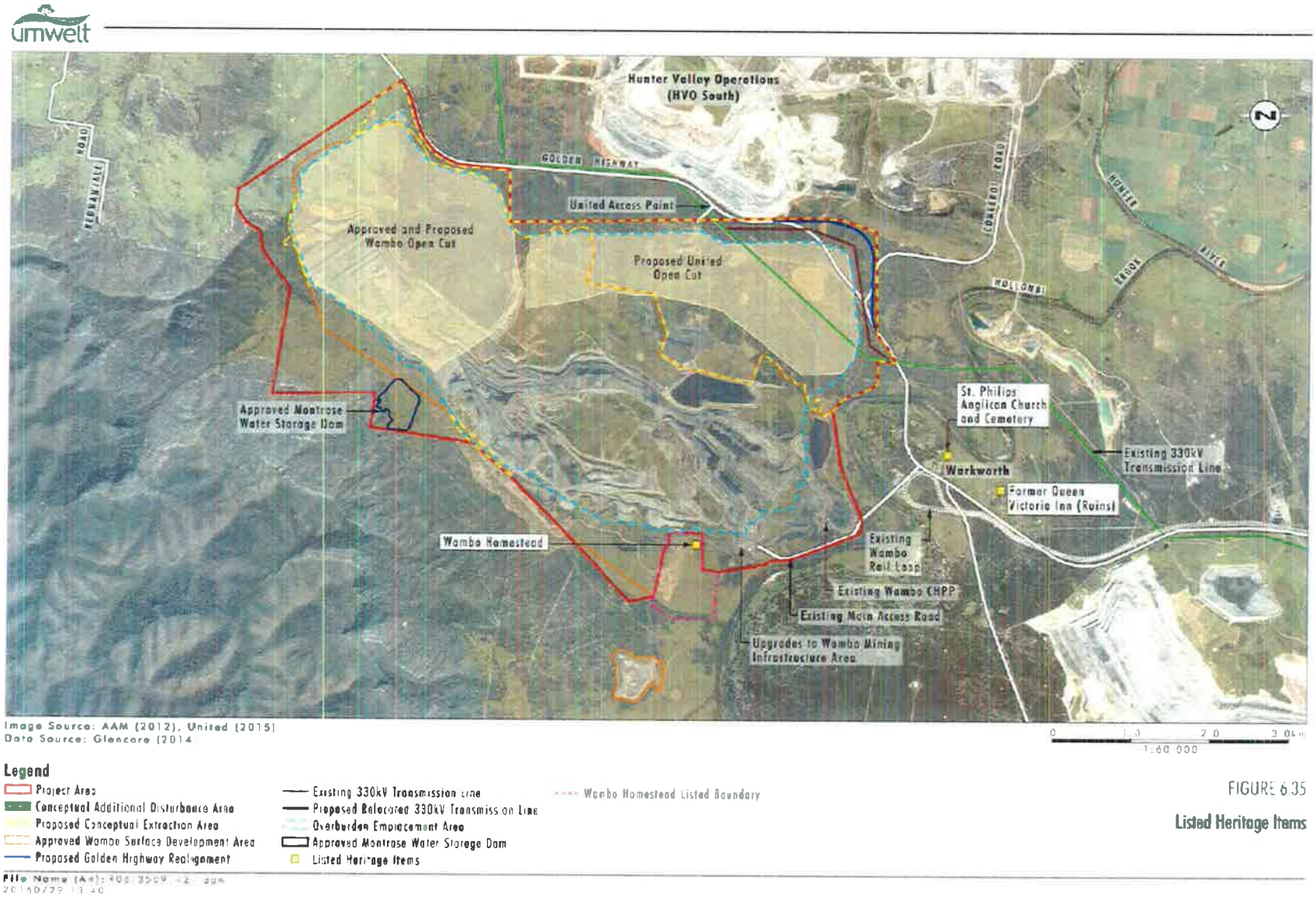


Figure 26: *Listed heritage items*

An additional 13 potential historical sites/items were identified within or near the Project area (see **Figure 27**). These include two sections of a Dog-leg Fence west of Jerrys Plains Road, a 450 m section located within the Project area and a 1.3 km section located immediately outside the Project area, and the Former House Site located within the Project area, which would be directly impacted by the Project.

The three listed heritage items are not located within the Project area, therefore there is no risk of direct impacts on these sites/items. The main potential indirect impact would be in the form of ground vibration from blasting. The predicted ground vibration ranges from 0.1 to 1.5 mm/s at Wambo Homestead, 0.2 to 2.4 mm/s at the St Philips Church and 1 to 1.5 mm/s at the Former Queen Victoria Inn Ruins. These ground vibration levels are below 3-5 mm/s, above which material impacts would be expected to occur. Blast impacts are discussed in more detail in **Section 6.3**.

The Applicant proposed that the existing management measures in place under Wambo's development consent are maintained. The main proposed management actions for each of the listed heritage items are summarised in **Table 14**.

***Table 14**: Summary of proposed management actions for listed heritage sites/items*

Listed item/site	Location	Impacts	Proposed Management Actions
Wambo Homestead	Adjacent to Project area (south)	• No predicted impacts	• Maintain existing management measures under the Wambo consent and approved Conservation Management Plan. • Blast monitoring for blasts within 2 km. • Review of blast records by a suitably qualified and experienced structural engineer. • Annual inspections by an approved structural engineer.
St Philips Church Warkworth	1.2 km east of Project area	• No predicted impacts	• Blast monitoring using blast monitors in Warkworth Village to confirm that blast vibration levels meet the criteria.
Former Queen Victoria Inn Ruins	1.8 km east of Project area	• No predicted impacts	• N/A

The proposed management actions to mitigate direct or indirect impacts on potential heritage sites/items, excluding site/items deemed to be of little significance and no research potential, are summarised in **Table 15**.

