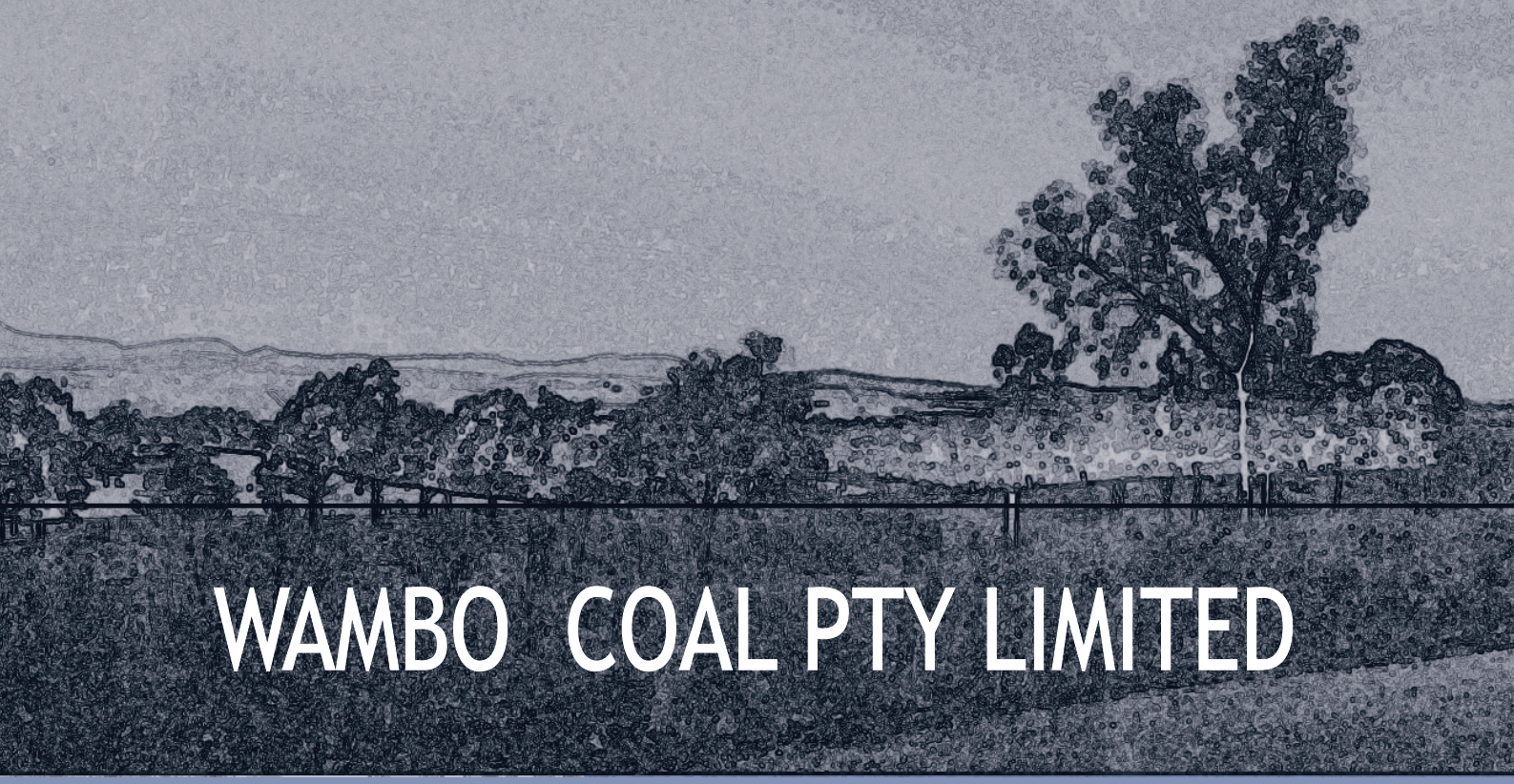

WAMBO COAL PTY LIMITED

SOUTH WAMBO UNDERGROUND MINE EXTENSION

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 REFERRAL OF PROPOSED ACTION

January 2016

Peabody ENERGY

Referral of proposed action

Project title: SOUTH WAMBO UNDERGROUND MINE EXTENSION

1 Summary of proposed action

1.1 Short description

The South Wambo Underground Mine Extension (the Action) is a proposed extension of underground coal mining operations at the Wambo Coal Mine and related surface infrastructure and activities. The Action is located approximately 15 kilometres (km) west of Singleton, near the village of Warkworth, New South Wales (NSW) (Figure 1).

The Wambo Coal Mine is owned and operated by Wambo Coal Pty Limited (WCPL), a subsidiary of Peabody Energy Australia Pty Limited (Peabody). The Wambo Coal Mine was determined to be a Controlled Action in 2003 (EPBC 2003/1138) and was subsequently approved in November 2004 (Figure 2).

1.2 Latitude and longitude

Table 1
Location of the Action

Location Point	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	32	33	56	151	01	13
2	32	37	48	151	00	52
3	32	37	45	150	57	56
4	32	33	54	150	58	08

Location points are presented on Figure 3.

1.3 Locality and property description

The Action is 15 km west of Singleton, near the village of Warkworth, NSW (Figure 1). The Action's additional underground mining areas are located within Coal Lease (CL) 365, Consolidated Coal Lease (CCL) 743, Mining Lease (ML) 1402 and ML 1594, which are mining tenements under the NSW *Mining Act, 1992*.

Land use in the vicinity of the Action is characterised by a combination of coal mining operations, agricultural land use and land reserved for conservation. Lands owned by WCPL that are not subject to mining operations are being utilised for the agistment of stock or part of WCPL's Remnant Woodland Enhancement Program (RWEP).

The Action is generally within land owned by WCPL.

1.4 Size of the development footprint or work area (hectares)

The extent of surface disturbance related to the Action is approximately 7.8 hectares (ha).

The extent of the additional underground mining areas related to the Action is shown on Figure 3 and is located within the boundaries of CL 365, CCL 743, ML 1402 and ML 1594.

1.5	**Street address of the site**	Wambo Coal Mine via Jerrys Plains Road, Warkworth NSW 2330.

1.6 Lot description

The Action would involve underground mining within the areas shown on Figure 3 and associated surface infrastructure and activities. Relevant lot and deposited plan numbers for parcels of land within the area of the Action are provided in Attachment B.

The majority of freehold land (approximately 99%) within the Action area is owned by WCPL (Figure 4).

1.7 Local Government Area and Council contact (if known)

The Action is within the Singleton Local Government Area (Figure 1). The Action is not subject to a local government planning approval, however, any modification of the Wambo Coal Mine Development Consent (DA 305-7-2003) would require approval by the NSW Minister for Planning (or delegate).

Section 2.4 of this referral provides further details about the relevance of the NSW planning system to the Wambo Coal Mine.

1.8 Time frame

The Action would be an extension of underground coal mining operations at the Wambo Coal Mine and related additional surface infrastructure and activities that are necessary to support the extension of underground mining.

It is anticipated that construction activities associated with the Action would commence as soon as practicable after all necessary consents, approvals and licences for the Action have been obtained. Underground mining related to the Action would be undertaken at various times between approximately 2019 and 2032.

1.9	**Alternatives to proposed action**		No
		✓	Yes, you must also complete section 2.2
1.10	**Alternative time frames etc**	✓	No
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment**		No
		✓	Yes, you must also complete Section 2.5
1.12	**Component of larger action**	✓	No
			Yes, you must also complete Section 2.7

1.13	**Related actions/proposals**		No
		✓	Yes, provide details: The Action is separate from, but related to, the approved Wambo Coal Mine. The Wambo Coal Mine incorporating development and operation of an open cut and underground mine, associated activities including construction and operation of a coal handling and preparation plant (CHPP), raw and product coal handling facilities and rail and train loading infrastructure over a mine life of some 21 years was determined to be a Controlled Action in 2003 (EPBC 2003/1138) and was subsequently approved in November 2004. The Action that is the subject of this referral under the EPBC Act relates to those aspects of the proposed Wambo Coal Mine that are not the subject of existing approvals and where additional disturbance is required. The Action is largely limited to extensions to underground mining operations and supporting infrastructure that have not previously been approved under the NSW planning system. Further discussion of the relationship of the Action to the approved Wambo Coal Mine is provided in Section 2.1.
1.14	**Australian Government funding**	✓	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park**	✓	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

Background

The Wambo Development Project was determined to be a Controlled Action in 2003 (EPBC 2003/1138) and subsequently approved in November 2004 (the approved Controlled Action). The Wambo Development Project included the continued development of open cut and underground mining operations at the Wambo Coal Mine and the development and operation of rail and train loading infrastructure.

The main activities associated with the development of the approved Controlled Action included:

- construction and operation of a rail spur (including a rail underpass beneath the Golden Highway and realignment of the intersection between Wallaby Scrub Road and the Golden Highway), rail loop, coal reclaim area, product coal conveyor and train load-out bin to enable the transport of product coal by rail to market;
- continued development of open cut mining operations (including limited auger mining beyond open cut mining limits) within existing WCPL mining and coal leases and into new mining lease application areas;
- an extension to the existing Wollemi Underground Mine Box Cut (within the limits of the Project open cut mining area) to provide direct access for three underground longwall panels in the Whybrow seam;
- extension of drifts from the Wollemi Underground Mine to facilitate longwall mining of the Wambo seam;
- construction of a portal and drift access adjacent to the CHPP to facilitate longwall mining of the Arrowfield and Bowfield seams;
- upgrade of the existing CHPP to facilitate increased coal production;
- development of a water control system including a water control structure across North Wambo Creek at the north-western limit of the open cut operation and a channel to allow the passage of flows to the lower reaches of North Wambo Creek around the open cut development;
- de-gazettal and physical closure of Pinegrove Road and development of new access and internal haul roads; and
- relocation of the administration area, site offices, existing explosives magazine and construction of additional hydrocarbon storage facilities.

The general arrangement of the approved Controlled Action (EPBC 2003/1138) is shown on Figure 2.

The Wambo Development Project was approved under the NSW planning system in February 2004. The Wambo Coal Mine Development Consent (DA 305-7-2003) has been modified 13 times under the NSW planning system (Modifications).

None of the approved Modifications have significantly extended the overall physical extent of the Wambo Coal Mine, nor did they extend the overall life of the complex beyond 2025.

For each of the above Modifications, WCPL determined that no referral under the EPBC Act was required (i.e. no significant impacts on matters of national environmental significance were expected to occur as a result of each Modification and/or the Modification was consistent with the approved Controlled Action). This current approved development, and the continued operations associated with this development, does not form part of the proposed Action.

The Action

The Action is a proposed extension to underground coal mining operations at the Wambo Coal Mine and related additional surface infrastructure and activities that are necessary to support the extension of underground mining. The Action additional underground mining areas would be located within CL 365, CCL 743, ML 1402 and ML 1594.

The general arrangement of the Action is shown on Figure 3, including the extents of additional underground mining areas and the extent of the infrastructure area extension, new access road and mine ventilation infrastructure.

The Action would include the following components at the Wambo Coal Mine:

- longwall mining from the Woodlands Hill Seam within the additional underground mining area shown as Area 1 on Figure 3 (underground mining area 1) located beneath previously approved surface development areas;
- longwall mining from the Woodlands Hill Seam and Arrowfield Seam within the additional underground mining area shown as Area 3 on Figure 3 (underground mining area 3);
- development of the infrastructure area extension for the South Wambo Underground Mine (Figure 3);
- construction of a new access road (Figure 3);
- development of two mine ventilation shafts and associated infrastructure to support underground mining activities within the additional underground mining areas (northern ventilation shaft and southern ventilation shaft) (Figure 3); and
- development of surface infrastructure associated with gas management to support underground mining activities within underground mining area 3.

The Action would use existing infrastructure associated with previously approved mining activities at the Wambo Coal Mine including the existing CHPP, Wambo Coal Terminal, access roads, administration block, bathhouse, workshops, water storages and associated infrastructure. However, the Action does not include any of this existing or approved infrastructure.

The Action which is the subject of this referral under the EPBC Act, does not include aspects of the operations at the Wambo Coal Mine (including any approved land disturbance activities within the Action development area) that would remain consistent with:

- actions currently approved through the Development Consent DA 305-7-2003 (including Modifications) issued under the NSW planning system; and/or
- aspects that form part of the approved Controlled Action under the EPBC Act (EPBC 2003/1138).

The Wambo Coal Mine operations which are not the subject of this referral include (but are not limited to):

- approved open cut mining operations at the Wambo Coal Mine;
- approved underground mining operations in the Wambo Seam and Whybrow Seam at the Wambo Coal Mine;
- approved operation of the rail spur, rail loop, coal reclaim area, product coal conveyor and train load-out bin to enable the transport of product coal by rail to market;
- approved operation of the CHPP and associated infrastructure and coal stockpile areas within the approved surface development area;
- approved operation of the administration area, workshops, site offices, explosives magazine and hydrocarbon storage facilities;
- approved construction and operation of a portal and drift access adjacent to the CHPP to facilitate access to the Arrowfield Seam and Woodlands Hill Seam;

- approved operation and maintenance of the North Wambo Creek Diversion;
- approved underground mining of the Arrowfield Seam and Bowfield Seam to the east of Wollombi Brook;
- underground mining in the Arrowfield Seam and Woodlands Hill Seam that are generally within the approved extent of underground development; and
- ongoing exploration activities at the Wambo Coal Mine.

Underground Mining Operations

The Action would involve longwall mining within additional underground mining areas known as underground mining area 1 and underground mining area 3 (Figure 3).

Longwall mining involves the extraction of rectangular panels of coal defined by underground roadways constructed around each longwall. The longwall mining machine travels back and forth across the width of the coal face progressively removing coal in slices from the panel. Once each slice of coal is removed from the longwall face, the hydraulic roof supports are moved forward, allowing the roof and a section of the overlying strata to fall behind the longwall machine (referred to as forming the 'goaf').

Extraction of coal by longwall mining methods results in the vertical and horizontal movement of the land surface. The land surface movements are referred to as subsidence effects. The type and magnitude of subsidence effects are dependent on a range of variables which include the mine geometry and topography, the depth of mining, the number of seams mined, the coal recovery from each seam, the nature of overlying strata and other geological factors. The subsidence impacts pertinent to the Action include non-conventional movements and systematic subsidence movements.

As part of the Action, underground mining activities would be undertaken 24 hours per day, seven days per week.

Over the life of the Action, the mining layout may vary to account for factors that include: localised geological features; mine economics; coal market demand; detailed mine design considerations; and adaptive management. The mining layout would remain within the additional underground mining areas (shown on Figure 3) and would be documented in the relevant Mining Operations Plan and Extraction Plans.

WCPL's mine layout would achieve the following mine design objectives that have been developed to meet the subsidence impact performance measures for the Wambo Coal Mine:

- Longwalls at the Wambo Coal Mine would be offset from the base of the escarpment associated with the Wollemi National Park by a distance equivalent to a 26.5 degree angle of draw from the edge of the longwall. This would limit vertical subsidence from the additional underground mining areas to less than 20 millimetres (mm) (i.e. negligible subsidence impacts) at Wollemi National Park.
- Longwalls at the Wambo Coal Mine would be offset from Wollombi Brook by an angle of 26.5 degrees from the vertical to a 40 metre (m) buffer from the Wollombi Brook highbank. This would limit vertical subsidence from the additional underground mining areas to less than 20 mm (i.e. negligible subsidence impacts) at the Wollombi Brook channel.

Surface infrastructure and activities associated with underground mining activities are discussed below. A process for the environmental assessment and management of impacts associated with surface disturbance for gas management infrastructure above the additional underground mining areas would be documented in the Flora and Fauna Management Plan, as described in Section 5.