***Table 15**: Summary of proposed management actions for potential heritage site/item*

Listed item/site	Location	Impacts	Proposed Management Actions
Dog-leg Fence	Two sections: within and to the north of the Project area	• Approximately a total of 675 m within the Project area would be removed. • Possible indirect impact from blasting ground vibration on the remaining 1230 m outside the Project area.	• Detailed survey and photographic/archival recording in accordance with OEH guidelines. • Additional research to attempt to identify the constructor and construction date. • Creation of an interpretation feature at the mine site entrance or a community park including reconstructed fence section(s) using salvaged materials (stone blocks, logs, etc) and signage to highlight its heritage significance.
Former House Site	Within Project area	• structures removed ahead of open cut mining.	• Archaeological investigation prior to disturbance. • Archaeological work method statement to be provided to OEH's Heritage Division, for comment.
Shearing Shed and Creamery	Within Project area	• structures removed ahead of open cut mining.	• Photographic/archival recording in accordance with OEH guidelines. • Investigation of potential for archaeological relics and appropriate mitigation measures in the Heritage

			Management Plan. • Additionally, OEH recommended that photographic views to and from site, drawings/plans of the site and a map of where the photographs were taken is recorded.
Montrose Property	450 m north of Project area	• May be susceptible to impacts from ground vibration (max. predicted ground vibration of 14 mm/s).	• Photographic/archival recording in accordance with OEH guidelines. • Main house of the property already recorded during the HHA. • Further research to understand the history of occupation and use of the property. • Additionally, OEH recommended that a condition report be reported prior to blasting.
Former Warkworth Public School	480 m east of Project area	• May be susceptible to impacts from ground vibration.	• Blast sizes to be managed to 5 mm/s ground vibration at the site via the application of lower charge masses, except if agreed otherwise with the owner and/or based on structural assessment that identifies alternate acceptable vibration levels. • Ongoing blast vibration monitoring to monitor compliance
Warkworth RAAF Landing Ground – Satellite Airstrip	Adjacent and partially inside the northeast corner of the Project area	• Only the southwest corner is within the Project area (not including the runway)	• The site, including the airstrip, is currently used by the HVGC. • See **Sections 6.3**, **6.7** and **6.11** for consideration of expected impacts and mitigation measures.

The Applicant proposed the following management measures to mitigate impacts in the event of unexpected discovery of heritage items/sites:

- establishing procedures in accordance with section 146 of the *Heritage Act 1977* to cease works and notify OEH's Heritage Division in the event of an unexpected archaeological or heritage item discovery; and
- establishing procedures in accordance with the *Policy Directive – Exhumation of Human Remains* (NSW Department of Health, 2008), *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998) and the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (NPWS, 1997) to appropriately identify and secure the site in the event of the unexpected discovery of a burial site or skeletal remains.

Conclusion

The Department considers that the proposed creation of a public interpretation feature using salvaged materials and signage to highlight the heritage significance of the Dog-leg Fence would significantly mitigate impacts on this structure, which is currently in a state of natural degradation due to exposure to the elements. The Applicant's proposal to undertake a detailed archaeological investigation in accordance with OEH guidelines before removing the Former House Site is also considered to be acceptable.

The Department notes that the remainder of the items/sites that would be directly impacted were assessed to be of little or no heritage significance. Nonetheless, those heritage items/sites which would be removed are proposed to be recorded in a photographic record. Where appropriate, the indirect impact of ground vibration on heritage sites/items located close to the Project area would be managed through existing or updated blast management controls.

Given the absence of predicted impacts on listed heritage items, the Department considers that the potential impacts on historic heritage sites/items would be relatively minor in the context of existing mining operations in the area. The proposed mitigation and management measures would preserve heritage values so far as is practicable. The Department is therefore satisfied that the impacts would be satisfactorily managed under a Heritage Management Plan and conditions of consent.

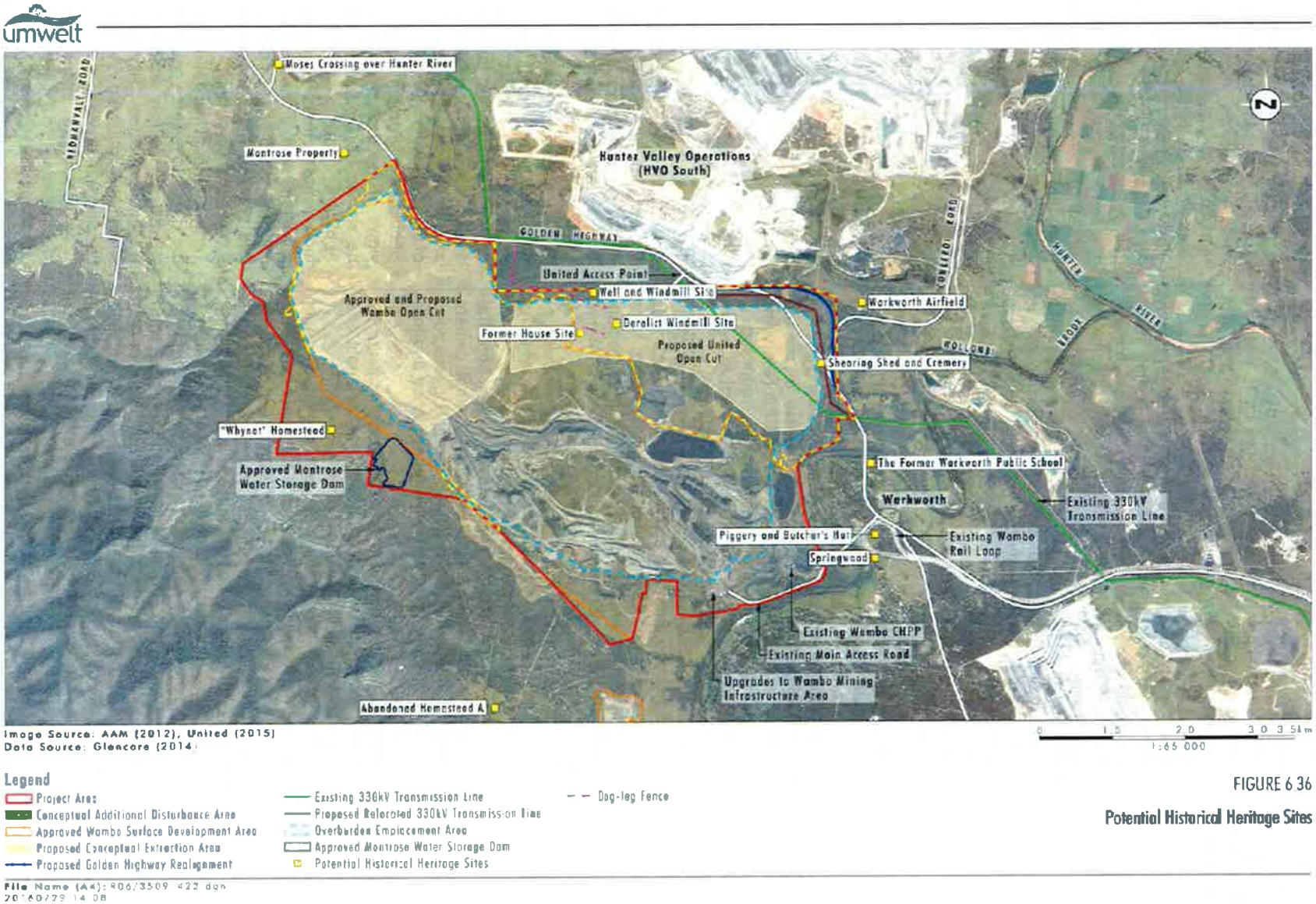


Figure 27: *Potential historical heritage sites*

6.11 Other Issues

The Department is satisfied that the other impacts associated with the proposed Project are likely to be minor. Consideration of these impacts is provided in **Table 16**, below.

***Table 16**: Summary of other issues*

Issue	Potential Impacts	Consideration & Conclusion
Agriculture, Soil and Land Resources	• The predominant land uses within the local area are mining, agriculture and conservation. Agricultural land use is dominated by grazing, with intensive cropping on alluvial flats. • The majority of land within the Project area is already subject to mining operations but a small portion in the northwest corner is currently used for low-intensity grazing. This land would be replaced by mining operations. • The Soil and Land Capability Assessment indicates that the vast majority of land proposed for open cut mining is LSC Class 5, (ie moderate to low capability with severe limitations). • No critical industry cluster land, either equine or viticultural, occurs close to the Project (at least 5 km away). • The Applicant lodged a SVC application with the Department which verified that biophysical strategic agricultural land is not present in any area of the Project, not previously disturbed by mining operations or subject to road infrastructure or a current mining lease. • The Applicant has committed to the use of pasture species in the final landform to support future dryland grazing, to mitigate the effects of the reduction in grazing land proposed under the Project and to return the land in the northwest corner to LSC Class 4.	• The Department considers that the Project's impact on agricultural land use within the area would be minor. • The Department considers there to be merit in reinstatement of grazing lands in the northwest of the landform as this would integrate with surrounding grazing lands.
Visual	• The Hunter Valley is characterised by gently undulating forested slopes, farmland and agricultural land uses, as well as power generation and coal mining activities. • Despite the presence of mining activities in the region, many private residences and public areas are sheltered from such views by intervening ridgelines that traverse the Valley. These natural ridgelines can minimise or block direct views of mining activities and provide for isolated areas characterised by rural landscapes. • The EIS notes that the main visual impact from the Project would be increased overburden emplacement heights. This would be mitigated through overburden and landform design, progressive rehabilitation and tree screening. • Views of existing mining operations would continue for private receivers towards the south and northeast and along sections of the Golden Highway. • Some areas along the Golden Highway would experience increased views of emplacement operations, as would some residences in Warkworth Village towards the southeast. • The Department notes that, while intervening topographic ridges would mitigate views for private receivers in Moses Crossing, limited views would be experienced when the operation is mining at height. While recognising that these views may occur over a lengthened period of time, the Department is satisfied that the Project would not materially increase visual impacts beyond those currently approved for the Wambo mine. • Further, the Department considers that the improved final landform designs (see **Section 6.5**) would integrate more naturally with the surrounding landform features and improve long-term visual amenity, post-mining. • The HVGC expressed concern over the potential for	• The Department is satisfied that the visual impacts of the Project would be relatively minor, especially when considered in relation to the existing operations. • The Department is satisfied that the long-term visual impacts of the Project could be suitably minimised through appropriate landform design and progressive rehabilitation of the final landform. • Should private properties with views of the Project claim to be significantly impacted, the Applicant could undertake further assessment of these properties and, if necessary, implement further site-specific and targeted visual mitigation such as tree screening. • Targeted visual mitigation for the HVGC to mitigate potential impacts of visibility from the realigned Golden Highway. should be reflected in any conditions of consent. • The Department intends to recommend standard conditions regulating visual impacts in the consent.

	trespassing, theft, vandalism and runway incursions due to the closer proximity and increased visibility from the realigned Golden Highway. The Applicant has recommended treatments such as the use of tree planting to act as a visual screen from the Golden Highway.	
Waste	• The Applicant proposes to develop a waste management system using the existing United Waste Management Plan which is aimed at waste avoidance and reduction, re-use, recycling and appropriate removal and disposal. • This program would continue to apply to general solid, liquid, hazardous and special waste streams (eg used tyres) generated by under the Project. • The Applicant proposes to amend the existing United EPL 3141 to incorporate the Wambo open cut, currently licensed under Wambo's EPL 529. EPL 529 would then apply to the Wambo underground operations and CHPP only. • EPA has expressed uncertainty over separation between the revised EPLs, particularly the potential for overlapping EPL boundaries and transfer of materials, including waste materials, between the two adjacent but separately managed entities. • Tailings emplacement is proposed to continue within Wambo's approved Homestead and Main Homestead TSFs and, once available, within the Bates South void. • The Applicant expects tailings storage volume to be sufficient for all tailings generated by the Project and the Wambo mine. Other mining voids may also become available over the life of the Project. • Coarse rejects would be trucked to the overburden emplacement areas and subsequently emplaced within overburden material. • The TSFs would be dewatered to promote geotechnical stability with the decant water re-used on site for coal processing or dust suppression. • Geochemical characterisation studies demonstrate that the quality of waste rock and tailings leachate should not adversely impact the mine's WMS. • The Applicant proposed that the WMS would receive all leachate from tailings and that the leachate volume would make up a small proportion of the total water balance. However, as a precautionary measure, the Applicant proposed additional groundwater bores and ongoing monitoring to ensure early detection should leachate characteristics change. • Over the post-mining period, seepage from the TSFs is expected to report to the United pits final void.	• The Department is satisfied with implementation of the Applicant's waste management strategy based on the hierarchy of waste principles (ie avoidance, re-use, recycling and disposal) at the Wambo mine. • The Department recommends that the Applicant continue to consult with the EPA in order to resolve concerns over overlapping EPLs at the Project and Wambo mine. • The Department considers the available capacity for tailings emplacement to be sufficient and recognises the potential land use and waste management benefits arising from utilising mining voids as approved TSFs. • The Department notes that the geology of the Hunter coalfields has historically presented a low risk of acid and metalliferous drainage. • Nonetheless, the Department recommends that monitoring of leachate quality and that groundwater monitoring bores are required as conditions of consent. • The Department is satisfied with the Applicant's proposed waste management strategy.
Hazards	• The application seeks to continue to use the existing Wambo explosives magazine and Ammonium Nitrate Emulsion (ANE) storage tank located in the south of the Project area on rehabilitated land, and to relocate these facilities as mining progresses. • The storage facilities are Class 5.1 (oxidising materials) and Class 1.1 (explosive materials) and must maintain separation distances of 1,300 m and 320 m, respectively. • At present the storage facilities are at acceptable distances to the proposed open cut mining, the CHPP, rail infrastructure and the site boundary. The Applicant has committed to maintaining the licensed separation distances as mining progresses. • The Applicant is not seeking to increase the hazardous materials inventory but an increase in expected coal extraction from the Project in comparison to the existing Wambo mine, may result in an approximately 25% increase in hazardous materials transported to site.	• The Department is satisfied that the Project would not increase the likelihood of off-site hazards and would not materially affect existing arrangements relating to delivery and storage of explosives, or operational procedures and management measures in place at Wambo mine. • The Department notes that, should the location of the explosives storage facilities change over the Project life, the new location would have to comply with the requirements of SEPP 33 including appropriate buffer