Surface Infrastructure

Infrastructure Area Extension

An extension to the existing mine infrastructure area (outside the approved surface development area) would be developed for the South Wambo Underground Mine as part of the Action (Figure 3). This would include the construction and operation of the following within the infrastructure area extension:

- administration offices and bathhouse;
- water management infrastructure including water storage dams;
- water and septic tanks;
- electrical infrastructure, workshop, stores and fuel bay; and
- car park.

The extent of disturbance for the infrastructure area extension is approximately 2.6 ha.

Access Road

An access road to the South Wambo Underground Mine infrastructure area would be constructed, including upgrades to existing access roads and the construction of a grade separated crossing of the existing Wambo access road (Figure 3).

The extent of surface development for the access road (outside the approved surface development area and existing disturbed areas) is approximately 1.7 ha.

Mine Ventilation Infrastructure

Two mine ventilation shafts and associated infrastructure would be developed as part of the Action to support underground mining activities within the additional underground mining areas (Figure 3). Each ventilation shaft would require an approximate 75 m by 75 m construction footprint with ancillary disturbance for associated infrastructure.

These ventilation shafts would be staged with the progression of mining and may be used as upcast shafts (including installation of fans) or downcast shafts, depending on the location of mining. The ventilation shafts would also require access roads, security (e.g. fencing), electrical infrastructure, water management and flood control infrastructure and other associated ancillary infrastructure. The total surface disturbance area for mine ventilation infrastructure associated with the Action would be approximately 1.4 ha.

Gas Management Infrastructure

Gas management infrastructure would be required to support the Action for mine safety reasons (i.e. to maintain gas composition in the underground mine at safe levels).

Surface disturbance for gas management would be required above underground mining area 3. Up to three gas drainage boreholes would be developed for each gateroad either side of the longwalls in underground mining area 3.

Gas drainage boreholes would be developed using a conventional drill rig. Access to gas management infrastructure for maintenance and monitoring would require the construction of temporary access tracks.

The specific locations of gas management infrastructure would be defined as a component of future detailed mine planning and engineering studies during the Action. This is due to variable gas quantities and the range of topography, vegetation cover and access constraints to be considered.

Surveys of potential gas management infrastructure locations would be conducted to identify any threatened flora/fauna (e.g. species, communities or populations) and Aboriginal cultural heritage sites. If any threatened flora/fauna or Aboriginal cultural heritage sites are identified, consideration would be given to relocating the works so as to avoid direct impacts.

It is expected that threatened flora species, threatened fauna species and Aboriginal cultural heritage sites would be able to be avoided. Impacts to threatened communities would be minimised by the minor nature of the disturbance (small, isolated and temporary) and by locating the surface components to reduce clearance requirements (e.g. using existing cleared areas or areas with a sparse mid/over story).

Surface disturbance associated with gas management infrastructure would be temporary and isolated in nature. The surface disturbance would occur progressively during mining of underground mining area 3 and would be rehabilitated progressively as the gas management infrastructure is no longer required.

Gas management infrastructure associated with underground mining area 3 would require a disturbance of approximately 2.1 ha. This disturbance would be progressively rehabilitated, with less than 1 ha disturbed at any time.

Employment

The Wambo Coal Mine workforce currently consists of approximately 670 employees and contractors. The Action would allow for the continued employment of underground and support personnel.

The total Wambo Coal Mine workforce would fluctuate with the completion of open cut mining and any increase in production in the underground operations. Following approval of the Action, the workforce is expected to remain within the existing workforce numbers.

2.2 Alternatives to taking the proposed action

Alternatives to the proposed location, mining methods and scale of the Action have been considered by WCPL in the development of the project description and design for the Action as described in Section 2.1. An overview of the alternatives already considered by WCPL is provided below:

- **Action Location** – the additional underground mining areas were identified by the presence of coal seams able to be economically mined in the vicinity of the Wambo Coal Mine within mining tenements held by WCPL and able to achieve WCPL's existing subsidence impact performance measures for significant natural and built features.
- **Surface Facilities** – the location of the surface facilities was determined by the infrastructure required to service the South Wambo Underground Mine, the space available for this infrastructure and a number of other design parameters, including geotechnical and environmental factors.
- **Mining Method** – the depth, seam thickness and dip of the coal seams associated with the Action (Woodlands Hill Seam and Arrowfield Seam) are more amendable to underground mining methods than open cut mining methods. Longwall mining was selected over other mining methods due to its superior productivity and suitability to extract the resource.
- **Scale** – the Action would recover approximately an additional 33 million tonnes of ROM coal from the Woodlands Hill Seam and Arrowfield Seam. Resource definition, exploration drilling and detailed mine planning being conducted by WCPL indicates that this is the optimum scale for the South Wambo Underground Mine.

2.3 Alternative locations, time frames or activities that form part of the referred action

Alternatives that have been considered for the Action are discussed in Section 2.2.

2.4 Context, planning framework and state/local government requirements

NSW Environmental Planning and Assessment Act, 1979

The NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) and the NSW *Environmental Planning and Assessment Regulation, 2000* set the framework for planning and environmental assessment in NSW.

The Wambo Coal Mine operates under a Development Consent (DA 305-7-2003) issued and modified under the NSW EP&A Act. WCPL has applied to modify its Development Consent (DA 305-7-2003) under section 75W of the EP&A Act for the South Wambo Underground Mine Modification (referred to as MOD 12), which incorporates the Action.

Section 75W falls under the former Part 3A of the EP&A Act, and continues to apply to modifications to the Development Consent (DA 305-7-2003), notwithstanding its repeal, through the transitional provisions in Schedule 6A of the EP&A Act. The assessment process for the proposed MOD 12 falls under clause 2(a)(iv) of Schedule 1 (Classes of actions to which clause 4.1 applies) of the *Bilateral agreement made under section 45 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) relating to environmental assessment* between the Commonwealth of Australia and the State of NSW (February 2015).

While the Action forms part of the proposed MOD 12 to the Development Consent (DA 305-7-2003), the Action only includes the elements described as part of the Action in Section 2.1.

Other Leases, Licence and Approvals

Relevant leases, licences or approvals required under other NSW legislation would also be varied and/or obtained for the Action as required.

Under the NSW *Mining Act, 1992*, environmental protection and rehabilitation are regulated by conditions included in all mining leases, including requirements for the regular submission of a Mining Operations Plan, submission of Annual Environmental Management Reports and submission of Extraction Plans to reduce and manage potential impacts of subsidence.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

An Environmental Assessment will be prepared to accompany the application to modify the Development Consent (DA 305-7-2003) pursuant to section 75W of the EP&A Act.

The NSW Department of Planning and Environment (DP&E) issued revised Secretary's Environmental Assessment Requirements (SEARs) for the proposed modification to the Development Consent (DA 305-7-2003) on 23 October 2015.

The Environmental Assessment will consider the potential impacts of the Action by addressing the SEARs (as revised) by the NSW DP&E. Mr Oliver Holm (Executive Director, Resource Assessments and Compliance) is the relevant contact officer at the NSW DP&E.

2.6 Public consultation (including with Indigenous stakeholders)

WCPL conducts regular consultation with government agencies, community members and other interested parties regarding the Wambo Coal Mine and the proposed South Wambo Underground Mine Modification (incorporating the Action).

Consultation undertaken to date in relation to the proposed South Wambo Underground Mine Modification (incorporating the Action) has included:

- Ongoing consultation with the DP&E regarding the South Wambo Underground Mine Modification (incorporating the Action) from June 2012 to present (with a recent briefing in October 2015).
- Consultation with the NSW Office of Environment and Heritage, including a meeting in December 2015 to discuss the preliminary results of the ecology and Aboriginal heritage assessments for the South Wambo Underground Mine Modification (incorporating the Action).
- Ongoing consultation with the Wambo Coal Mine Community Consultative Committee.
- Ongoing consultation with other local landholders and Indigenous groups.
- Ongoing consultation with industry groups and private enterprise within the region.
- Ongoing consultation with surrounding mining and resource companies.

Further consultation in relation to the proposed South Wambo Underground Mine Modification (incorporating the Action) will be undertaken during the preparation of the Environmental Assessment, and would involve the use of a variety of consultation mechanisms that in summary include current and future actions such as:

- public availability of key documents (e.g. the request for SEARs and the Environmental Assessment);
- provision of information on the Wambo Coal Mine website (http://www.peabodyenergy.com/content/404/australia-mining/new-south-wales/wambo-mine);
- meetings with the general community including Indigenous stakeholders;
- meetings with relevant government agencies; and
- community newsletters.

The consultation would include, but not necessarily be limited to, the following government agencies and authorities in addition to the Commonwealth Department of the Environment [DotE]:

- NSW DP&E;
- NSW Office of Environment and Heritage;
- NSW Environment Protection Authority;
- NSW Department of Primary Industries (DPI);
- NSW Road and Maritime Services;
- NSW Mine Subsidence Board; and
- Singleton Shire Council.

Consultation with Indigenous stakeholders is being conducted in accordance with the requirements of the NSW Office of Environment and Heritage policy *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW Department of Environment, Climate Change and Water [DECCW], 2010).

Indigenous stakeholders have been identified through correspondence with local authorities, government agencies and community organisations in accordance with Section 4.1.2 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010).

Written notification of the South Wambo Underground Mine Modification (incorporating the Action) was provided to Indigenous stakeholders identified by the organisations listed above. These stakeholders were invited to register an interest in the process of consultation for the South Wambo Underground Mine Modification (incorporating the Action). A notice was also placed in the Singleton Argus on 25 August 2015 seeking registrations of interest from any additional interested Indigenous stakeholders.

In addition to Indigenous stakeholders having the opportunity to register their interest as detailed above, all Indigenous stakeholders involved in previous consultation activities and the management of Aboriginal heritage at the Wambo Coal Mine were included in the list of stakeholders consulted for the South Wambo Underground Mine Modification (incorporating the Action).

The following Indigenous stakeholders have registered their interest in being involved in the consultation process, or been involved in previous consultation activities at the Wambo Coal Mine (in alphabetical order):

- Aboriginal Native Title Consultants.
- AGA Services.
- Bawurra Consultants.
- Breeza Plains Cultural Heritage Consultants.
- Bullen Bullen Heritage Consultants.
- Buudang.
- Cacatua Culture Consultants.
- Carrawonga Consultants.
- Culturally Aware.
- Deslee Talbott Consultants.
- DFTV Enterprises.
- DRM Cultural Management.
- EMT Cultural & Heritage.
- Galamaay Consultants.
- Gidawaa Walang Cultural Heritage Consultancy.
- Giwiirr Consultants.
- HECMO Consultants.
- Heilamon Cultural Consultants.
- HTO Environmental Management Services.
- Hunter Valley Aboriginal Corporation.
- Hunter Valley Culture Consultants.
- Hunter Valley Cultural Surveying.
- Hunter Valley Natural & Cultural Resource Management.
- I & E Aboriginal Culture and Heritage.
- Janbant Mugrebea.
- Jeffery Matthews.
- Jill Green.
- JLC Cultural Services.
- Kauwul (Wonn1).
- Kawul Cultural Services.
- Kayaway Eco Cultural & Heritage Services.
- KL.KG Saunders Trading Services.
- L.J. Cultural Management.
- Lorraine Towney.
- Lower Hunter Aboriginal Incorporated.
- Lower Hunter Wonnarua Cultural Services.
- Maree/Trading As Wallangan Cultural Services.
- Minnga Consultants.
- Moreeites.
- Muswellbrook Cultural Consultants.
- Myland Cultural Heritage Group.
- Ngarramang-Kuri Aboriginal Culture & Heritage Group.
- Plains Clans of the Wonnarua People's Registered Native Title Claimants.
- Roger Noel Matthews.
- Ronald Fenwick.
- Roslyn Sampson.
- Scott Smith.
- Smith Dhagaans Cultural Group.
- Tocomwall Pty Ltd.
- T & G Culture Consultants.
- Ungooroo Aboriginal Corporation.
- Ungooroo Cultural & Community Services.
- Upper Hunter Heritage Consultants.
- Upper Hunter Wonnarua Council.
- Valley Culture.
- Waabi Gabinya Cultural Consultancy.
- Wanaruah Custodians Aboriginal Corporation.
- Wanaruah Local Aboriginal Land Council.
- Warragil Cultural Services.
- Wattaka Wonnarua Cultural Consultancy Services.
- Widescope Indigenous Group.
- Wonnarua Culture Heritage.
- Wonnarua Nation Aboriginal Corporation.
- Wonnarua Traditional Owners.
- Wurrumay Consultants.
- Yinarr Cultural Services.

All Indigenous stakeholders were provided with a Proposed Methodology (i.e. draft assessment methodology) for the Cultural Heritage Impact Assessment for their review and comment. Representatives from Indigenous stakeholder groups have also participated in the field surveys undertaken to date for the area associated with the Action. Field surveys were undertaken in the Action area and surrounds over eight days in October 2015.

The next steps in the consultation programme include the Indigenous stakeholders being provided with the opportunity to review and provide comment on the draft Cultural Heritage Impact Assessment (including the provision of any comments regarding the cultural significance of any Aboriginal object(s) and/or place(s) in the South Wambo Underground Mine Modification area [incorporating the Action area]), and the facilitation of a meeting and site inspection with Indigenous stakeholders.

2.7 A staged development or component of a larger project

The Action is an extension to underground coal mining operations at the approved Wambo Coal Mine and related surface infrastructure and activities.

The Wambo Coal Mine incorporating development and operation of an open cut and underground mine, associated activities including construction and operation of a CHPP, raw and product coal handling facilities and rail and train loading infrastructure over a mine life of some 21 years was determined to be a Controlled Action in 2003 (EPBC 2003/1138) and was subsequently approved in November 2004.

For each of the subsequent Modifications that have been approved through the NSW planning system and form part of the approved Wambo Coal Mine, WCPL determined that no referral under the EPBC Act was required (i.e. no significant impacts on matters of national environmental significance were expected to occur as a result of each Modification and/or the Modification was consistent with the approved Controlled Action).

The Action that is the subject of this referral under the EPBC Act relates to an extension to underground coal mining operations at the Wambo Coal Mine and related additional surface infrastructure and activities that are necessary to support the extension of underground mining and that have not previously been approved under the NSW planning system.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

No World Heritage Properties are situated within the Action area. The closest World Heritage Property is the Greater Blue Mountains Area.

The Greater Blue Mountains Area consists of 10,000 square kilometres (km^2) of mostly forested landscape on a sandstone plateau extending 60 to 180 km inland from central Sydney, NSW (Figure 5). Wollemi National Park covers an area of approximately 5,017 km^2 and is one of eight areas listed as part of the Greater Blue Mountains Area.

Wollemi National Park, which is part of the Greater Blue Mountains Area, is located approximately 1 km to the south-east of the Action area at its closest point (Figures 4 and 5). An escarpment and cliffs associated with Wollemi National Park are located adjacent to, but generally outside the Wollemi National Park boundary.

The values of the Greater Blue Mountains Area which meet the World Heritage criteria are:

(ix) to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

(x) to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

Nature and extent of likely impact

The Action is unlikely to have any direct or indirect impact on the Greater Blue Mountains Area.

The NSW Development Consent (DA 305-7-2003) for the Wambo Coal Mine includes subsidence impact performance measures which are required to be met (Section 4). These subsidence impact performance measures require negligible subsidence impacts and negligible environmental consequence on Wollemi National Park. These subsidence impact performance measures would apply to the Action.

To achieve the subsidence impact performance measure, all longwalls at the Wambo Coal Mine are offset from the base of the escarpment associated with the Wollemi National Park by a distance equivalent to a 26.5 degree angle of draw from the edge of the longwall. This would limit vertical subsidence from the additional underground mining areas to less than 20 mm. Vertical movements of these magnitudes are in the order of those which naturally occur due to wetting and drying of surface soils (i.e. the movements could be considered negligible as they are small in comparison to normal processes). As such, it is considered unlikely that the Wollemi National Park would be adversely impacted by the Action.

Secondary effects, including the Action's contribution to global greenhouse gas emissions, would be relatively small.

Given the above, the Action would not have a significant impact on the World Heritage values of the Greater Blue Mountains Area given the Action would not cause one or more of the World Heritage values to be lost, one or more of the World Heritage values to be degraded or damaged, or one or more of the World Heritage values to be notably altered, modified, obscured or diminished. Accordingly, the Action would not have, and is not likely to have, a significant impact on the World Heritage values of the Greater Blue Mountains Area.

3.1 (b) National Heritage Places

Description

No National Heritage Places are situated in the Action area. The closest National Heritage Place is the Greater Blue Mountains Area. Wollemi National Park, which is part of the Greater Blue Mountains Area, is located approximately 1 km to the south-east of the Action area (as described in Section 3.1(a) above).

Nature and extent of likely impact

As described above, the Action is unlikely to have any direct or indirect impact on the Greater Blue Mountains Area.

The mine layout for the additional underground mining areas has been designed to achieve negligible subsidence impacts and negligible environmental consequences on Wollemi National Park (Section 4).

Secondary effects, including the Action's contribution to global greenhouse gas emissions, would be relatively small.

Given the above, the Action would not have a significant impact on the National Heritage values of the Greater Blue Mountains Area given the Action would not cause one or more of the National Heritage values to be lost, one or more of the National Heritage values to be degraded or damaged, or one or more of the National Heritage values to be notably altered, modified, obscured or diminished. Accordingly, the Action would not have, and is not likely to have, a significant impact on the National Heritage values of the Greater Blue Mountains Area.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

No Ramsar wetlands are situated in the Action area. The closest Ramsar wetland to the Action is the Hunter Estuary Wetlands, which is situated approximately 70 km to the south-east of the Action. The Hunter Estuary Wetlands is comprised of two components, the Kooragang and the Hunter Wetlands Centre Australia and the combined area is approximately 2,968 ha (DotE, 2011).

Nature and extent of likely impact

The Hunter Estuary Wetlands are situated approximately 70 km to the south-east (i.e. downstream) of the Action, and it is unlikely that the Hunter Estuary Wetlands would be affected by any potential direct or indirect effect of the Action. Secondary effects, such as the Action's contribution to global greenhouse gas emissions, would be relatively small.

The Action would not have a significant impact on the ecological character of the Hunter Estuary Wetlands Ramsar site as it would:

- not result in areas of the wetland being destroyed or substantially modified;
- not result in a substantial and measurable change in the hydrological regime of the wetland;
- not result in the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected;
- not result in a substantial and measurable change in the water quality of the wetland; and
- not result in an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.

3.1 (d) Listed threatened species and ecological communities

The following subsections consider threatened flora species, threatened fauna species and threatened ecological species in this order.

Description

Threatened Flora Species

A flora assessment was conducted by Orchid Research (2003) for the Wambo Development Project in 2003. A number of flora studies have been undertaken within the Wambo Coal Mine area and surrounds since 2003, including routine monitoring commissioned by WCPL.

FloraSearch conducted flora surveys across the Action area in spring of 2015. The surveys incorporated three methods of sampling: quadrat sampling; spot sampling; and random meanders. This included targeted surveys for all threatened flora species which may occur within the Action area.

These flora surveys supplemented the previous surveys completed over the Action area and contributed to the current knowledge of the presence of threatened species within the Action area. In addition, consolidated vegetation mapping was prepared across the Action area and surrounds.

A list of threatened flora species under the EPBC Act that have the potential to occur in the Action area was generated from database searches (i.e. EPBC Protected Matters Search Tool and the BioNet website) of a 20 x 20 km search area centred on the Action (Table 2) (DotE, 2015a; OEH, 2015a). Threatened flora species database records potentially relevant to the Action are presented on Figure 6.

Table 2
Potential Threatened Flora Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]			
Allocasuarina glareicola	E	•	-	The Action is not within the known distribution of this species (OEH, 2015b) and there are no known populations within the Action area. The species is primarily restricted to the Richmond district in NSW (south of the Action area) (OEH, 2015b).	Nil	No
Cryptostylis hunteriana (Leafless Tongue-orchid)	V	•	-	The Action is not within the known distribution of this species (OEH, 2015b) and there are no known records within 20 km of the Action area. There is no potential habitat for this species in the Action area.	Nil	No
Cynanchum elegans (White-flowered Wax Plant)	E	•	-	Mainly in rainforest, but also occasionally in woodland (OEH, 2015b). The nearest records are deep within Wollemi National Park to the south-west of the Action area, where it is likely to occur in sandstone gully rainforest.	Low	No
Eucalyptus glaucina (Slaty Red Gum)	V	•	•	There are several records of this species in the vicinity of the Action area. This species occurs on deep, fertile soils in river valleys (OEH, 2015b).	High	No

Table 2 (Continued)
Potential Threatened Flora Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]			
Euphrasia arguta	CE	•	-	The Action is not within the known or predicted distribution of this species (OEH, 2015b) and there are no known records within 20 km of the Action area.	Nil	No
Grevillea parviflora subsp. *parviflora* (Small-flower Grevillea)	V	-	-	The species has been recorded in the vicinity of the Action area by previous surveys for the Wambo Coal Mine (FloraSearch, in prep.). There is no potential habitat for this species in the Action area.	Nil	No
Homoranthus darwinioides	V	•	-	The Action is not within the known or predicted distribution of this species (OEH, 2015b) and there are no known records within 20 km of the Action area.	Nil	No
Olearia cordata	V	•	-	The Action area is located at the northern edge of the known distribution of this species (OEH, 2015b). This species grows in dry open sclerophyll forest and open shrubland, on sandstone ridges (OEH, 2015b). Sandstone ridges and the habitats they support are absent from the Action area.	Nil	No
Pelargonium sp. *striatellum* (G.W. Carr 10345) (Omeo Stork's-bill)	E	•	-	The Action is not within the known or predicted distribution of this species (OEH, 2015b) and there are no known records within 20 km of the Action area. There is no potential habitat for this species in the Action area.	Nil	No
Pomaderris brunnea (Rufous Pomaderris)	V	•	-	The Action is not within the known or predicted distribution of this species (OEH, 2015b). The species occurs on active alluvium (OEH, 2015b).	Low	No
Prasophyllum petilum (Tarengo Leek Orchid)	E	•	-	*Prasophyllum* sp. Wybong is now included with *P. petilum* (DotE, 2015b). Natural populations of the Tarengo Leek Orchid are known from a total of five sites in NSW, which are removed from the Action area. Suitable habitat may be present in the Action area. This species occurs mainly in Grassy Box Woodlands with fertile to moderately fertile soils on undulating terrain (DotE, 2015b). The soils of the Action area are relatively infertile away from the former floodplains, and do not provide habitat for this species.	Nil	No
Prasophyllum sp. Wybong (C. Phelps ORG 5269)	CE	•	-			
Prostanthera cryptandroides subsp. *cryptandroides* (Wollemi Mint-bush)	V	•	-	In the Denman-Gungal and Widden-Baerami Valley areas, this species occurs on rocky ridgelines on Narrabeen Group sandstones in association with a range of communities (OEH, 2015b). The Action area does not contain suitable habitat for this species.	Nil	No

Table 2 (Continued)
Potential Threatened Flora Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]			
Pterostylis gibbosa (Illawarra Greenhood)	E	•	-	The closest record for this species is over 20 km from the Action area at Milbrodale (OEH, 2015a). In the Hunter region, it grows in open woodland dominated by Narrow-leaved Ironbark *E. crebra*, Forest Red Gum and Black Cypress Pine *Callitris endlicheri* (OEH, 2015b).	Low	No
Thesium australe (Austral Toadflax)	V	•	-	This species has a disjunct distribution on the NSW tablelands; there are many records for the northern and southern tablelands, but none for the central tablelands or Hunter Valley (OEH, 2015b). The species is highly unlikely to occur on the Action area.	Nil	No
Wollemia nobilis (Wollemi Pine)	E	•	-	This species is restricted to a few small occurrences in the west of Wollemi National Park in deep sandstone gorges (OEH, 2015b). The Action area is not within the known distribution of this species and does not contain suitable habitat.	Nil	No

1 Conservation status under the EPBC Act (current as of 13 January 2016).
CE – Critically Endangered.
E – Endangered.
V – Vulnerable.

2 DotE (2015a).

3 OEH (2015a). Note this database includes records from the Atlas of NSW Wildlife, Royal Botanical Gardens and Domain Trust, Forests NSW and the Australian Museum.

4 Recorded by FloraSearch (in prep.).

As detailed in Table 2, 15 plant species listed under the EPBC Act have been considered for their potential to occur within the Action area or surrounds. The habitat requirements of each of the flora species listed in Table 2 were reviewed using species profiles provided on the OEH and DotE websites, and other material referenced in Table 2. This information was compared with the habitats identified within the Action area by detailed contemporary surveys, and an assessment was made of the likelihood of suitable habitat for each species being present. Threatened species whose habitats do not occur within the Action area are considered to have a nil likelihood of occurrence (FloraSearch, in prep.).

The habitat filtering identified four EPBC Act listed flora species that are considered to have a likelihood of occurring within the Action area (Table 2), including the *Cynanchum elegans* (White-flowered Wax Plant), *Eucalyptus glaucina* (Slaty Red Gum), *Pomaderris brunnea* (Rufous Pomaderris) and *Pterostylis gibbosa* (Illawarra Greenhood). These four species (along with all the other species) were specifically targeted during the field surveys conducted in the Action area, and none of these species were recorded in the Action area (FloraSearch, in prep.).

Threatened Fauna Species

A number of fauna studies have been undertaken previously within the Wambo Coal Mine area and surrounds, including routine fauna monitoring commissioned by WCPL.

Eco Logical Australia (Eco Logical) conducted fauna surveys across the Action area in spring of 2015. These fauna surveys supplemented the previous surveys completed over the Action area and contributed to the current knowledge of the presence of threatened species within the Action area. The fauna surveys undertaken included a variety of techniques and methods, including:

- Amphibian surveys.
- Terrestrial and arboreal mammal trapping.
- Diurnal bird surveys.
- Microchiropteran bat surveys.
- Remote camera surveys.
- Spotlight surveys.
- Reptile surveys.
- Habitat surveys and mapping, including riparian habitat assessment.
- Recording of opportunistic fauna sightings.

A description of the survey effort undertaken is provided below.

The survey effort focussed on the surface infrastructure areas and underground mining area 3. Underground mining area 1 is located beneath previously disturbed areas and therefore was not targeted by the 2015 spring surveys.

A list of threatened fauna species under the EPBC Act that have the potential to occur in the Action area was generated from database searches (i.e. EPBC Protected Matters Search Tool and the BioNet website) using a 20 x 20 km search area centred on the Action (Table 3) (DotE, 2015a; OEH, 2015a). Threatened fauna species database records are presented on Figure 7.

The Painted Honeyeater (*Grantiella picta*) and Large-eared Pied Bat (*Chalinolobus dwyeri*) were the only threatened fauna species listed under the EPBC Act that were recorded within the Action area by Eco Logical (in prep.). Notably, these records were in underground mining area 3, but outside the extent of disturbance associated with surface infrastructure (Figure 7).

Survey Effort

Amphibian surveys were undertaken at night during suitable weather conditions, including nocturnal searches for adult frogs and tadpoles. Targeted surveys and habitat assessments for the Green and Golden Bell Frog (*Litoria aurea*) were also undertaken (Eco Logical, in prep.). Eco Logical (in prep.) targeted reptiles during their fauna surveys using passive and active searches.

Systematic bird surveys were conducted as part of a fauna survey of the Action area. Survey methods included bird point counts, bird call playback, spotlighting and opportunistic recordings during other fauna surveys (Eco Logical, in prep.).

A detailed trapping programme was employed with Elliot traps of varying sizes to trap small, medium and large mammals as well as arboreal mammals. Nocturnal mammals were surveyed by spotlighting by foot along transects (Eco Logical, in prep.). Camera traps were set in combination with the Elliot traps and in other locations (Eco Logical, in prep.).

Table 3
Potential Threatened Fauna Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]				
Amphibians							
Litoria aurea (Green and Golden Bell Frog)	V	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 15 km north of the Action area. Potential habitat for this species is located within the Action area in the form of farm dams.	Potential	Nil	No
Litoria booroolongensis (Booroolong Frog)	E	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is over 50 km north-east of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil	No
Litoria littlejohni (Littlejohn's Tree Frog)	V	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is over 50 km south of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil	No
Reptiles							
Hoplocephalus bungaroides (Broad-headed Snake)	V	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is over 60 km south-west of the Action area. Limited potential habitat for this species exists in the form of exposed sandstone outcrops within and adjacent to the Action underground mining area 3.	Potential	Nil	No
Aprasia parapulchella (Pink-tailed Worm-lizard)	V	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is over 105 km west of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil	No

Table 3 (Continued)
Potential Threatened Fauna Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]				
Birds							
Botaurus poiciloptilus (Australasian Bittern)	E	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is over 55 km east of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil	No
Rostratula australis (Australian Painted Snipe)	E	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 58 km south-east of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil	No
Lathamus discolour (Swift Parrot)	E	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 7 km east of the Action area. Potential habitat for this species exists within the proposed Action area in the form of potential foraging habitat with winter flowering eucalypt species.	Potential	Potential	No
Anthochaera phrygia (Regent Honeyeater)	CE, M	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 5 km east of the Action area. Potential habitat for this species exists within the Action area in the form of potential foraging habitat with winter flowering eucalypt species.	Potential	Potential	No
Grantiella picta (Painted Honeyeater)	V	•	•	This species was recorded during the field surveys for the Action. Potential habitat for this species exists within the Action area in the form of potential foraging and nesting habitat.	Known	Potential	Yes

Table 3 (Continued)
Potential Threatened Fauna Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]				
Mammals							
Dasyurus maculatus maculatus (Spotted-tailed Quoll [SE mainland population])	E	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. This species has been recorded by surveys at the adjacent United Mine. Potential habitat for this species exists within the Action area in the form of roosting (tree hollows), nesting and foraging (woodland) habitats.	Potential	Potential	No
Phascolarctos cinereus (Koala)	V	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. This species has been recorded by surveys at the adjacent United Mine. Potential habitat for the Koala exists within the Action area in the form of feed trees (White Box).	Potential	Potential	No
Petrogale penicillata (Brush-tailed Rock-wallaby)	V	•	•	This species was not recorded during the field surveys for the Action, however has been previously recorded in the surrounds during ongoing monitoring conducted by WCPL. No potential habitat for this species is located within the Action area.	Unlikely	Unlikely	No
Pteropus poliocephalus (Grey-headed Flying-fox)	V	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. This species has been recorded by surveys at the adjacent United Mine. Potential habitat for this species exists within the Action area in the form of foraging habitat, with no roost sites occurring within the Action area.	Potential	Potential	No

Table 3 (Continued)
Potential Threatened Fauna Species

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas	Recorded in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]				
Mammals (Cont.)							
Nyctophilus corbeni (South-eastern Long-eared Bat)	V	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 25 km west of the Action area. Potential habitat for this species exists within the Action area in the form of potential foraging and roosting habitat (hollow-bearing trees).	Potential	Potential	No
Chalinolobus dwyeri (Large-eared Pied Bat)	V	•	•	This species was recorded during the field surveys for the Action and has previously been recorded at the Wambo Coal Mine and surrounds. Potential roosting habitat for this species exists adjacent to the Action additional underground mining area 3 in the form of exposed sandstone outcrops and caves/clifflines. Potential foraging habitat exists in the form as open woodland.	Known	Potential	Yes
Pseudomys novaehollandiae (New Holland Mouse)	V	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 3 km north of the Action area. Potential habitat for this species exists within the Action area in the form of nesting and foraging (shrubby woodland on sands).	Potential	Potential	No
Pseudomys oralis (Hastings River Mouse)	E	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 45 km north of the Action area. Potential habitat for this species exists within the Action area in the form of nesting and foraging habitat (creek, gullies and rocky outcrops).	Potential	Potential	No

[1] Conservation status under the EPBC Act (current as of 13 January 2016).
CE – Critically Endangered.
E – Endangered.
V – Vulnerable.
M – Migratory.