	• The Preliminary Hazard Assessment (PHA) considered the route selection for transportation of technical grade ammonium nitrate along two possible routes from Kooragang Island and of ANE from representative suppliers at Mt Thorley and Liddell. • The PHA noted that the Project proposes to increase the annual tonnages but not the maximum daily tonnages of hazardous materials transported, over the current limits at Wambo mine. • In addition to the technical design specifications for the storage and handling of hazardous materials, the Applicant proposes to implement procedures such as safe work procedures, an emergency response plan, on-site speed limits, regular inspections and equipment maintenance to further mitigate risks. • The Applicant proposes to prioritise the selection of hazardous materials supply contractors to favour approved carriers of dangerous goods and contractors with suitable safety management systems. • Other hazardous materials, including diesel and lubricants, would continue to be stored in above-ground tanks with capacities of 370 kL and 57 kL, respectively, in accordance with AS 1940-2004 *Storage and Handling of Flammable and Combustible Liquids*. • HVGC questioned whether blasting would impact on the safety of the club's operations, due to the proximity of the airfield to the proposed United open cut. At a distance of 670 m, the HVGC would be located outside the 500 m blast exclusion zone. However, flights approaching the airfield might enter the exclusion zone. It is recommended that the Applicant be required to develop a communication protocol to coordinate blasting with the HVGC to ensure flight safety. • It is also recommended that the Warkworth Shooting Complex is included in this communication protocol, given its location at the limit of the 500 m exclusion zone from the proposed United open cut. • The HGVC also questioned whether changes to the landform near the HGVC might present obstacles to aircraft in the vicinity of the airfield. The Department notes that the Project would result in higher overburden emplacements. The HGVC requested and the Applicant agreed to continue consultation to identify any hazards that the landform design might present to the operation of the HGVC. The Department is supportive of this approach.	zones. • The Department recommends that the Applicant continue to consult with HVGC during the development of the landform design so that the height of overburden emplacements is given due consideration. • The Department is of the opinion that hazards posed by blasting to the HVGC and Warkworth Shooting Complex could be appropriately managed through appropriate blast design, communications protocols and associated management actions. It is recommended that these requirements be included in conditions of consent. • The Department is satisfied that the Project could be operated to minimise hazard risks to the public and the environment.
Public Infrastructure	• The EIS identifies that a range of public infrastructure occurs in the area surrounding the Project. • The main impacts of the Project on this infrastructure is associated with the proposed realignment of electricity transmission lines (ETLs) and telecommunications infrastructure to allow for the development of the United open cut. Impacts on transport infrastructure is discussed in **Section 6.7**. • The Project proposes the realignment a 3.2 km section of a Transgrid 330 kV ETL as well as sections of Ausgrid 66 kV and 11 kV ETLs to allow access to coal resources in the United open cut (see **Figure 6**). • The Applicant has confirmed that it has commenced discussions with Ausgrid and Transgrid regarding potential routes for the realignment of the ETLs, however the final design is subject to development of a detailed design, in consultation with these infrastructure owners. • Ausgrid has indicated in correspondence to the Department that it is satisfied that the impacts of the Project can be managed through the Department's standard conditions of consent to protect public	• In developing the proposed infrastructure realignments, the Applicant has reviewed alternative designs such as altering the mine design and different routes for the realignment. The design seeks to balance numerous considerations including the needs of infrastructure owners, safety concerns such as potential interference with flight paths at the HVGC and electromagnetic fields (EMFs), visual and vegetation clearance impacts and limiting resource sterilisation. The Applicant is consulting with RMS, Council, Transgrid, Ausgrid, Telstra and the local community (including the HVGC and Warkworth Shooting Complex) in

	infrastructure. • The Department notes that the Applicant has consulted with the HVGC regarding the design of the realigned ETLs to ensure they do not interfere with the operation of flights. The 330 kV and 66 kV transmission lines would be located approximately 590 m and 550 m from the HVGC, respectively. • The ETLs were designed in accordance with the *Civil Aviation Safety Regulations 1998* and the Applicant has committed to implement the HVGC's request to fit high visibility markers and daylight visible strobe lights on towers, subject to agreement with the infrastructure owners. • Existing telecommunications and associated infrastructure located adjacent to the Golden Highway would also require rerouting when the Golden Highway is realigned. The Applicant has commenced discussions with Telstra regarding this matter.	determining the most feasible designs. • The Department is satisfied that the Applicant has given due consideration to the potential impacts and is undertaking extensive consultation with all relevant stakeholders in determining the optimal design for the realigned infrastructure. • Overall, the Department is satisfied that the proposed realignments would be feasible, subject to continued consultation with relevant Government agencies, infrastructure owners and other stakeholders, and that any potential impacts or interactions can be managed through conditions of consent.
Interactions with Neighbouring Mines	• The Blast Impact Assessment noted that no material impacts on HVO South's infrastructure are expected due to Project blasting (see **Section 6.3**). • The realignment of the Golden Highway would not bring the road closer to HVO South than at present but would increase the length of the road at this closest proximity. • The Department notes that HVO has demonstrated that it can manage blasts at this proximity already but also recognises that the realignment may have operational implications for HVO South such as possibly requiring more frequent temporary road. • The Applicant would be required to develop a road closure protocol in consultation with RMS and the Council to manage potential impacts of blasting on road users (see **Section 6.3**). • The Department notes that the Applicant has well established communication channels within the local mining community and that it is common practice in the industry to develop protocols to jointly manage certain activities (such as blasting) between neighbouring mines. • The Department notes that HVO South's development consent includes an area in the southeast of the site which is owned by United. HVO South's current mine plan does not include extraction of coal from this area. • The Department also notes that Yancoal owns two small lots of land which would be impacted by the realignment of the Golden Highway.	• The Applicant should develop and implement appropriate protocols, in consultation with neighbouring mines, such as HVO South and Wambo Underground, to jointly manage potential impacts of blasting (including road closure, avoidance of concurrent blasting and maintaining safe work practices in underground workings). • Protocols should be incorporated in management plans, such as the Blast Management Plan and Traffic Management Plan. • The Department believes that interactions of the Project with HVO South in respect of land owned by the Applicant and the realignment of the Golden Highway over land owned by Yancoal can be addressed by means of commercial agreements between the parties. • The Department is satisfied that interactions with neighbouring mines could be managed by means of conditions of consent requiring establishment of appropriate protocols and implementation of management plans.