[2] DotE (2015a).

[3] OEH (2015a). Note this database include records from the Atlas of NSW Wildlife, Royal Botanical Gardens and Domain Trust, Forests NSW and the Australian Museum.

[4] Recorded by Eco Logical (in prep.).

Threatened Ecological Communities

A list of threatened ecological communities under the EPBC Act that were considered to have the potential to occur in the Action area was generated from a database search (i.e. EPBC Protected Matters Search Tool) of a 20 x 20 km search area centred on the Action (Table 4) (DotE, 2015a; OEH, 2015a).

Table 4
Potential Threatened Ecological Communities

Community Name	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Mapped in Action Area[4]
		EPBC Protected Matters Search[2]	BioNet[3]			
Central Hunter Valley Eucalypt Forest and Woodland	CE	•	•	The Action is within the known distribution of this community (DotE, 2015b). The community is associated with soils derived from Permian sedimentary rocks found on the valley floors, lower hillslopes and low ridges (OEH, 2015b). This community has been mapped in the Action area.	Known	Yes
Hunter Valley Weeping Myall (Acacia pendula) Woodland	CE	•	•	The Action is within the known distribution of this community (DotE, 2015b). This community occurs on heavy Permian clay soils (OEH, 2015b). There are known occurrences in the vicinity of the Action area.	High	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	•	•	The Action is within the known distribution of this community (DotE, 2015b). This community occurs on the footslopes of the Narrabeen Group sandstone escarpments of the upper Hunter Valley. This community is not considered to have potential to occur on the Action area (OEH, 2015a).	Nil	No

1 Conservation status under the EPBC Act (current as of 13 January 2016).
CE – Critically Endangered.

2 DotE (2015a).

3 OEH (2015a).

4 Recorded by FloraSearch (in prep.).

As indicated in Table 4, the *Central Hunter Valley Eucalypt Forest and Woodland* Critically Endangered Ecological Community (CEEC) is the only threatened ecological community that has been identified within the Action area.

Nature and extent of likely impact

This section assesses the potential impacts on threatened species or threatened ecological communities under the EPBC Act, and identifies the nature and extent of any likely impacts.

The vegetation clearance for surface infrastructure for the Action includes clearance of the following vegetation types in the approximate areas listed below (Figure 8):

- Forest Red Gum Floodplain Forest (Community 2) – less than 1 ha.
- Spotted Gum – Narrow-leaved Ironbark – Grey Box Woodland (Community 4) – less than 1 ha.
- Narrow-leaved Ironbark – Grey Box Woodland (Community 5) – approximately 3 ha.
- Bull Oak Grassy Woodland (Community 6) – approximately 1 ha.
- Rough-barked Apple – Coast Banksia Woodland (Community 11) – less than 1 ha.
- Derived Grassland (Community 12) – approximately 3.1 ha.

Surface infrastructure would also be located in previously disturbed areas.

Underground mining area 1 is located within the approved surface development area for the Wambo Coal Mine. The vegetation types identified within the underground mining area 3 include (Figure 8):

- River Oak Riparian Woodland (Community 1).
- Forest Red Gum Floodplain Forest (Community 2).
- Spotted Gum – Narrow-leaved Ironbark – Grey Box Woodland (Community 4).
- Narrow-leaved Ironbark – Grey Box Woodland (Community 5).
- Bull Oak Grassy Woodland (Community 6).
- Grey Box – Slaty Box Woodland (Community 10).
- Derived Grassland (Community 12).

The potential impacts of the Action in regards to subsidence are being considered by Mine Subsidence Engineering Consultants (MSEC) (in prep.). The results of this assessment indicate that mine subsidence impacts may include surface cracking and land deformation, changes to water drainage, changes to surface water resources, changes to groundwater resources and impacts to built features (MSEC, in prep.).

The following bullet points provide a summary of the potential impacts of the Action associated with mining induced subsidence:

- Subsidence modelling for the proposed longwall layout indicates that within the flatter areas (i.e. away from the open cut operations) surface cracking and deformations would be limited to typically 25 to 50 mm, with some isolated cracking around 150 mm or greater (MSEC, in prep.).
- The magnitude of expected surface cracking is considered too small to influence the hydrological processes in these areas and is unlikely to have any biologically significant effect on the soil moisture regime that sustains the existing vegetation. Cracking of soils in similar terrain at the Wambo Coal Mine has produced no observable changes to vegetation condition or the health of individual plants (FloraSearch, in prep.). In addition, no scientific evidence of significant surface effects on vegetation from minor soil cracking induced by subsidence is known from underground mining anywhere in Australia (FloraSearch, in prep.).
- Negligible subsidence impacts are predicted to occur on the channel of Wollombi Brook due to the distance from the proposed longwalls and WCPL's mine design objectives (MSEC, in prep.) (Section 4).
- Subsidence may affect the ephemeral drainage lines in the Action area, through changes in stream alignment and grade, potential increased erosion risk or ponding. With the implementation of proposed remediation measures and given the limited habitat value of these drainage lines, availability of water in streams would not be impacted to an extent that would significantly affect the availability of habitat resources for fauna species. Topographical depressions that may lead to additional ponding are not predicted outside of existing drainage lines above underground mining area 3 (MSEC, in prep.).
- There are no cliffs located above the additional underground mining areas associated with the Action. MSEC consider it is unlikely that cliffs would be adversely impacted by the Action and therefore it is very unlikely there would be any impacts on potential shelter, retreat or roosting sites for threatened fauna species associated with cliffs.

Threatened Flora Species

Table 5 evaluates the nature and extent of likely impacts on each individual threatened flora species identified in Table 2 and discussed in the above sections.

Table 5
Potential Impacts on Flora Species and their Habitats

Scientific Name	Common Name	Nature and Extent of Likely Impacts
Allocasuarina glareicola	-	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Cryptostylis hunteriana	Leafless Tongue-orchid	The Action is not likely to impact this species given the absence of records and lack of suitable habitat within the Action area.
Cynanchum elegans	White-flowered Wax Plant	This species has a low likelihood of occurrence within the Action area, and targeted searches failed to identify this species. It is therefore considered the Action is not likely to impact this species given the absence of records and the nature and extent of proposed disturbance.
Eucalyptus glaucina	Slaty Red Gum	Slaty Red Gum (*Eucalyptus glaucina*) is a large conspicuous species that would have been detected in the Action area by the surveys if it was present. On this basis, the Action is not likely to impact this species given the absence of records within the Action area.
Euphrasia arguta	-	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	The Action is not likely to impact this species given the absence of habitat in the Action area.
Homoranthus darwinioides	-	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Olearia cordata	-	The Action is not likely to impact this species given the absence of records and lack of suitable habitat within the Action area.
Pelargonium sp. *striatellum* (G.W. Carr 10345)	Omeo Stork's-bill	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Pomaderris brunnea	Rufous Pomaderris	This species had a low likelihood of occurrence within the Action area, and targeted searches failed to identify this species. It is therefore considered the Action is not likely to impact this species given the absence of records, the location of the Action area relative to the known distribution of the species and the nature and extent of proposed disturbance.
Prasophyllum petilum	Tarengo Leek Orchid	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Prasophyllum sp. *Wybong* (C. Phelps ORG 5269)	-	
Prostanthera cryptandroides subsp. *cryptandroides*	Wollemi Mint-bush	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Pterostylis gibbosa	Illawarra Greenhood	This species has a low likelihood of occurrence within the Action area, and targeted searches failed to identify this species. It is therefore considered the Action is not likely to impact this species given the absence of records and the nature and extent of proposed disturbance.
Thesium australe	Austral Toadflax	The Action is not likely to impact this species given the absence of records in proximity to the Action area.
Wollemia nobilis	Wollemi Pine	The Action is not likely to impact this species given the absence of records in proximity to the Action area.

The Action is not likely to have a significant impact on any threatened flora species listed under the EPBC Act (Table 5) in accordance with the *Matters of National Significance: Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act, 1999* (Significant Impact Guidelines) (DotE, 2013a) as it is unlikely that the Action would:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to the species becoming established in the species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

This is because:

- Only limited surface disturbance is proposed as part of the Action (approximately 4.7 ha of woodland and approximately 3.1 ha of derived grassland).
- No threatened flora species have been recorded during the recent flora surveys within the Action area. In particular, the *Cynanchum elegans* (White-flowered Wax Plant), *Eucalyptus glaucina* (Slaty Red Gum), *Pomaderris brunnea* (Rufous Pomaderris) and *Pterostylis gibbosa* (Illawarra Greenhood) were not identified despite targeted searches.
- Cracking of soils as a result of subsidence in similar terrain at the Wambo Coal Mine has produced no observable changes to vegetation condition or the health of individual plants (FloraSearch, in prep.).
- Land undisturbed by the proposed surface infrastructure provides a higher quality habitat (i.e. there are significant areas of conserved vegetation in the vicinity of the Action).
- The Action is unlikely to disrupt the lifecycle of the species provided in Table 5 given the absence of records from the Area.

Threatened Fauna Species

Table 6 evaluates the nature and extent of likely impacts on each individual threatened fauna species identified in Table 3 and discussed in the above sections.

Table 6
Potential Impacts on Fauna Species and their Habitats

Scientific Name	Common Name	Nature and Extent of Likely Impacts
Amphibians		
Litoria aurea	Green and Golden Bell Frog	Despite suitable habitat being present in the vicinity of the Action area, the Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area and the nature and extent of proposed disturbance.
Litoria booroolongensis	Booroolong Frog	The Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, the lack of suitable habitat present and the nature and extent of proposed disturbance.
Litoria littlejohni	Littlejohn's Tree Frog	The Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, the lack of suitable habitat present and the nature and extent of proposed disturbance.

Table 6 (Continued)
Potential Impacts on Fauna Species and their Habitats

Scientific Name	Common Name	Nature and Extent of Likely Impacts
Reptiles		
Hoplocephalus bungaroides	Broad-headed Snake	Despite suitable habitat being present in the vicinity of the Action area, the Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, and the nature and extent of proposed disturbance.
Aprasia parapulchella	Pink-tailed Worm-lizard	The Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, the lack of suitable habitat present and the nature and extent of proposed disturbance.
Birds		
Botaurus poiciloptilus	Australasian Bittern	The Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, the lack of suitable habitat present and the nature and extent of proposed disturbance.
Rostratula australis	Australian Painted Snipe	The Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, the lack of suitable habitat present and the nature and extent of proposed disturbance.
Lathamus discolour	Swift Parrot	Despite suitable habitat being present within the Action area, the Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, and the nature and extent of proposed disturbance.
Anthochaera phrygia	Regent Honeyeater	Despite suitable habitat being present within the Action area, the Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, and the nature and extent of proposed disturbance.
Grantiella picta	Painted Honeyeater	The Action is not likely to significant impact this species as its nesting and foraging resources are not limited to the Action area, would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Mammals		
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland population)	The Action is not likely to significant impact this species as its roosting, nesting and foraging resources are not limited to the Action area, would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Phascolarctos cinereus	Koala	The Action is not likely to significant impact this species as its foraging resources are not limited to the Action area, would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Petrogale penicillata	Brush-tailed Rock-wallaby	The Action is not likely to significant impact this species given it is very unlikely there would be any impacts on potential shelter sites associated with cliffs. In addition, this species' foraging resources would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Pteropus poliocephalus	Grey-headed Flying-fox	The Action is not likely to significant impact this species as its foraging resources are not limited to the Action area, would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Nyctophilus corbeni	South-eastern Long-eared Bat	Despite suitable habitat being present within the Action area, the Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, and the nature and extent of proposed disturbance.
Chalinolobus dwyeri	Large-eared Pied Bat	The Action is not likely to significant impact this species given it is very unlikely there would be any impacts on potential roosting sites associated with cliffs. In addition, this species' foraging resources are not limited to the Action area, would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Pseudomys novaehollandiae	New Holland Mouse	The Action is not likely to significant impact this species as its nesting and foraging resources are not limited to the Action area, would not be materially reduced by the Action and would not be fragmented by the Action in consideration of the nature and extent of proposed disturbance.
Pseudomys oralis	Hastings River Mouse	Despite suitable habitat being present within the Action area, the Action is not likely to significantly impact this species given the absence of records within and surrounding the Action area, and the nature and extent of proposed disturbance.

The Action is not likely to have a significant impact on any threatened fauna species listed under the EPBC Act (Table 6) as it is unlikely that the Action would:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to the species becoming established in the species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

This is because:

- Surface infrastructure for the Action involves the direct disturbance of approximately 4.7 ha of woodland and approximately 3.1 ha of derived grassland, which is a small area in comparison to the significant areas of conserved vegetation in the vicinity of the Action.
- The Action would not materially increase fragmentation of any habitat as it does not involve linear development through remnant vegetation.
- Land undisturbed by the proposed surface infrastructure provides a higher quality habitat (i.e. there are significant areas of conserved vegetation in the vicinity of the Action).
- Cracking of soils as a result of subsidence in similar terrain at the Wambo Coal Mine has produced no observable changes to vegetation condition (FloraSearch, in prep.), and therefore subsidence is unlikely to affect foraging habitat or nesting and roosting habitat in hollow-bearing trees.
- It is unlikely that cliffs would be adversely impacted by the Action (MSEC, in prep.) and therefore it is very unlikely there would be any impacts on potential shelter, retreat or roosting sites for threatened fauna species associated with cliffs.
- Negligible subsidence impacts are predicted to occur on the channel of Wollombi Brook due to the distance from the proposed longwalls and WCPL's mine design objectives (MSEC, in prep.) (Section 4).
- With the implementation of proposed remediation measures and given the limited habitat value of drainage lines in the Action area, availability of water in streams would not be impacted to an extent that would significantly affect the availability of habitat resources for fauna species.

Threatened Ecological Communities

The *Hunter Valley Weeping Myall (Acacia pendula) Woodland* CEEC was not mapped by FloraSearch (in prep.) in the Action area despite targeted searches. Therefore it is unlikely the Action would have a significant impact on the *Hunter Valley Weeping Myall (Acacia pendula) Woodland* CEEC.

The *Central Hunter Valley Eucalypt Forest and Woodland* CEEC was mapped within the Action area and surrounds as vegetation Communities 4, 5, 5a, 10 and 10a. Less than 4 ha of *Central Hunter Valley Eucalypt Forest and Woodland* CEEC would be disturbed as a result of the southern ventilation shaft, gas management infrastructure and infrastructure area extension for the Action, comprising:

- Spotted Gum – Narrow-leaved Ironbark – Grey Box Woodland (Community 4) – less than 1 ha.
- Narrow-leaved Ironbark – Grey Box Woodland (Community 5) – approximately 3 ha.