7. CONCLUSION

The Department has assessed the development application, the EIS, the RTS and the various other documents submitted to support the application during the assessment process. The Department has also obtained independent expert advice on the economic and air quality aspects of the Project, and carefully considered the advice provided by NSW Government agencies, DoEE and the IESC.

The Department's assessment has concluded that the Project represents a logical and strategic extension of open cut mining operations at the Wambo and United sites. The collaborative approach adopted by the joint-venture partners would allow for efficient recovery of an additional 150 Mt of ROM coal, make use of the existing Wambo CHPP and rail infrastructure and extend the life of mining operations at the site by 23 years. Importantly, the mine plan would optimise the recovery of the State's mineral resources by allowing for the extraction of 40 Mt of additional coal from beneath an area of the approved Wambo open cut's disturbance footprint and the recovery of 110 Mt coal from the new United Pit by avoiding site constraints that would have applied to two stand-alone operations. In this way, the Project would facilitate the recovery of a significant resource with fewer environmental impacts than would be expected form an equivalent greenfield Project.

With regards to amenity impacts, the Department notes that the Project could be managed and conditioned to meet relevant blast vibration and overpressure criteria at all nearby private residences, unless an agreement has been entered into with the relevant landowner to exceed these limits. While the Project would also be expected to achieve acceptable noise and air quality amenity levels at most nearby private residences, it would result in perceivable increases in noise levels and increases in air quality impacts at a number of nearby receivers, relative to the approved Wambo open cut operations.

The Department has identified that, should the Project be approved, 9 private receivers should be afforded voluntary acquisition rights due to these increased amenity impacts and a further 22 private receivers should be afforded rights to the installation of mitigation measures directed at minimising the intrusive and amenity impacts of the Project on these residences. Notwithstanding, the Department considers that, on balance, the Project's air quality and noise impacts would be manageable and could be appropriately monitored and regulated through conditions of consent.

With respect to the environment, the Department's assessment found that while the Applicant still needs to obtain a number of residual offset credits, the quantum of the proposed biodiversity offset package and rehabilitation works would adequately compensate for the Project's biodiversity impacts and would lead to an overall improvement in the extent and connectivity of woodland communities on the floor of the Hunter Valley over the medium to long-term.

The Department is also satisfied that the Project could be managed to account for all water take both during operations and post-mining, and would not result in any material environmental consequences for water quality, downstream users or the receiving environment, relative to existing approved operations.

The Department has also considered the social and economic effects of the Project at the regional and State level, including as a result of interactions with existing surrounding land owners, land users (such as the HVGC and HVO South mine) and public infrastructure assets. The Department is satisfied that the management, mitigation and offset measures discussed would appropriately minimise, address and compensate for any residual negative social and economic aspects arising from the Project. When these matters are considered alongside the Project's substantial social and economic benefits, the Department is satisfied that it would deliver a net benefit to the State of NSW.

Consequently, the Department believes that the proposed mine plan, management measures and final landform outcomes strike an appropriate balance between protecting the environment and local communities and realising the economic benefits of the Project. The Department's preliminary finding is that the Project is likely to be approvable, subject to conditions.

Following the Commission's review of the Project, the Department will finalise its assessment, including carefully considering the Commission's findings. It will then refer the development application for the Project to the Commission for its determination. The Department will also make a recommendation to the Commonwealth Minister in its final assessment report.

Howard Reed 12.12.17

Howard Reed
Director
Resource Assessments

12/12/17

Oliver Holm
Executive Director
Resource Assessments and Compliance

APPENDIX A – ENVIRONMENTAL IMPACT STATEMENT

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7142

APPENDIX B – SUBMISSIONS

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7142

APPENDIX C – RESPONSE TO SUBMISSIONS

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7142

APPENDIX D – STATUTORY CONSIDERATIONS

The Department's assessment of the Project has given detailed consideration to a number of statutory requirements. These include:

- the objects found in section 5 of the EP&A Act;
- matters relating to threatened species found in the now repealed sections 5A-5D of the Act; and
- the matters listed under section 79C of the Act, including applicable environmental planning instruments and regulations.

A summary of these considerations is provided below. Reference should also be made to **Section 4** of this report.

D.1 Objects of the EP&A Act

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

"ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

(a) the precautionary principle;
(b) inter-generational equity;
(c) conservation of biological diversity and ecological integrity; and
(d) *improved valuation, pricing and incentive mechanisms."*

In regard to the *precautionary principle*, the Department has assessed the threats of serious or irreversible environmental damage using reasonable worst case scenarios, and is satisfied that there is sufficient scientific certainty to enable the decisionmaker to weigh up the impacts of the Project and determine the development application.

In undertaking this assessment, the Department has noted the material provided by the Applicant in its EIS, RTS and supplementary responses, has consulted closely to obtain input from key government agencies and has commissioned two technical experts to provide independent advice on the Project.

While it is recognised the Project would result in a number of impacts of varying significance, the key matters that could cause serious or irreversible environmental damage relate to unmitigated impacts on biodiversity values (including threatened species and EECs) and impacts on water resources.

Importantly, the Project incorporates a number of design measures to avoid impacts on these matters so far as the Applicant considers practicable, and mitigate or offset any unavoidable residual impacts. These measures include minimising the extent of surface disturbance by sharing access to existing CHPP, and rail infrastructure assets; restricting the extent of additional disturbance outside of the existing Wambo open cut disturbance area; designing OEAs to build upon existing disturbed areas and create a single integrated final landform with adequate microrelief, surface drainage, landform features that are sympathetic to surrounding landscapes and land uses; and designing mine plans to ensure the maintenance of buffers between mining areas and ensure that final voids are located further away from sensitive waterways and GDEs in order to minimise the duration and extent of drawdown effects on these natural systems. The Applicant has also proposed a range of management measures and offsets to compensate for residual impacts on biodiversity values, including the in-perpetuity protection of at least 2,153 ha of additional biodiversity offset and rehabilitation areas, with additional species and ecosystem offsets to be identified prior to disturbance of these values.