The Action is unlikely to have a significant impact on *Central Hunter Valley Eucalypt Forest and Woodland* CEEC because:

- The Action would not materially reduce the extent of the community given the small area of disturbance proposed (less than 4 ha).
- The Action would not increase fragmentation of the community as it does not involve linear development through *Central Hunter Valley Eucalypt Forest and Woodland* CEEC.
- The Action would not adversely affect habitat critical to the survival of the community.
- The Action would not modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the community's survival.
- The Action would not cause a substantial change in the species composition of an occurrence of the community.
- The Action would not cause a substantial reduction in the quality or integrity of an occurrence of the community.
- The Action would not interfere with the recovery of the community.

3.1 (e) Listed migratory species

Description

Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations (DotE, 2015c).

Table 7 provides a list of migratory fauna species listed under the EPBC Act that have the potential to occur in the Action area. This list was generated from database searches (including the EPBC Protected Matters Search Tool and the BioNet website) of a 20 km search radius centred over the Action (DotE, 2015a; OEH, 2015a).

For many species in Table 7, the Action area lacks the extent or presence of habitat needed to support them other than to allow for occasional appearances as nomads, vagrants or individuals with 'passing through' status. At any one time, appearances of these species within the Action area would represent a very small sample of their wider populations.

Table 7
Migratory Species with Potential to Occur in Action Area

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas
		EPBC Protected Matters Search[2]	BioNet[3]			
Ardea ibis (Cattle Egret)	M	•	-	This species was not recorded during the field surveys for the Action, however has been previously recorded in the surrounds during ongoing monitoring conducted by WCPL. Potential foraging habitat for this species exists within the Action area in the form of farm dams and paddocks containing cattle.	Known	Potential
Ardea modesta (Eastern Great Egret)*	M	•	-	This species was recorded in the surrounding area during the field surveys for the Action. Potential foraging habitat for this species exists within the Action area in the form of farm dams and wet areas.	Known	Potential
Pandion haliaetus (Osprey)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 15 km north of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil
Haliaeetus leucogaster (White-bellied Sea-Eagle)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 15 km north of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil
Gallinago hardwickii (Latham's Snipe)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 55 km east of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil
Hirundapus caudacutus (White-throated Needletail)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 6 km east of the Action area. Potential foraging habitat for this species exists within the Action area in the form of open woodland.	Potential	Potential

Table 7 (Continued)
Migratory Species with Potential to Occur in Action Area

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas
		EPBC Protected Matters Search[2]	BioNet[3]			
Apus pacificus (Fork-tailed Swift)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 10 km south-east of the Action area. Potential foraging habitat for this species exists within the Action area in the form of open woodland.	Potential	Potential
Merops ornatus (Rainbow Bee-eater)*	M	•	-	This species was recorded in the surrounding area during the field surveys for the Action. Potential foraging habitat for this species exists within the Action area in the form of open woodland.	Known	Potential
Anthochaera phrygia (Regent Honeyeater)	CE, M	•	•	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 5 km east of the Action area. Potential habitat for this species exists within the Action area in the form of potential foraging habitat with winter flowering eucalypt species.	Potential	Potential
Rhipidura rufifrons (Rufous Fantail)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 9 km north of the Action area. Potential foraging habitat for this species exists within the Action area in the form of open woodland.	Potential	Potential
Monarcha melanopsis (Black-faced Monarch)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 5 km west of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil
Myiagra cyanoleuca (Satin Flycatcher)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 7 km south-east of the Action area. Potential foraging habitat for this species exists within the Action area in the form of open woodland.	Potential	Potential

Table 7 (Continued)
Migratory Species with Potential to Occur in Action Area

Species	Conservation Status[1]	Source of Record		Distribution/Habitat Requirements in Relation to the Action	Likelihood of Occurrence within Action Area and Immediate Surrounds	Likelihood of Occurrence within Surface Infrastructure Areas
		EPBC Protected Matters Search[2]	BioNet[3]			
Cuculus optatus (Oriental Cuckoo)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 15 km east of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil
Motacilla flava (Yellow Wagtail)	M	•	-	This species has not been recorded during the field survey or during previous assessments undertaken for WCPL approvals and/or ongoing monitoring. The closest record of this species is approximately 60 km south-east of the Action area. No potential habitat for this species is located within the Action area.	Nil	Nil

1 Conservation status under the EPBC Act (current as of 13 January 2016).
CE – Critically Endangered.
M – Migratory.

2 DotE (2015a).

3 OEH (2015a). Note this database include records from the Atlas of NSW Wildlife, Royal Botanical Gardens and Domain Trust, Forests NSW and the Australian Museum.

* Recorded by Eco Logical (in prep.).

Two migratory species were recorded during the recent 2015 spring fauna surveys conducted in the Action area, namely the Rainbow Bee-eater (*Merops ornatus*) and the Eastern Great Egret (*Ardea modesta*) (Eco Logical, in prep.) (Table 7).

Nature and extent of likely impact

The Action is not likely to have a significant impact on migratory species listed under the EPBC Act as it is unlikely that the Action would:

- substantially modify, destroy or isolate an area of important habitat for a migratory species;
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species.

This is because:

- None of these species are considered to be at the limit of their known migratory ranges.
- Each of these species is highly mobile and foraging and territorial ranges far exceed the Action area.
- Each of these species is highly mobile and the Action area is not considered to contain limiting foraging or breeding habitat for these species.
- The Action area does not constitute an area of important habitat for any of these species.

- The Action involves the direct disturbance of approximately 4.7 ha of woodland and approximately 3.1 ha of grassland and some of this disturbance would be minor and temporary.
- The proposed action is unlikely to disrupt the lifecycle of any of these species.

3.1 (f) Commonwealth marine area

Description

There are no Commonwealth Marine Areas located in the vicinity of the Action. The Commonwealth Marine Area generally stretches from 3 to 200 nautical miles from the Australian coast (DotE, 2015d). As the Action is not located within a Commonwealth Marine Area, the Action is unlikely to impact marine species within a Commonwealth Marine Area.

Nature and extent of likely impact

The Action is unlikely to impact on a Commonwealth Marine Area, and accordingly, is unlikely to have a significant impact on any Commonwealth Marine Area. Secondary effects, including the Action's contribution to global greenhouse gas emissions, would be relatively small.

3.1 (g) Commonwealth land

Description

The Action will not take place on Commonwealth land.

A search of the EPBC Act database using the Protected Matters Search Tool indicates there are five areas of Commonwealth Land within a 20 km radius centred on the Action, including the Singleton Military Area (Lone Pine Barracks) and land operated by the Australian Telecommunications Commission, Telstra Corporation Limited and Defence Housing Authority (DotE, 2015a).

Nature and extent of likely impact

The Action will not take place on Commonwealth land. The Action is unlikely to impact on Commonwealth land, and accordingly, is unlikely to have a significant impact on any Commonwealth land. Secondary effects, including the Action's contribution to global greenhouse gas emissions, would be relatively small.

3.1 (h) The Great Barrier Reef Marine Park

Description

The Action is not within the Great Barrier Reef Marine Park, or the catchment area of the Great Barrier Reef Marine Park.

Nature and extent of likely impact

The Action will not impact the Great Barrier Reef Marine Park, and accordingly, will not have a significant impact on the Great Barrier Reef Marine Park. Secondary effects, including the Action's contribution to global greenhouse gas emissions, would be relatively small.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

A description of the existing environment in relation to the hydrological characteristics, quality and value of the water resources is provided below.

The NSW DPI Water has developed two groundwater source categories to define the value of groundwater resources as part of the NSW *Aquifer Interference Policy* (NSW Government, 2012):

- highly productive groundwater (total dissolved solids [TDS] of less than 1,500 milligrams per litre [mg/L] and contains water supply works that can yield water at a rate greater than 5 litres per second); and
- less productive groundwater (groundwater that does not meet the highly productive definition).

The terms 'highly productive' and 'less productive' are referred to throughout this section.

Hydrology of the Water Resources

The Action area is situated within the Hunter Coalfield subdivision of the Sydney Basin, which forms the southern part of the Sydney-Gunnedah-Bowen Basin.

The stratigraphy in the area surrounding the Action comprises the Triassic Narrabeen Group, Permian coal measures and more recent Quaternary deposits associated with major drainage pathways (HydroSimulations, in prep.) (Figure 9). The Action area is situated within the Late Permian age coal measures of the Singleton Supergroup, which comprise mainly coal, shale, sandstone, siltstone, mudstone and conglomerate.

The target coal seams for the Action lie within the Jerrys Plains Subgroup of the Wittingham Coal Measures that form part of the Singleton Supergroup.

Groundwater Resources

The hydrogeological regime of the Wambo area and surrounds comprises two main systems (HydroSimulations, in prep.):

- Quaternary alluvial aquifer system of channel fill deposits associated with Wollombi Brook, North Wambo Creek, Wambo Creek and Stony Creek.
- Underlying Permian strata consisting of:
  - hydrogeologically 'tight' and hence very low yielding to essentially dry sandstone and lesser siltstone; and
  - low to moderately permeable coal seams, which are the prime water-bearing strata within the Permian measures.

The alluvium within the Hunter Valley region and more locally is associated with fluvial depositional sequences. The main drainage channels have a sequence of up to 10 m to 20 m of unconsolidated materials including gravels, sands, silts and clays depending upon location (Mackie, 2009).

A transient electromagnetic (TEM) survey (Groundwater Imaging, 2012) was carried out to investigate the extent and thickness of alluvium along the lower reaches of Wambo Creek and North Wambo Creek. The extent of alluvium interpreted from the TEM study is typically of a narrower alluvial body along both the lower reaches of Wambo Creek and North Wambo Creek than is mapped in the publicly available mapping (e.g. Glen and Beckett, 1993) (HydroSimulations, in prep.) (Figure 9).

Analysis of the rainfall residual mass curve against groundwater level hydrographs indicates that the alluvial aquifer is responsive to rainfall recharge and it is likely that the alluvium plays an important role in supplying recharge to the underlying Permian strata as well as contributing to baseflow of surface water features (HydroSimulations, in prep.).

Prior to the commencement of mining operations in the region, the potentiometric surface within the Permian aquifers of the Wambo area most probably reflected the topography, with elevated water levels/pressures in areas distant from the major drainages and reduced levels in areas adjacent to the alluvial lands (HydroSimulations, in prep.). Historical and ongoing open cut and underground mining within and surrounding the Action area has created a regional zone of depressurisation within the Permian coal measures (HydroSimulations, in prep.).

Surface Water Resources

The Action is located within the Hunter River catchment. The Action area is adjacent to Wollombi Brook, south-west of its confluence with the Hunter River (Figures 1 and 3).

Wollombi Brook drains an area of approximately 1,950 km^2 and joins the Hunter River some 5 km north-east of the Wambo Coal Mine. The Wollombi Brook sub-catchment is bound by the Myall Range to the south-east, Doyles Range to the west, the Hunter Range to the south-west and Broken Back Range to the north-east (Hunter Catchment Management Trust, 2002).

The Action area is within the catchment area of:

- Wollombi Brook, including its tributary Wambo Creek (also known as South Wambo Creek); and
- the water management system of the approved Wambo Coal Mine open cut and infrastructure areas.

A section of North Wambo Creek was diverted to avoid the Wambo open cut and this water control system was approved as part of the approved Controlled Action (EPBC 2003/1138).

Groundwater and Surface Water Interactions

Groundwater flow paths in the vicinity of the watercourses in the vicinity of the Action are likely to be complex (HydroSimulations, in prep.).

HydroSimulations (in prep.) inferred that Wambo Creek and Wollombi Brook would have been gaining watercourses on average in the pre-mining hydrogeological environment (i.e. groundwater would have discharged as baseflow into the creeks and river). Some reductions in baseflow from these surface water features are likely due to the changes in the hydrogeological regime due to the complex history of mining in this area. As a net effect, Wollombi Brook is now a losing stream whereas Wambo Creek is still a gaining stream overall.

These watercourses may 'lose' or 'gain' groundwater from alluvium in some areas depending on the relative level of groundwater in the alluvium compared with the creeks. Groundwater may discharge to watercourses and much of this discharge occurs due to shallow 'interflow' (i.e. movement of perched groundwater through regolith layers or alluvium after rainfall recharge has occurred) (HydroSimulations, in prep.).

The discharge rates from deeper, hard rock aquifers to some surface water features are limited due to the low vertical permeability of the Permian strata (HydroSimulations, in prep.).

Relevant Water Sharing Plans

The NSW State Government has implemented a number of water sharing plans (i.e. state water resource plans) for rivers and groundwater systems under the NSW *Water Management Act, 2000*, that are applicable to the Action.

The regulatory instruments and applicable water sources and water management zones relevant to the Action are summarised in Table 8. For the groundwater resources, the relevant aquifer and level of productivity is also presented.

Table 8
Relevant State Water Resource Plans and Water Sources

Regulatory Instrument	Water Source	Relevant Aquifer	Productivity[1]
Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009	Lower Wollombi Brook	Alluvial aquifers associated with Wollombi Brook and a small portion of Wambo Creek outside the Action area.	Highly Productive
		Alluvial aquifers associated with most of Wambo Creek and all of Stony Creek and North Wambo Creek	Less Productive
Water Sharing Plan for the Hunter Regulated River Water Source 2003	Zone 1B (Hunter River from Goulburn River Junction to Glennies Creek Junction) Zone 2A (Hunter River from Glennies Creek Junction to Wollombi Brook Junction)	N/A (Regulated River Water Source)	N/A (Regulated River Water Source)

[1] As designated by the NSW DPI Water.

The Permian 'porous rock' aquifer within the Action area is regulated under the NSW *Water Act, 1912*, as no applicable water sharing plan has commenced to date for this water source. This aquifer is classified as less productive by the NSW DPI Water.

Water Quality of the Water Resources

Groundwater Resources

An extensive groundwater monitoring network in the vicinity of the Action is maintained for the approved Wambo Coal Mine in accordance with a Groundwater Monitoring Program approved by the NSW DP&E (Figure 10).

Groundwater in the alluvium is recharged from multiple sources with varying qualities.

The salinity of groundwater recently sampled from areas surrounding the Action is variable, with TDS ranging from about 300 mg/L to 15,000 mg/L (HydroSimulations, in prep.). The highest salinities are reported from the surficial groundwater (i.e. the colluvium and weathered Permian).

Surface Water Resources

An extensive surface water monitoring network in the vicinity of the Action is maintained for the approved Wambo Coal Mine in accordance with a Surface Water Monitoring Program approved by the NSW DP&E (Figure 10).

The available data indicates that the surface water quality of Wollombi Brook near the Action area can be characterised as being:

- near neutral to slightly alkaline (median pH range from 7.5 to 7.8);
- having moderate salinity (median EC values ranging from 643 to 825 microSiemens per centimetre [µS/cm]); and
- having generally low total suspended solids concentrations (median concentrations of 6 to 10 mg/L) (Advisian, in prep.).

The surface water quality data available for Wambo Creek indicate that:

- pH levels have been near neutral (median values 7.4 to 7.6);
- salinity has been moderate (median values of 511 µS/cm at SW6 and 596 µS/cm at SW7 [Figure 10]); and
- total suspended solids concentrations have been generally low (median concentration at SW6 of 5 mg/L and 3 mg/L at SW7 [Figure 10]) (Advisian, in prep.).