Nevertheless, the Project would need to be operated in accordance with strict conditions of consent, as well as the requirements of an EPL for the site and any necessary licences and approvals related to the take, management and discharge of water. The Department requested the Applicant review any reasonable and feasible opportunities to improve the water quality contained in its proposed final voids, identify opportunities to minimise the number and size of voids to remain in the final landform and integrate these voids into the surrounding environment. The revised mine plans and final landform provided in response to this request would deliver significantly improved post-mining environmental outcomes, relative to the EIS.

The Department has assessed these matters in detail (see **Section 6**) and recommended that a range of risk-based conditions and performance measures be developed to govern the Project, provide

appropriate protection for the environment and minimise the potential for any serious or irreversible environmental damage.

In regard to *intergenerational equity,* the Department acknowledges that coal and other fossil fuel combustion is a contributor to climate change, which has the potential to impact future generations. However, the Department also recognises that there remains a clear need to extract coal resources to meet society's basic energy needs for the foreseeable future.

Overall, the Department notes that the Project's direct energy use and GHGEs would constitute a very small contribution towards climate change at both the national and global scale. In addition, the Applicant has incorporated several measures to mitigate potential GHGEs from the Project. Finally, the Department considers that the socio-economic benefits and downstream energy generated by the Project would benefit future generations, particularly through the provision of national and international energy needs in the short to medium term.

The *conservation of biological diversity and ecological integrity* has been a fundamental consideration of the Department's assessment of the Project. As outlined above, the Department recognises that the Project has the potential to impact biodiversity, but is satisfied that these impacts can be mitigated and/or offset to achieve an improvement in regional biodiversity values in the medium to long-term.

Finally, the Department has considered *improved valuation, pricing and incentive mechanisms* in its assessment of the Project. The EIS was accompanied by an EIA, CBA and SIA that sought to identify, quantify and weigh up the project's costs and benefits based on its full range of environmental, social and economic impacts. In carefully considering these matters, the Department also sought technical advice in the form of an independent review of the EIA and CBA for the Project, against applicable NSW Government guidelines.

CIE's independent review concluded that these documents were generally adequate to inform the assessment process, but identified several matters that required further clarification. CIE reviewed the Applicant's response to these matters and was generally satisfied that they had been addressed sufficiently to support the conclusion that the Project would generate minimum net benefits to the NSW community in the order of $154 to $257 million. CIE recognised that some residual costs around air pollution, noise, biodiversity and water management need to be confirmed prior to determination, these impacts are not expected to materially affect the CBA's conclusions. The Department has considered these matters further in **Section 6.9**, and believes that the Project would still provide a net benefit to the State and local region.

D.2 Threatened Species

The now repealed sections 5A-5D of the EP&A Act relate to threatened species assessment and management. The Department confirms that its assessment of the Project has taken into account the matters listed in these sections in assessing whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats. These matters include the:

- factors in section 5A(2), known as the '7 part test of significance';
- threatened species assessment guidelines[1] identified in section 5A(1); and
- register of critical habitat as identified in section 5B.

In assessing these matters, the Department has had regard to the EIS's Statement of Consistency, the Applicant's RTS and separate FBA assessment (including the 7 part tests of significance included in that assessment), supplementary information provided by the Applicant, along with the threatened species assessment guidelines which assist in the interpretation and application of the 7 factors (or tests) of significance. This assessment has considered the direct and indirect impacts of the Project on threatened species, populations or ecological communities, or their habitats – both on the site and the broader study area, as defined under the threatened species assessment guidelines.

As outlined in **Section 6.4**, the Project would cause a range of direct and indirect impacts on several listed threatened species and communities (including habitat and foraging resources for a number of threatened species) that would be deemed to be significant in the absence of avoidance, mitigation or

[1] Assessment guidelines means assessment guidelines issued and in force under section 94A of the TSC Act or, subject to section 5C, section 220ZZA of the *Fisheries Management Act 1994*, including the *Threatened Species Assessment Guidelines – The Assessment of Significance*, prepared by the then Department of Environment and Climate Change, dated August 2007.

offsetting measures. The Department's assessment concludes that the Project's potential impacts of could be sufficiently mitigated or compensated for to meet acceptable standards, following the application of the proposed avoidance, mitigation and offsetting measures.

In addition to the above, the RTS identifies that the Project is not predicted to result in any significant impacts to GDEs or aquatic biota (including stygofauna) due to either predicted changes in surface water flows within the Wollombi Brook or drawdown within alluvial aquifers associated with the Hunter River and Wollombi Brook. Consequently, the Department is satisfied that the Project is unlikely to cause any significant adverse impacts on threatened species and communities listed under the *Fisheries Management Act 1994*.

In undertaking its assessment, the Department has also paid particular attention to several threatened species and communities listed under the EPBC Act. Consideration of MNES is provided in **Section 6.4** supporting the Department's overall finding that the Project is unlikely to result in any long-term significant effects on threatened species, populations or ecological communities, or their habitats.

Notwithstanding, the Department notes that OEH and DoEE have advised that further offsets are likely to be required to meet the requirements of the EPBC Act. The Department is confident that sufficient time exists prior to determination to allow the Applicant to clarify the extent of this shortfall and identify additional offsets and/or measures that would satisfactorily address the Commonwealth's environmental offset requirements. Once this information is available, the Department will undertake further consideration of the adequacy of the biodiversity offset package under the EPBC Act and the compatibility of the Project with species recovery plans, as part of its final assessment.

D.3 Environmental Planning Instruments (EPIs)

Under section 79C of the EP&A Act the consent authority is required to consider amongst other things the provisions of relevant EPIs including any exhibited draft EPIs and development control plans.

The Department notes the consideration of these instruments provided in the EIS, and has undertaken its own consideration of the Project against the applicable provisions of relevant EPIs. The key instruments relating to the Project include:

- *Singleton Local Environmental Plan 2013;*
- *Hunter Regional Environmental Plan 1989 (Heritage);*
- *SEPP No.33 – Hazardous and Offensive Development;*
- *SEPP No.44 – Koala Habitat Protection;*
- *SEPP No.55 – Remediation of Land;*
- *SEPP (State and Regional Development) 2011;*
- *SEPP (Infrastructure) 2007* (Infrastructure SEPP); and
- *SEPP (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP).

Singleton Local Environmental Plan 2013

The Project disturbance area is located in the Singleton local government area. All subject land within the proposed Project area is zoned RU1 (Primary Production) or SP2 (Infrastructure) under the *Singleton Local Environmental Plan 2013* (Singleton LEP). Open cut mining is permissible with consent in areas zoned RU1 but is prohibited within land zoned SP2.

The Department notes that the land zoned SP2 relates to the current Golden Highway road corridor. As agricultural development may be carried out within this zone, mining is permissible with consent on this land under clause 7(1)(b)(i) of the Mining SEPP.

The Applicant is proposing to realign a section of the Golden Highway over land classified as RU1 (Primary Production). Development for the purpose of roads is permissible with consent in this zone.

Following the relocation of the Golden Highway and gazettal of the alternative road corridor, the existing road corridor would no longer serve its original intended purpose as a mapped Classified Road under the Singleton LEP. As identified by clause 5(3) of the Mining SEPP, the provisions of the Mining SEPP shall prevail over any inconsistency with the Singleton LEP.

Therefore, given that mining is permissible within this area and an alternative Classified Road corridor would be provided under the Project, all components of the Project are permissible with development consent and the Commission may determine the application.

SEPP No. 33 – Hazardous and Offensive Development

Mining operations at the site would entail storage and use of hazardous substances, including Class 1.1 explosive materials and Class 5.1 oxidising materials. Despite the existing dangerous goods licences and management measures in place at the mine, the Department notes that the number of traffic movements required for the delivery of Class 5.1 materials exceeds the annual transport screening threshold and as such the transport of materials could be seen as a potentially hazardous and requiring a PHA of the transport route.

Notwithstanding, the Department notes that existing controls are in place for the delivery of these materials to the existing Wambo operations and considers that these deliveries can continue to be undertaken in an appropriate manner, subject to the development of detailed conditions of consent. The Department has considered this issue further in **Section 6.11**.

The storage of hazardous materials on site could be characterised as a potentially hazardous industry without the employment of appropriate mitigation measures. Having considered the Applicant's assessment of these matters and commitments to maintain appropriate minimum setback distances between its hazardous substance facilities and nearby land users, the Department is satisfied that suitable mitigation measures could be incorporated into the design of the Project to ensure that it would meet relevant standards and be compatible with the existing or likely future use of land surrounding the Project. With the proposed measures in place, the PHA demonstrated that the potential hazards associated with the Project can be managed.

The Department is satisfied that the Project would not increase risks to public safety and would not alter the consequences or likelihood of a hazardous event on the site or during materials transport. Consequently, the Project can be considered to be consistent with the aims, objectives and requirements of SEPP 33.

SEPP No. 44 – Koala Habitat Protection

The Ecological Assessment concluded that the Project would not impact any areas of core or potential Koala habitat, as defined under SEPP 44. This is primarily due to the scarcity of recorded Koala sightings in the area and the results of detailed flora studies on the site. These flora studies indicated the limited presence of limited preferred Koala feed trees (listed in SEPP 44) across the site, including a 0.29 ha area of Forest Red Gum.

The Statement of Consistency and FBA assessment contained in the RTS identify that, despite Koala scats having been historically recorded in the disturbance area in 2006, subsequent monitoring efforts and targeted field surveys between 2009 and 2015 were unable to locate additional evidence of Koala habitation. Consequently, these assessments concluded that while Koalas may utilise the site transiently, resident Koala populations are considered unlikely to occur in the Project area and the proposed clearance of 233 ha of Eucalyptus dominated woodlands would be unlikely to have any significant impacts on Koala populations or the recovery of this vulnerable species.

SEPP 44 aims to conserve and manage Koala habitat to reverse the current trend of Koala population decline. In this respect, the Department undertook detailed consideration of impacts of the Project on Koala populations, including the recovery of populations in the longer term (see **Section 6.4**).

This assessment concluded that the Project was unlikely to result in any significant impacts on Koala populations and would eventually lead to improved long-term habitat outcomes, in part given the presence of three species of preferred feed trees across the proposed offset sites and particularly following the establishment of woodland vegetation corridors under the proposed rehabilitation plan. The Department also emphasised the opportunity to require the incorporation of preferred feed trees into the mix of species comprising the final rehabilitated woodland areas and noted that the establishment of these species would assist in supporting the movement of Koalas throughout the final landscape.

Overall, the Department is satisfied that the Project is generally consistent with the aims, objectives and requirements of SEPP 44.

SEPP No. 55 – Remediation of Land

A vast majority of the proposed disturbance area comprises rural land and remnant woodland vegetation areas, which are unlikely to be contaminated. The remainder of the Project is located on land that is within the existing disturbance areas of the Wambo and United mines.

As with all mining projects, some minor areas of the existing Wambo and United Mine sites may require management for the presence of hydrocarbons prior to mine closure (ie areas surrounding fuel storages). Nevertheless, the Department is satisfied that these matters would not constitute a significant or persistent contamination of the site and could be easily managed and/or remediated under conditions of consent and/or an EPL for the site. Accordingly, the Department is satisfied that the proposed Project could be appropriately managed and remediated (if necessary) to ensure it is suitable for its existing or future use.

Overall, the Department is satisfied that there is limited risk of any material contamination of the land subject to the application and that the Project is generally consistent with the aims, objectives, and provisions of SEPP 55.

SEPP (State and Regional Development) 2011

The proposed development is declared to be State significant development under section 89C of the EP&A Act as it is 'development for the purposes of coal mining', which is specified in clause 5 of Schedule 1 of the *SEPP (State and Regional Development) 2011.*

Consequently, the Minister for Planning is the consent authority for the development. However, the development application falls within the Minister's delegation to the Commission dated 14 September 2011 and 11 October 2017, because there were more than 25 public submissions in the nature of objections and a related entity, Glencore Australia Holdings Pty Ltd, has declared reportable political donations. Consequently, the Commission must determine the application.

SEPP (Infrastructure) 2007

The Infrastructure SEPP requires the consent authority to notify relevant public authorities about developments that may affect public infrastructure or public land. To this end, the Department notified Council, the RMS, Transport NSW, the ARTC, Crown Lands, Ausgrid and Transgrid about the proposed Project.

While none of these public authorities objected to the Project, several made comments on the potential interactions of the proposed development with their nearby infrastructure assets and recommended conditions of consent to manage these interactions, should the Project be approved.

The Department has given extensive consideration to the matters raised by public authorities in its assessment of the Project (see **Section 6**). Where appropriate, the Department has also indicated where it may be appropriate to develop conditions of consent to address the recommendations and advice of these public authorities. The Department is satisfied that such conditions would provide appropriate protection for public infrastructure. While Ausgrid and Transgrid have indicated that they would be generally satisfied if the impacts of the Project on their electricity transmission line assets were managed in accordance with contemporary conditions of consent, the Department will seek their further endorsement of any recommended conditions, prior to finalising its assessment of the Project. Consequently, the Department is satisfied that the requirements of the Infrastructure SEPP have been satisfied.