Value of the Water Resources

As detailed in Section 5.2.1 of the *Significant impact guidelines 1.3: Coal seam gas and large coal mining developments—impacts on water resources* (Significant Impact Guidelines – Water Resources) (DotE, 2013b), the value of a water resource is determined by its utility for third party uses, including environmental and other public benefit outcomes (e.g. use by other industries, recreation and tourism uses or the maintenance of ecosystem function).

Groundwater Resources

A search of the NSW Bore Database was undertaken to identify registered bores within a 5 km radius of the Wambo Coal Mine. The search identified 74 bores, including:

- the majority (45 bores) registered as monitoring/test bores and located within WCPL's mining tenement boundaries;
- an additional 10 bores identified as mining/dewatering bores;
- sixteen bores registered for irrigation, domestic and/or stock use; and
- three bores of unknown use (HydroSimulations, in prep.).

The Permian groundwater sources are generally low yielding and brackish to saline, and are therefore considered to have low resource potential.

Culturally Significant Sites

The relevant water sharing plans do not identify any culturally significant sites in the vicinity of the Action.

Groundwater Dependent Ecosystems

The closest 'high priority' groundwater dependent ecosystem (GDE) identified by the NSW Government is Parnell Spring. Parnell Spring likely flows from the Triassic age Narrabeen Group and is located approximately 11 km south-southwest of the Action area. The Wambo Coal Mine has resulted in negligible drawdown in Triassic age material.

Potentially GDEs in the Action area and surrounds have been identified through a review of the relevant water sharing plans, the regional mapping of GDEs in the Bureau of Meteorology *Atlas of Groundwater Dependent Ecosystems* (2015), the vegetation mapping conducted by FloraSearch (in prep.) (Figure 8) and consideration of the simulated depth to groundwater in the Action area (Figure 11).

GDEs in the vicinity of the Action area are likely to be associated with the riparian zone associated with Wambo Creek and the riparian, floodplain and alluvial zones on Wollombi Brook. These zones generally correlate with River Oak Riparian Woodland (Community 1) and Forest Red Gum Floodplain Forest (Community 2) mapped by FloraSearch (in prep.).

Surface Water Resources

Long-term gauging records from Wollombi Brook show that Wollombi Brook has flows on over 80% of days (Advisian, in prep.).

Tributaries to Wollombi Brook in the Action area are generally considered ephemeral and have been subject to disturbance from past agricultural and mining activities. The tributaries that would be affected by subsidence from the Action are located on land owned by WCPL and are not utilised for water supply.

In August 2009, there were 110 surface water licences within the Lower Wollombi Brook water source with a total surface water entitlement of 6,663 megalitres per year (88% used for irrigation purposes, 10% used for industrial purposes) (NSW Department of Water and Energy, 2009).

Nature and extent of likely impact

The potential impacts of the Action in regards to the hydrology and water quality of water resources are considered below. This assessment builds upon a number of hydrological and hydrogeological studies conducted for the Wambo Coal Mine and the significant record of environmental monitoring at the Wambo Coal Mine (Figure 10).

Hydrology of the Water Resources

Potential Impacts on Integrity of Hydrogeological Connections

The main potential impacts on the groundwater regime due to the Action would be as a result of:

- subsurface fracturing and shearing of sedimentary strata above the additional underground mining areas resulting in changes in bulk rock mass permeability and storage capacity; and
- dewatering of groundwater that enters the additional underground mining areas as a result of the above.

The rocks in the zone of connective cracking would have a substantially higher vertical permeability than the undisturbed strata. This will encourage groundwater to move out of rock storage downwards towards the mined areas. In the upper part of the zone of fracturing, where disconnected cracking occurs, the vertical movement of groundwater should not be significantly greater than under natural conditions.

Underground mining area 1 is located in an area where the pre-mining hydraulic characteristics have been substantially altered by the approved Wambo Coal Mine open cut operations and previous mining undertaken in this area by United Collieries.

Given the depth of cover in underground mining area 3, connective cracking would be unlikely to reach the ground surface over this area (HydroSimulations, in prep.).

The Action would have a negligible impact on the hydraulic characteristics of the alluvial aquifer associated with Wollombi Brook, and there would be no change in the integrity of the hydrogeological connections between the Wollombi Brook alluvial aquifer and the Permian aquifers.

Potential Impacts on Water Levels

Historical and ongoing open cut and underground mining within and surrounding the Action area has created a regional zone of depressurisation within the Permian coal measures (HydroSimulations, in prep.).

During mining of the targeted coal seams, the Permian coal measures within the Action area are anticipated to be depressurised. It is expected that the impacts on water levels due to the Action would not be significant from a regional perspective.

Based on previous experience at the Wambo Coal Mine, it is anticipated that the Action would not cause a significant impact on water levels in the highly productive alluvial aquifer associated with Wollombi Brook. The Action is also anticipated to not have a significant impact on stream baseflow or natural river leakage for Wollombi Brook.

Subsidence Impacts on Watercourses

The NSW Development Consent (DA 305-7-2003) for the Wambo Coal Mine includes subsidence impact performance measures which are required to be met (Section 4). These subsidence impact performance measures require negligible subsidence impacts on Wollombi Brook. These subsidence impact performance measures would apply to the Action.

To achieve the subsidence impact performance measure, all longwalls at the Wambo Coal Mine would be offset from Wollombi Brook by an angle of 26.5 degrees from the vertical to a 40 m buffer from the Wollombi Brook highbank. This would limit vertical subsidence from the additional underground mining areas to less than 20 mm (i.e. negligible subsidence impacts) at the Wollombi Brook channel. As such, it is considered unlikely that the Wollombi Brook would be adversely impacted by subsidence effects associated with the Action.

Subsidence impacts on ephemeral watercourses within underground mining area 3 may include:

- possible increased erosion as a result of increased bed gradients;
- possible increased ponding as a result of differential subsidence; and
- possible cracking of the channel bed as a result of tensile strains.

WCPL would implement monitoring and remediation measures to mitigate the potential subsidence impacts on these watercourses. It is unlikely that any surface water users would be affected by these subsidence impacts. There is limited aquatic or terrestrial fauna habitat resources associated with these watercourses.

Licensing and Water Entitlements

Under the *Water Management Act, 2000*, all water taken by aquifer interference activities is required to be accounted for within the extraction limits set by any relevant water sharing plans (i.e. state water resource plans). Therefore, licensing under the *Water Management Act, 2000* is required to account for any loss of water as a result of the Action from alluvial aquifers in the Lower Wollombi Brook water source. Licensing to account for water taken from the coal seams and adjacent hardrock under the *Water Act, 1912* is also required for any mine inflows from the Permian aquifers.

WCPL would hold/acquire any necessary licences and approvals for the predicted water take associated with the Action, prior to the commencement of the Action, in accordance with (but not limited to) the following:

- *Water Management Act, 2000*, including:
  - *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009.*
  - *Water Sharing Plan for the Hunter Regulated River Water Source 2003.*
- NSW *Access Licence Dealings Principles Order 2004*.
- *Water Act, 1912*.

Following completion of the Action, WCPL would surrender any licence entitlements required to account for post-closure water takes.

Potential Impacts on Existing Water Users

As described above, WCPL would hold/acquire any necessary licences and approvals for the predicted water take associated with the Action. This would mitigate potential impacts on water users associated with Wollombi Brook and the downstream Hunter River.

In accordance with the NSW *Aquifer Interference Policy* (NSW Government, 2012), WCPL is required to 'make good' impacts on privately owned water supply works (bores) where there is greater than 2 m cumulative drawdown, or cumulative pressure head decline of more than 40% where the "post-water sharing plan" pressure head above the base of the water source is less than 5 m.

The above requirement of the NSW *Aquifer Interference Policy* is implemented at the Wambo Coal Mine through the Surface and Groundwater Response Plan. 'Make good' provisions could include, but are not necessarily limited to, lowering of pumps, deepening of bores, or provision of new bores/alternative water supplies.

The requirement to 'make good' impacts on privately owned water supply works (bores) would apply to the Action, and therefore there is not anticipated to be a significant impact on water users of alluvial aquifers or Permian aquifers as a result of the Action.

Potential Impacts on Culturally Significant Sites

As described above, there are no culturally significant sites listed in the relevant water sharing plans. Therefore, there are no potential impacts on culturally significant sites anticipated as a result of the Action.

Potential Impacts on Groundwater Dependent Ecosystems

The closest 'high priority' GDE identified by the NSW Government is Parnell Spring, which likely flows from the Triassic age Narrabeen Group. The Action would result in negligible drawdown in Triassic age material, and therefore would not have a significant impact on Parnell Spring.

Less than 1 ha of Forest Red Gum Floodplain Forest (Community 2) would be disturbed as a result of construction of the new access road (Figure 8).

No significant subsidence impacts have been observed on riparian vegetation at the Wambo Coal Mine to date. Therefore, the Action is not expected to have a significant impact on GDEs.

Summary of Impacts on Hydrology

Based on the above, there would be no significant additional impact on the hydrological characteristics of the Permian aquifers or alluvial aquifers, or surface water flows in Wambo Creek and Wollombi Brook as a result of the Action in isolation. Any potential changes in water quantity, integrity of hydrological or hydrogeological connections or changes in the area or extent of the water resources as a result of the Action would not be significant from a regional perspective.

Water Quality of the Water Resources

Regional water quality objectives relevant to the Action area include the following:

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand [ANZECC & ARMCANZ], 2000); and
- The National Water Quality Management Strategy (DotE, 2014).

Impacts Associated with Underground Mining

The existing systems for water management and erosion and sediment control would be expanded to control runoff from the infrastructure area extension and new access road associated with the Action. It is therefore considered unlikely that there would be significant impacts on the surface water sources as a result of surface runoff from the Action and the relevant local water quality objectives would not be materially affected.

There are no simulated risks of reduced beneficial uses of the alluvium as a result of underground mining activities associated with the Action (HydroSimulations, in prep.).

There is not expected to be a migration of groundwater away from the additional underground mining areas in the Permian aquifers either during mining or following completion of mining activities. On this basis, Wambo would not lower the beneficial use category of the groundwater within the Permian aquifers.

Licensed Water Discharges

The site water management strategy for Wambo is based on the containment and re-use of mine water and on the control of sediment that may be potentially carried with runoff from disturbed areas such as the waste rock emplacements.

The Wambo Coal Mine releases water to the Wollombi Brook in accordance with its Environment Protection Licence (EPL) 529, which operates under the arrangements of the Hunter River Salinity Trading Scheme (a state water quality management plan). These arrangements require flow in Wollombi Brook to exceed 500 megalitres per day (measured at the Bulga gauging station) for water releases to occur.

As any water releases would comply with the rules of the Hunter River Salinity Trading Scheme which accounts for other third party uses, water releases associated with the Action are considered unlikely to have a significant impact on the water quality of Wollombi Brook or the Hunter River.

Summary of Impacts on Water Quality

The Action is not expected to result in the lowering of beneficial use categories in any of the relevant aquifers or any surface watercourses, and would not result in a significant change to the water quality of the receiving environment. Therefore it is anticipated that the Action would not materially compromise relevant local or regional water quality objectives.

The Action would not result in any significant changes in the ability to achieve relevant local or regional water quality objectives (i.e. water quality targets of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* [ANZECC & ARMCANZ, 2000] or the National Water Quality Management Strategy [DotE, 2014]).

There would be no significant worsening of the local quality of water and/or high quality water releases into systems adapted solely to lower quality water as a result of the Action, as controlled water releases from the Wambo Coal Mine would continue in accordance with the Hunter River Salinity Trading Scheme.

It is therefore considered unlikely that there would be a significant impact on the water quality of local or regional watercourses, alluvial aquifers or the Permian aquifers.

Cumulative Impacts

A range of open cut and underground mine operations has been conducted at the Wambo Coal Mine since mining operations commenced in 1969.

Historically there has been, and there continues to be, a substantial amount of coal mining in the area surrounding the Wambo Coal Mine. This is carried out by a number of companies with development occurring across several coal seams. Coal has been extracted by means of both underground and open cut mining methods. Coal mines adjacent to the Wambo Coal Mine include (Figure 3):

- Hunter Valley Operations, to the north and east;
- Mt Thorley-Warkworth Complex, to the east; and
- United Collieries (in care and maintenance), to the north and east.

The adjacent United Collieries also mined the Arrowfield Seam until 2010 (United Underground Mine) directly beneath portions of underground mining area 1.

Historical and ongoing open cut and underground mining within and surrounding the Action area has created a regional zone of depressurisation within the Permian coal measures (HydroSimulations, in prep.). All neighbouring mines have been included in groundwater model simulations (HydroSimulations, in prep.). It is expected that the impacts on water levels due to the Action would not be significant from a regional perspective and in the context of impacts as a result of previous developments.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Threatened flora and fauna species that are known to occur or could possibly occur within the Action area and surrounds are described in Section 3.1(d). The general kinds of flora and fauna that occur in the Action area and surrounds are summarised below, as well as a description of the regional and local setting of the Action.

Regional Setting

The Action area lies in the north of the Sydney Basin Bioregion as defined originally by Thackway and Cresswell (1995) and in the south-west corner of the North Coast Botanical Division (Anderson, 1968; Harden, 2002). The Action area is close to the southern boundary of the Brigalow Belt South Bioregion (Thackway and Cresswell, 1995) and just outside the eastern boundary of the Central Western Slopes Botanical Division (Anderson, 1968; Harden, 2002).

Flora

Vegetation types within the Action area and surrounds are shown on Figure 8.

As detailed in Section 3.1(d), a number of flora surveys in the Action area have been undertaken, including by Orchid Research (2003) and FloraSearch (in prep.). During the 2015 spring baseline surveys, a total of 199 plant species were recorded within the Action area. Of these 165 (approximately 82.9%) of the species were native to the natural communities of the Action area, while 34 (approximately 17.1%) of these species were introduced (FloraSearch, in prep.).

The condition of vegetation is discussed in Section 3.3(g).

Fauna

As detailed in Section 3.1(d), fauna surveys in the Action area and surrounds have been undertaken by Eco Logical (in prep.) using a variety of survey techniques. Eco Logical (in prep.) recorded a total of 172 fauna species in the Action area and surrounds during the 2015 spring surveys, comprising 120 birds, 12 non-flying mammals, 15 microbats, 18 reptiles and seven frogs.

A number of introduced pest species are either known or expected to occur in the Action area and surrounds, including (DotE, 2015a):

- Rock Pigeon (*Columba livia*);
- Spotted Turtle-Dove (*Streptopelia chinensis*);
- Common Blackbird (*Turdus merula*);
- Common Starling (*Sturnus vulgaris*);
- Common Myna (*Acridotheres tristis*);
- Skylark (*Alauda arvensis*);
- Mallard (*Anas platyrhynchos*);
- House Sparrow (*Passer domesticus*);
- Nutmeg Mannikin (*Lonchura punctulata*);
- European Goldfinch (*Carduelis carduelis*);
- Red-whiskered Bulbul (*Pycnonotus jocosus*);
- Cane Toad (*Rhinella marina*);
- House Mouse (*Mus musculus*);
- Brown Rat (*Rattus norvegicus*);
- Black Rat (*Rattus rattus*);
- Domestic Dog (*Canis familiaris*);
- Red Fox (*Vulpes vulpes*).
- Cat (*Felis catus*);
- Brown Hare (*Lepus capensis*);
- Rabbit (*Orctolagus cuniculus*);
- Pig (*Sus scrofa*);
- Domestic Cattle (*Bos Taurus*); and
- Feral deer (*Dama dama*).

3.3 (b) Hydrology, including water flows

The Action is located within the Hunter River catchment. The Action area is adjacent to Wollombi Brook, south-west of its confluence with the Hunter River (Figures 1 and 3).

Wollombi Brook drains an area of approximately 1,950 km^2 and joins the Hunter River some 5 km north-east of the Wambo Coal Mine. The Wollombi Brook sub-catchment is bound by the Myall Range to the south-east, Doyles Range to the west, the Hunter Range to the south-west and Broken Back Range to the north-east (Hunter Catchment Management Trust, 2002).

Water resources in proximity to the Action are considered in detail in Section 3.1(i).

3.3 (c) Soil and Vegetation characteristics

The Action area is situated within the Hunter Coalfield subdivision of the Sydney Basin, which forms the southern part of the Sydney-Gunnedah-Bowen Basin. The coal bearing rocks of the Sydney Basin are Permian in age (i.e. approximately 225 to 270 million years old) and are typically associated with low-lying gentle topography (WCPL, 2003).

The Action area is situated within the Late Permian age coal measures of the Singleton Supergroup, which comprise mainly coal, shale, sandstone, siltstone, mudstone and conglomerate. South and west of the Action area is an escarpment of Triassic Narrabeen Group sandstone overlying the Permian sediments (Figure 9).

Soil landscapes in the Action area and surrounds have been mapped by the former NSW Department of Land and Water Conservation as described in the *Soil Landscapes of the Singleton 1:250,000 Sheet* (Kovac and Lawrie, 1991).

Underground mining area 1 has already been disturbed as a result of existing open cut mining operations at the Wambo Coal Mine.

Four soil landscape units have been mapped within the Action area by Kovac and Lawrie (1991):

- Bulga Soloths;
- Jerrys Plains Soloths;
- Benjang Solidic Soils;
- Lees Pinch Shallow Soils; and
- Wollombi Alluvial Soils.

The Bulga Soloths soil landscape is typically associated with smooth slopes (up to 10%) forming undulating rises, and is mapped over the majority of underground mining area 3 (Kovac and Lawrie, 1991). This soil landscape is comprised mainly of Yellow Soloths on upper to midslopes, and occasionally Yellow and Brown Solodic Soils and Brown Earths on lower slopes (Kovac and Lawrie, 1991). Much of this soil landscape has been cleared for grazing (Kovac and Lawrie, 1991).

The Jerrys Plains Soloths soil landscape is associated with undulating low hills and occurs in the outcropping areas of the Jerrys Plains Subgroup of the Wittingham Coal Measures (Kovac and Lawrie, 1991). This soil landscape is mapped in the area of the new access road and infrastructure area extension and underground mining area 1 (within the approved surface development area). The main soils on the crest and midslopes are Soloths with Solodic soils occurring on the lower slopes and in drainage depressions (Kovac and Lawrie, 1991). Native vegetation regrowth can be found on unimproved pastures in this soil landscape (Kovac and Lawrie, 1991).

The Benjang Solodic Soils soil landscape occurs on rounded rolling hills with large open valleys, and was mapped over the south-western portion of underground mining area 1 (which is within the approved surface development area) (Kovac and Lawrie, 1991). This soil landscape is comprised mainly of red, yellow and brown Solodic Soils, Brown Podozolic Soils, Non-calcic Brown Soils and Siliceous Soils (Kovac and Lawrie, 1991). Much of this soil landscape has been cleared for grazing on unimproved pastures (Kovac and Lawrie, 1991).

The Lees Pinch Shallow Soils soil landscape occurs in the south-western corner of underground mining area 3 at the base of the Narrabeen Group slopes. This soil landscape is typically associated with rolling hills to steep mountains (Kovac and Lawrie, 1991). This soil landscape unit is comprised mainly of shallow Silicious Sands with shallow loams, and is dominated by a number of shrub woodland communities (Kovac and Lawrie, 1991).

The Wollombi Alluvial Soils soil landscape occurs adjacent to underground mining area 3 and at the edge of the infrastructure area extension and is associated with the valley flats of Wollombi Brook (Kovac and Lawrie, 1991). Native vegetation associated with this soil landscape includes forest oak and river oak, with some areas cleared for grazing on unimproved pastures (Kovac and Lawrie, 1991).

As discussed in Section 3.1(d), the vegetation types identified in the Action area include (Figure 8):

- River Oak Riparian Woodland (Community 1).
- Forest Red Gum Floodplain Forest (Community 2).
- Spotted Gum – Narrow-leaved Ironbark – Grey Box Woodland (Community 4).
- Narrow-leaved Ironbark – Grey Box Woodland (Community 5).
- Bull Oak Grassy Woodland (Community 6).
- Grey Box – Slaty Box Woodland (Community 10).
- Derived Grassland (Community 12).

3.3 (d) Outstanding natural features

Wollemi National Park is located approximately 1 km to the south-east of the Action area at its closest point. Wollemi National Park and its associated escarpment are discussed in Sections 3.1(a). Longwalls at the Wambo Coal Mine would be offset from the base of the escarpment associated with the Wollemi National Park so that there is negligible subsidence impact (Section 4).

Wollombi Brook is located adjacent to the Action area and flows on over 80% of days. Longwalls at the Wambo Coal Mine would be offset from Wollombi Brook by an angle of 26.5 degrees from the vertical to a 40 m buffer from the Wollombi Brook highbank. This would result in negligible subsidence on the Wollombi Brook channel (Section 4).

3.3 (e) Remnant native vegetation

Refer to Sections 3.1(d), 3.3(a) and 3.3(c) above and Figure 8.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

The Wambo Coal Mine is located in the Upper Hunter Valley region where landforms are characterised by gently sloping floodplains associated with the Hunter River and the undulating foothills, ridges and escarpments of the Mount Royal Range and Great Dividing Range.

The infrastructure area extension and new access road are located adjacent to the Wollombi Brook at an elevation of approximately 60 m Australian Height Datum (AHD). Underground mining area 1 is located beneath an area modified by open cut mining operations with elevations up to approximately 160 m AHD. Underground mining area 3 has elevations ranging from approximately 65 m AHD in the north-east to approximately 100 m AHD in the west.

3.3 (g) Current state of the environment

The Action area encompasses varied geology, soils and topography that have strongly influenced past land use and, consequently, the condition of the native vegetation (FloraSearch, in prep.).

Historic disturbance factors on the Action area have included:

- clearing of native vegetation (generally on areas of gentler topography and better soil types);
- logging;
- grazing by livestock and introduced feral herbivores such as rabbits;
- construction of tracks and fire trails;
- wildfires (the most recent being in 1994); and
- underground and open cut mining activities (which have been occurring in the area since 1969 and 1974, respectively).

Underground mining area 1 has been substantially modified by the approved surface development and open cut mining operations associated with the Wambo Coal Mine.

In the remaining Action area, the condition of the vegetation varies from poor to good (FloraSearch, in prep.).

The most alienated parts of the Action area are the flat valley floor and gentle lower slopes in the creek valleys, which have been almost completely cleared of their original native tree and shrub cover. This cleared land has been used mainly for grazing in recent decades.

Adjacent to the valley areas is steeper partially cleared land on the footslopes of the Triassic age Narrabeen Group sandstone in underground mining area 3. These areas have been semi-cleared and logged historically and have been used mainly for grazing. The tree cover is predominantly regeneration approximately 30 or more years old with occasional scattered old growth trees. These wooded areas tend to occupy poorer soils, and are dominated by native species in all canopy layers. These sites are considered to have retained most of their ecological resilience with a high capacity for regeneration, and are assessed to be in good condition (FloraSearch, in prep.).

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

As described in Section 3.1(b), no National Heritage Places are situated within the Action area. The closest National Heritage Place is the Greater Blue Mountains Area. Wollemi National Park, which is part of the Greater Blue Mountains Area, is located approximately 1 km to the south-east of the Action area.

There are no Commonwealth Heritage Places within 20 km of the Action area. The closest Commonwealth Heritage Place is the Murinbin House Group, which is located approximately 28 km to the south-east of the Action area. The Murinbin House Group is a considerable distance from the area of any potential direct or indirect impacts of the Action.

3.3 (i) Indigenous heritage values

Aboriginal cultural heritage assessments conducted to date indicate that the Action area was likely used for foraging and access to the lower lying areas to the east. The area above underground mining area 1 has been substantially disturbed, and Aboriginal sites within this area have been salvaged. Surveys of the other areas associated with the Action have identified artefact scatters and isolated finds within the Action area (RPS, in prep.). In the broader area, surveys have also identified scarred trees, earth mounds and grinding grooves/surfaces.

A Cultural Heritage Impact Assessment would be prepared for the South Wambo Underground Mine Modification (incorporating the Action), as a component of the Environmental Assessment. The assessment would include the development of surface disturbance protocols, including salvage or demarcation of sites where applicable.

There are no indigenous land use agreements, Aboriginal land claims or joint management arrangements existing over the Action area. The Action area is within the boundary of the Plains Clans of the Wonnarua People registered Native Title claim. The Action area is also within the boundary of the Wonnarua Traditional Custodians Claim #3 Native Title application area.

3.3 (j) Other important or unique values of the environment

As detailed in Section 3.1(a), the Wollemi National Park is located in the vicinity, but outside, of the Action area.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

Relevant lot and deposited plan numbers for parcels of land within the Action area and surrounds are provided in Attachment B as discussed in Section 1.6.

The majority of the Action area is owned by WCPL as shown on Figure 4.

3.3 (l) Existing land/marine uses of area

Underground and open cut mining activities have been occurring in vicinity of the Action area since 1969 and 1974, respectively.

The Action is within the existing mining tenements of the Wambo Coal Mine. Underground mining area 1 is within the approved surface development area of the Wambo Coal Mine.

The operational mines in the vicinity of the Action area include:

- Hunter Valley Operations, to the north and east;
- Mt Thorley-Warkworth Complex, to the east; and
- United Collieries (in care and maintenance), to the north and east.

3.3 (m) Any proposed land/marine uses of area

The United and Wambo Open Cut Coal Mine Project is proposed adjacent to the Action area, and has been determined a Controlled Action under the EPBC Act (EPBC 2015/7600). The designated proponent for Controlled Action (EPBC 2015/7600) is United Collieries Pty Ltd. The Controlled Action for the United and Wambo Open Cut Coal Mine Project includes open cut mining operations in two areas (the proposed United Open Cut and modified operations generally within the approved Wambo open cut mining area) and associated activities. The United and Wambo Open Cut Coal Mine Project is not related to this proposed Action.

Existing land uses would continue to occur above the additional underground mining areas during and following mining.

4 Environmental outcomes

The following environmental outcomes, relevant to matters of national environmental significance, would be achieved as a result of the proposed Action:

- No impacts to the World Heritage values of a declared World Heritage property.
- No impacts to the National Heritage values of a National Heritage Place.
- No impacts to the ecological character of a declared Ramsar wetland.
- No significant impacts to listed threatened species or ecological communities or their habitat.
- No significant impacts to listed migratory species.
- No impacts to the environment in a Commonwealth marine area.
- No impacts to the environment on Commonwealth land.
- No impacts to the Great Barrier Reef Marine Park.
- No significant impacts to a water resource, in relation to coal seam gas development and large coal mining development.
- Protection of the environment from nuclear actions.

For relevant matters of national environmental significance, the above would be achieved through compliance with the subsidence impact performance measures in the Development Consent DA 305-7-2003 issued under the NSW planning system, which include the following relevant to matters of national environmental significance:

Wollombi Brook	Negligible impact. Controlled release of excess site water only in accordance with EPL requirements.
Wollemi National Park	Negligible subsidence impacts. Negligible environmental consequences.
Other threatened species, populations or communities	Minor cracking and ponding of the land surface or other impact. Negligible environmental consequences.

5 Measures to avoid or reduce impacts

Environmental monitoring and management at the Wambo Coal Mine is covered by a range of management plans and monitoring programmes overseen by statutory planning provisions, which manage and minimise the impacts of the Wambo Coal Mine on the surrounding environment and community.

Approved management plans/monitoring programmes at the Wambo Coal Mine include:

- Environmental Management Strategy.
- Environmental Monitoring Program.
- Flora and Fauna Management Plan.
- Site Water Management Plan incorporating the:
  - Groundwater Monitoring Program.
  - Surface Water Monitoring Program.
  - Erosion and Sediment Control Plan.
  - Surface and Groundwater Response Plan.
  - North Wambo Creek Diversion Plan.
- Bushfire Management Plan.
- Blast Management Plan.
- Noise Management Plan.
- Air Quality and Greenhouse Gas Management Plan.
- North Wambo Underground Mine Extraction Plan Longwalls 8 to 10A.
- Life of Mine Rejects Emplacement Strategy.
- Mine Management Plan: Underground Mining in the Vicinity of Wambo Homestead Complex.

WCPL maintains an extensive monitoring programme whereby data is collected, analysed and maintained for reporting, future examination and assessment.

The performance of the environmental management strategy and its associated plans, programs and strategies are reported annually in the Annual Environmental Management Report, in accordance with Development Consent DA 305-7-2003.

Mine Design Objectives

As outlined in Section 2.1, WCPL's mine layout would achieve the following mine design objectives that have been developed to meet the subsidence impact performance measures for the Wambo Coal Mine (Section 4):

- Longwalls at the Wambo Coal Mine would be offset from the base of the escarpment associated with the Wollemi National Park by a distance equivalent to a 26.5 degree angle of draw from the edge of the longwall. This would limit vertical subsidence from the additional underground mining areas to less than 20 mm (i.e. negligible subsidence impacts) at Wollemi National Park.
- Longwalls at the Wambo Coal Mine would be offset from Wollombi Brook by an angle of 26.5 degrees from the vertical to a 40 m buffer from the Wollombi Brook highbank. This would limit vertical subsidence from the additional underground mining areas to less than 20 mm (i.e. negligible subsidence impacts) at the Wollombi Brook channel.

Flora and Fauna Management

WCPL operates under a Flora and Fauna Management Plan prepared in accordance with the conditions of the Controlled Action approval (EPBC 2003/1138) and the conditions of the Development Consent DA 305-7-2003 issued under the NSW planning system.

The Flora and Fauna Management Plan includes the following mitigation strategies to minimise the potential impact from approved mining activities at the Wambo Coal Mine on flora and fauna:

- implementation of a Vegetation Clearance Protocol to delineate areas of remnant vegetation to be cleared and promote progressive clearing and the salvage and reuse of material;
- implementation of a Threatened Species Management Protocol including pre-clearance surveys, threat abatement measures, capture and release and the reuse and provision of habitat resources;
- implementation of a rehabilitation program, including progressive rehabilitation, in conjunction with the Wambo Coal Mine Mining Operations Plan;
- implementation of the RWEP; and
- flora and fauna monitoring, regular review, implementation of an adaptive management approach and reporting.

WCPL also implements programs to control weeds and feral animals on its lands.

WCPL implements a Bushfire Management Plan prepared in consultation with the NSW Rural Fire Service to manage bushfire hazards and to minimise the danger of bushfire spread.

The Flora and Fauna Management Plan would continue to apply at the Wambo Coal Mine incorporating the Action.

Site Water Management Plan

The site water management strategy for Wambo Coal Mine is based on the containment and re-use of mine water and on the control of sediment that may be potentially carried with runoff from disturbed areas such as the waste rock emplacements. The Wambo Coal Mine water management system controls waters generated from development and operational areas while diverting upstream water around such areas.

Water releases from the Wambo Coal Mine (including incorporating the Action) would continue to occur in accordance with WCPL's EPL 529, which operates under arrangements of the Hunter River Salinity Trading Scheme.

The Site Water Management Plan comprises a Groundwater Monitoring Program, Surface Water Monitoring Program, Erosion and Sediment Control Plan, Surface and Groundwater Response Plan and North Wambo Creek Diversion Plan.