SEPP (Mining, Petroleum Production and Extractive Industries) 2007

Clause 7(1)(b) of the Mining SEPP identifies that mining is permissible with consent on any land where development for the purposes of agriculture or industry may be carried out (with or without development consent). Consequently, the proposed development is permissible with consent under the Mining SEPP, and the Commission may determine the application.

In addition, Part 3 of the Mining SEPP lists a number of matters that a consent authority must consider before determining an application for consent to undertake development for the purposes of mining. The Department has considered these matters in its assessment of the proposed Project and has included a brief summary of these considerations below.

Non-discretionary Development Standards for Mining (clause 12AB)

The Department's assessment has considered the non-discretionary development standards set out under clause 12AB of the Mining SEPP. These standards relate to a range of considerations concerning potential noise, air quality, blasting and water resource impacts. The Department has considered the application of these standards in relevant sections of **Section 6**.

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. In addition, it has considered the potential impacts on downstream water users and potential noise, air quality, transport and visual impacts at nearby private residences, especially in Moses Crossing and Warkworth Village. This assessment has been undertaken in consideration of the public benefits of the Project, surrounding land uses and measures to avoid, mitigate or minimise any land use incompatibility.

The Department's assessment concludes that the Project is unlikely to result in any material impacts on regional water quality or downstream users. Likewise, the Department has considered current NSW Government policies and is satisfied that subject to appropriate management measures and the provision of acquisition and mitigation rights to the primarily affected landowners, the Project should be able to be operated to meet acceptable amenity levels for air quality, noise and blasting.

Overall, the Department is satisfied that, subject to the application of appropriately detailed conditions, including performance measures and adaptive management, 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 (VLAMP) (clause 12A)
The Department's assessment has considered the NSW Government's VLAMP (December 2014) and concluded that 9 private receivers should be afforded voluntary acquisition rights due to the Project's predicted noise impacts and that a further 22 private receivers should be afforded rights to the installation of appropriate noise mitigation measures. The Department's assessment also concluded that one of these 9 private receivers would also be eligible for acquisition on the basis of predicted air quality impacts.

The Department has considered the application of the VLAMP in detail in its assessment (see **Sections 6.1** and **6.2**). In summary, the Department is satisfied that the Project could be managed to minimise amenity impacts at surrounding private properties and that appropriate landowner rights could be offered through any recommended conditions of consent.

Compatibility with Mining, Petroleum and Extractive Industries (clause 13)
The Department is satisfied that the Project has been designed in a manner that could be managed to be compatible with and not significantly impact adjacent current or future mining-related activities.

The Department acknowledges that the proposed realignment of the Golden Highway would increase the length of road in close proximity to the existing HVO South coal mine and affect management of blasting activities in South Lemington Pit 2. However, the Applicant has advised that Yancoal owns two small lots of land beneath the proposed realignment of the Golden Highway. Accordingly, the Applicant must seek Yancoal's agreement to access this land before it can undertake the proposed road realignment.

The Department has considered these interactions further in **Sections 6.7** and **6.10**, and is satisfied that they can be managed through commercial arrangements and short term road closures, such that the Project would not impede the recovery of coal resources from HVO South.

The Department also considers that the interactions between the Project and the underlying Wambo Mine can continue to be managed to ensure the safety of underground workers and structural integrity of the underground longwall panels and chain pillars. To this end, the Department has recommended that the Applicant be required to develop and implement a personnel evacuation and safety protocol in conjunction with Peabody, including blast vibration trigger levels for surface infrastructure, personnel withdrawal thresholds and longwall structural integrity.

Natural Resource Management and Environmental Management (clause 14)
The Department is satisfied that the Project could be appropriately managed to ensure it is undertaken in an environmentally responsible manner. The Department considers that a detailed range of contemporary conditions could be developed to reflect this approach to managing the Project, including conditions in relation to soils, water resources, threatened species, biodiversity and GHGEs.

Resource Recovery (clause 15)
The Department has considered resource recovery in its assessment of the Project, and is satisfied that the Project can be carried out in an efficient manner that optimises resource recovery within

environmental constraints. Notwithstanding, the Department believes that conditions should be developed to require the Applicant 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 Department notes that the Project would require a range of heavy vehicle materials deliveries, employee light vehicle traffic accessing the site and the off-site transport of product coal on trains along the Main Northern Rail Line to the Port of Newcastle for export. The Department has consulted with the applicable roads authorities and the ARTC in relation to the Project and taken these submissions into consideration in its assessment of the Project (see **Section 6.7**).

Rehabilitation (clause 17)
Overall, the Department is satisfied that the proposed final landforms and rehabilitation plans could be undertaken in a manner that would meet contemporary best practice in the NSW mining industry. The Department considers that conditions should be developed to monitor and enforce the progressive and final achievement of these outcomes, as well as the review and continual improvement of land use outcomes prior to mine closure. The Department also notes that the proposed woodland rehabilitation areas would provide important ecological benefits in the medium to long-term.

Rehabilitation standards and outcomes are discussed in more detail in relevant sections of **Section 6** particularly **Section 6.5**.

Conclusion
The Department is satisfied that:

- the coal resource is significant, both for the Hunter Valley and NSW;
- the Project could be managed to comply with the assessed non-discretionary standards in the Mining SEPP;
- the project could be managed to ensure compatibility with other land uses in the area;
- with the implementation of appropriate mitigation, management and compensatory measures, the Project would have acceptable impacts on major natural resources in the region, including surface and groundwater resources and the biodiversity values of the site;
- the residual biodiversity impacts of the Project would be appropriately offset, leading to an ultimate long-term improvement in biodiversity outcomes;
- the GHGEs of the Project could be appropriately minimised;
- the resource recovery of the Project is appropriate, as it would maximise recovery of coal and minimise the sterilisation of known coal resources (including those underlying previously disturbed areas), while minimising a range of potential environmental impacts;
- none of the coal produced by the Project would be trucked on public roads; and
- the site would be suitably rehabilitated over time to blend in with the surrounding landscape and enhance the biodiversity values of the region.

APPENDIX E – AIR QUALITY EXPERT REVIEW

Air Quality Expert Review – Ramboll Environ Australia Pty Ltd

- Expert Review Report dated 30 September 2016
- Supplements to Expert Review Report including cumulative United/HVO Expert Reviews dated 21 July 2017, 1 November 2017 and 21 November 2017

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7142

APPENDIX F – ECONOMICS EXPERT REVIEW

Economics Expert Review – The Centre for International Economics

- Expert Review Report dated 11 October 2016
- Supplement to Expert Review Report dated 15 September 2017

Refer to the Department's website:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7142