These plans approved under the NSW planning system include measures to avoid, mitigate, manage, monitor and remediate potential impacts on surface water and groundwater resources.

The Site Water Management Plan would continue to apply at the Wambo Coal Mine incorporating the Action.

Management of Mine Subsidence

In accordance with the conditions of the Development Consent DA 305-7-2003 issued under the NSW planning system, an Extraction Plan would be prepared prior to the commencement of longwall extraction (also called secondary workings) for all longwalls associated with the Action to:

- demonstrate that the subsidence impact performance measures (Section 4) can be achieved; and
- develop detailed mitigation measures and monitoring to manage the potential impacts and/or environmental consequences on natural and built features.

Siting of Gas Management Infrastructure

The specific locations of gas management infrastructure would be defined as a component of future detailed mine planning and engineering studies during the Action.

Surveys of potential gas management infrastructure locations would be conducted to identify any threatened flora/fauna (e.g. species, communities or populations). If any threatened flora/fauna are identified, consideration would be given to relocating the works so as to avoid direct impacts.

It is expected that threatened flora species and threatened fauna species would be able to be avoided. Impacts to threatened communities would be minimised by the minor nature of the disturbance (small, isolated and temporary) and by locating the surface components to reduce clearance requirements (e.g. using existing cleared areas or areas with a sparse mid/over story).

Surface disturbance associated with gas management infrastructure would be temporary and isolated in nature. The surface disturbance would occur progressively during mining of underground mining area 3 and would be rehabilitated progressively as the gas management infrastructure is no longer required.

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

✓	No, complete section 6.2
	Yes, complete section 6.3

6.2 Proposed action IS NOT a controlled action.

On the basis of the reasons provided in Section 3, the Action is not considered to be a controlled action as it is not likely to have a significant impact on:

- the World Heritage values of a declared World Heritage property;
- the National Heritage values of a National Heritage Place;
- the ecological character of a declared Ramsar wetland;
- a listed threatened species, threatened ecological community, or their habitat;
- a listed migratory species;
- the hydrology or water quality of water resources (in consideration of the value of the resources);
- the environment in a Commonwealth marine area;
- the environment on Commonwealth land; or
- the Great Barrier Reef Marine Park.

6.3 Proposed action IS a controlled action

	Matters likely to be impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

7 Environmental record of the responsible party

		Yes	No
7.1	**Does the party taking the action have a satisfactory record of responsible environmental management?** **Provide details** WCPL has a strong record of compliance with its environmental obligations for its underground mining operations under Development Consent DA 305-7-2003 (as modified). WCPL has established and is committed to continuing open and constructive dialogue with the local community and stakeholders regarding environmental management as part of their operations. The annual AEMRs are available on the Wambo Coal Mine website (http://www.peabodyenergy.com/content/422/australia-mining/new-south-wales/wambo-mine/approvals-plans-and-reports-wambo-mine). The environmental monitoring program results over recent years have shown that WCPL's management of underground operations at the Wambo Coal Mine provides effective management of potential impacts from the mine's operations and achieves compliance with the subsidence impact performance measures in the Development Consent (DA 305-7-2003).	✓	
7.2	**Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?** **If yes, provide details** On 1 August 2014, WCPL was convicted in the Singleton Local Court for an offensive odour offence under section 129(1) of the NSW *Protection of the Environment Operations Act, 1997* for a blast fume incident associated with the open cut mining operations which occurred on 24 July 2012. WCPL was ordered to pay a fine of $13,000 and the NSW Environment Protection Authority's costs in the amount of $24,000. WCPL also pleaded guilty to an offensive odour offence under section 129(1) of the *Protection of the Environment Operations Act, 1997* for a blast fume incident associated with the open cut mining operations which occurred on 14 May 2014. The proceedings in respect of this offence were brought by the NSW Environment Protection Authority in the Land and Environment Court of NSW. A sentencing hearing was held on 17 December 2015, and the Court has reserved its judgment in respect of the matter. No approval under environmental protection legislation has been revoked or suspended in the 5 years immediately prior to this application being made.	✓	

7.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?** **If yes, provide details of environmental policy and planning framework** The Action would be undertaken in accordance with the Wambo Coal Mine environmental management system (refer Section 4) and Peabody's values as articulated in its Mission Statement: • **Safety:** We commit to safety and health as a way of life. • **Customer Focus:** We provide customers with quality products and excellent service. • **Leadership:** We have the courage to lead, and do so through inspiration, innovation, collaboration and execution. • **People:** We offer an inclusive work environment and engage, recognize and develop employees. • **Excellence:** We are accountable for our own success. We operate cost-competitive mines by applying continuous improvement and technology-driven solutions. • **Integrity:** We act in an honest and ethical manner. • **Sustainability:** We take responsibility for the environment, benefit our communities and restore the land for generations that follow.	✓	
7.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)** The Wambo Development Project was determined to be a Controlled Action in 2003 (EPBC 2003/1138) and subsequently approved in November 2004. The Wambo Development Project included the continued development of open cut and underground mining operations at the Wambo Coal Mine and the development and operation of rail and train loading infrastructure.	✓	

8 Information sources and attachments

8.1 References

Advisian (in prep.) *South Wambo Underground Mine Modification Surface Water Assessment*.

Anderson, R.H. (1968). *The Trees of New South Wales*. Fourth Edition. New South Wales Department of Agriculture, Sydney.

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Bureau of Meteorology (2015) *Atlas of Groundwater Dependent Ecosystems.*
Website: http://www.bom.gov.au/water/groundwater/gde/map.shtml
Date Accessed: December 2015.

Department of Environment, Climate Change and Water (2010) *Aboriginal cultural heritage consultation requirements for proponents 2010.*

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Website: http://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=24
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Department of the Environment (2013a) *Matters of National Significance: Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act, 1999*.

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Department of the Environment (2015b) *Species Profile and Threats Database*.
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Department of the Environment (2015d) *Commonwealth Marine Areas.*
Website: http://www.environment.gov.au/legislation/environment-protection-and-biodiversity-conservation-act/what-protected/commonwealth
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Eco Logical Australia (in prep.) *South Wambo Underground Mine Modification Fauna Assessment*.

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Glen R.A. and Beckett J. (1993) *Hunter Coalfield Regional Geology 1:100 000*, 2nd edition. Geological Survey of New South Wales, Sydney.

Groundwater Imaging (2012) *A Transient Electromagnetic Investigation of the Extent of the Wollombi Brook Alluvium at the Wambo Coal Mine Site.*

Harden, G.J. (Ed.) (1990 - 2002). *Flora of New South Wales*, Volumes 1 to 4 and revisions. University of New South Wales Press, Sydney.

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HydroSimulations (in prep.) *South Wambo Underground Mine Modification Groundwater Assessment*.

Kovac, M. and Lawrie, J.W. (1991) *Soil Landscapes of the Singleton 1:250,000 Sheet*. Soil Conservation Service of NSW.

Mackie, C.D. (2009) *Hydrogeological Characterisation of Coal Measures and Overview of Impacts of Coal Mining on Groundwater Systems in the Upper Hunter Valley of NSW*. PhD Thesis submitted to Faculty of Science, University of Technology, Sydney NSW Australia.

Mine Subsidence Engineering Consultants (in prep.) *South Wambo Underground Mine Modification Subsidence Assessment.*

New South Wales Government (2012) *Aquifer Interference Policy*. Released September 2012.

Office of Environment and Heritage (2015a) *NSW BioNet – A Website for the NSW Atlas of Wildlife search conducted for the following search area: -32.47, 151.09; -32.68, 151.09; -32.68, 150.91; -32.47, 150.91.*
Website: http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx
Date Accessed: December 2015.

Office of Environment and Heritage (2015b) *Threatened Species Profiles.*
Website: http://www.environment.nsw.gov.au/threatenedSpeciesApp/
Date Accessed: December 2015.

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RPS (in prep.) *South Wambo Underground Mine Cultural Heritage Impact Assessment.*

Thackway, R. and Cresswell, I.D. (Eds) (1995). An *Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves*. Version 4.0. Australian Nature Conservation Agency: Canberra.

Wambo Coal Pty Limited (2003) *Wambo Development Project Environmental Impact Statement*.

Wambo Coal Pty Limited (2015) *Wambo Coal Groundwater Monitoring Program*. Revision 10, WA-ENV-MNP-509.1.

8.2 Reliability and date of information

The information presented in Section 3 was sourced from publicly available data and numerous past surveys and assessments undertaken for the Wambo Coal Mine and current surveys/assessments in preparation for the Action. Information in this referral was compiled using assessments current as at late 2015, and included:

- Wambo Development Project EIS (WCPL, 2003) – various terrestrial flora, terrestrial fauna and aquatic ecology assessments;
- North Wambo Underground Mine Modification (WCPL, 2012) – various terrestrial flora, terrestrial fauna, Aboriginal cultural heritage and groundwater assessments;

- North Wambo Underground Mine Longwall 10A Modification (WCPL, 2014) – various terrestrial flora, terrestrial fauna, Aboriginal cultural heritage, surface water and groundwater assessments;
- South Bates (Wambo Seam) Underground Mine Modification (WCPL, 2015) – various terrestrial flora, terrestrial fauna, Aboriginal cultural heritage and groundwater assessments;
- Wambo Coal Mine Environmental Management System and associated management plans;
- WCPL project team (project information);
- Review and input from FloraSearch and Eco Logical Australia (*baseline flora and fauna surveys and impact assessments* – in prep.);
- Review and input from HydroSimulations (*groundwater assessment* – in prep.);
- Advisian (in prep.) (*surface water baseline conditions report*);
- RPS (in prep.) (*cultural heritage impact assessment*); and
- BioNet (OEH, 2015a) and the EPBC Act Protected Matters Search Tool (Department of the Environment, 2015a) (database searches within and surrounding the Action area).

Minimal uncertainty regarding the information used in Section 3 is expected given:

- the number of site-based surveys and assessments conducted in the vicinity of the Action;
- the period of operational experience at the Wambo Coal Mine;
- the comprehensive nature of the studies;
- the consultation process conducted with key stakeholders to date; and
- the mitigation measures proposed for the Action.

8.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Figure 1 Regional Location. Figure 3 Proposed Action. Figure 4 Land Tenure.
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	Figure 3 Proposed Action. Figure 4 Land Tenure. Figure 5 Greater Blue Mountains Area. Figure 6 Threatened Flora Records. Figure 7 Threatened and Migratory Fauna Records. Figure 8 Vegetation Communities. Figure 9 Geology of the Action Area. Figure 10 Wambo Coal Mine Water Monitoring Sites. Figure 11 Modelled Steady-State Depth to Water Table.
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		N/A
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		N/A
	copies of any flora and fauna investigations and surveys (section 3)		N/A
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)		N/A
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		N/A

9 Contacts, signatures and declarations

Project title: SOUTH WAMBO UNDERGROUND MINE EXTENSION

9.1 Person proposing to take action

1. Name and Title:	Mr Micheal Alexander
2. Organisation	Wambo Coal Pty Limited
3. EPBC Referral Number	-
4: ACN / ABN	13000668057
5. Postal address	Wambo Coal Pty Limited, PMB 1, Singleton NSW 2330
6. Telephone:	(02) 6570 2200
7. Email:	malexander@peabodyenergy.com
8. Name of designated proponent (if not the same person at item 1 above and if applicable):	Wambo Coal Pty Limited
9. ACN/ABN of designated proponent (if not the same person named at item 1 above):	-

I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

- ☐ an individual; OR
- ☐ a small business entity (within the meaning given by section 328-110 (other than subsection 328-119(4)) of the *Income Tax Assessment Act 1997*); OR
- ☑ not applicable.

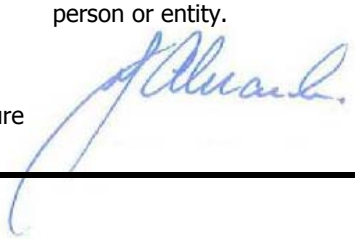
If you are small business entity you must provide the Date/Income Year that you became a small business entity:

I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations. Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made:

- ☑ not applicable.

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.
I agree to be the proponent for this action.
I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature  Date 19/01/2016

9.2 Person preparing the referral information (if different from 9.1)

Name	
Title	
Organisation	Organisation name should match entity identified in ABN/ACN search
ACN / ABN (if applicable)	
Postal address	
Telephone	
Email	
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.
Signature	Date

REFERRAL CHECKLIST

HAVE YOU:

- ☑ Completed all required sections of the referral form?
- ☑ Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- ☑ Provided a map showing the location and approximate boundaries of the project area?
- ☑ Provided a map/plan showing the location of the action in relation to any matters of NES?
- ☑ Provided a digital file (preferably ArcGIS shapefile, refer to guidelines at Attachment A) delineating the boundaries of the referral area?
- ☑ Provided complete contact details and signed the form?
- ☑ Provided copies of any documents referenced in the referral form?
- ☑ Ensured that all attachments are less than three megabytes (3mb)?
- ☑ Sent the referral to the Department (electronic and hard copy preferred)?

Figures

Refer to Files Provided Separately

Attachment A

Geographic Information System (GIS) data supply guidelines

If the area is less than 5 hectares, provide the location as a point layer. If the area greater than 5 hectares, please provide as a polygon layer. If the proposed action is linear (eg. a road or pipline) please provide a polyline layer.

GIS data needs to be provided to the Department in the following manner:

- Point, Line or Polygon data types: ESRI file geodatabase feature class (preferred) or as an ESRI shapefile (.shp) zipped and attached with appropriate title
- Raster data types: Raw satellite imagery should be supplied in the vendor specific format.
- Projection as GDA94 coordinate system.

Processed products should be provided as follows:

- For data, uncompressed or lossless compressed formats is required - GeoTIFF or Imagine IMG is the first preference, then JPEG2000 lossless and other simple binary+header formats (ERS, ENVI or BIL).
- For natural/false/pseudo colour RGB imagery:
    - If the imagery is already mosaiced and is ready for display then lossy compression is suitable (JPEG2000 lossy/ECW/MrSID). Prefer 10% compression, up to 20% is acceptable.
    - If the imagery requires any sort of processing prior to display (i.e. mosaicing/colour balancing/etc) then an uncompressed or lossless compressed format is required.

Metadata or 'information about data' will be produced for all spatial data and will be compliant with ANZLIC Metadata Profile. (http://www.anzlic.org.au/policies_guidelines#guidelines).

The Department's preferred method is using ANZMet Lite, however the Department's Service Provider may use any compliant system to generate metadata.

All data will be provide under a Creative Commons license (http://creativecommons.org/licenses/by/3.0/au/)

Attachment B
Parcels of Land within the Action Area

Tenure Type	Lot Number	Deposited Plan Number
Freehold	110	753792
Freehold	111	753792
Freehold	83	548749
Freehold	4	720705
Freehold	5	542226
Freehold	7	3030
Freehold	1	241316
Freehold	45	753792
Freehold	4	542226
Freehold	112	753792
Freehold	2	616303
Freehold	1	720705
Freehold	3	720705
Freehold	109	753792
Freehold	104	753792
Freehold	2	709722
Freehold	2	720705
Freehold	103	753792
Freehold	46	753792
Freehold	82	548749
Freehold	4	732501
Freehold	6	732501
Freehold	1	732501
Freehold	5	732501
Freehold	3	732501
Freehold	2	110084
Freehold	1	178612
Freehold	1	110084
Muswellbrook Shire Council or Department of Lands (Crown)	Other roads located between or adjacent to the above parcels of land	
Crown	Wollombi Brook located between or adjacent to the above parcels of land	