Appendix F

Preliminary Biodiversity Assessment

EnergyCo

May 2024

Hunter Transmission Project

Preliminary Biodiversity Assessment

Question today
Imagine tomorrow
Create for the future

Hunter Transmission Project
Preliminary Biodiversity Assessment

EnergyCo

WSP
Level 3, 51-55 Bolton St
Newcastle NSW 2300
PO Box 1162
Newcastle NSW 2300

Tel: +61 2 4929 8300
Fax: +61 2 4929 8382
wsp.com

	Name	Date	Signature
Prepared by:	Mark Stables	08/05/2024	
Reviewed by:	Toby Lambert; Alex Cockerill	08/05/2024	
Approved by:	Alex Cockerill	08/05/2024	

PS201156-WSP-SYD-ECO-
REP-001 RevG

Table of Contents

List of tables

List of figures

List of appendices

Executive summary

This Preliminary Biodiversity Assessment (PBA) has been prepared by WSP Australia Pty Ltd on behalf of the Energy Corporation of NSW (EnergyCo) for the Hunter Transmission Project (HTP). The PBA presents preliminary biodiversity findings within the project area based on desktop assessment and field surveys undertaken in 2023 and early 2024. The purpose of this report is to identify biodiversity constraints for consideration in the development of the HTP and inform the biodiversity assessment requirements for the project under the *Biodiversity Conservation Act 2016* (BC Act).

The HTP corridor transects two generally distinct environmental landforms in the Hunter, valley floor and forested plateau and ranges, each with unique biodiversity values and ecosystems. Avoiding significant biodiversity values within both of these landscapes has been key to informing the selection of the HTP corridor. This included a tiered approach to avoiding areas with significant biodiversity values, including National Parks, Nature Reserves, Protected Areas, offset areas, wetlands, and key fish habitat (see Figure ES.1).

The valley floor environment and riverine floodplains of the Hunter River and its tributaries dominate the first half of the HTP corridor from its northern starting point at the Baywater Power Station through to the township of Bulga. The predominant land use within this landscape is open cut coal mining and agriculture, which have generally resulted in highly disturbed environments. There are some isolated areas of remaining biodiversity value associated with Threatened Ecological Communities (TECs) under the BC Act. Of particular significance are the better-quality remnants of the TECs, Central Hunter Valley eucalypt forest and woodland and Warkworth Sands Woodland of the Hunter Valley that provide habitat for threatened species and the presence of existing conservation reserves and mine offset areas.

South from the township of Bulga the HTP corridor specifically avoids further impacts to the valley floor landscapes extending to the east of the project area, notably large areas of TECs and important habitat for the Regent Honeyeater and Swift Parrot by transecting the forest ecosystems of the plateau and ranges. These ranges are dominated by a mixture of remnant moist sclerophyll vegetation within the sheltered valleys and dry sclerophyll forests on the ridgelines and upper slopes. Both of these ecosystems are well represented within the National Park Estate and are not considered to be over cleared landscapes.

Based on preliminary field surveys and desktop assessments, the project area avoids and minimises impacts on ears with high conservation value, including:

- avoiding Watagans National Park, Werakata National Park, Warrawolong Flora Reserve and Jilliby State Conservation Area
- avoiding and minimising impacts to TECs, in particular minimising clearing of woodland remnants and scarce valley floor vegetation such as the critically endangered Warkworth Sands Woodland
- avoiding and minimising the removal of critical habitat for key threatened species, such as the critically endangered Regent Honeyeater and Swift Parrot
- avoiding and minimising impacts to threatened species at risk of Serious and Irreversible Impact (SAII) such as the Sooty Owl, Brush-tailed Rock Wallaby and *Rhodamnia rubescens*.

Within the project area, there is further scope to reduce the extent of clearing in the State forests by spanning steep ravines and avoiding clearing vegetation in the valleys and by partially clearing the easement in other areas, similar to the clearing for the existing 500kV Eraring-Kemps Creek transmission line in Olney State Forest.

The PBA combines broad-scale State vegetation type mapping (SVTM) and field surveys carried out in 2023 and early 2024 to inform the assessment of likelihood of occurrence for threatened communities, species, and populations in the project area.

This assessment has identified 42 native plant community types (PCTs) that could occur in the project area. Of these, 17 are linked to the following seven TECs listed under the BC Act:

- Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions
- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Warkworth Sands Woodland in the Sydney Basin Bioregion.

It has also identified the following numbers of threatened species as having a moderate or higher likelihood of occurrence within the project area:

- 32 threatened flora species under the BC Act, 9 recorded within the project area.
- 54 threatened fauna species under the BC Act, 23 recorded within the project area.

The assessment of the project's impacts on biodiversity values will require further surveys and assessment in accordance with the NSW Biodiversity Assessment Methodology (BAM). The BAM assessment will identify the potential residual impacts on approximately **1129.54 ha** of native vegetation and habitats within the project area. This will also require further detailed consideration of the following;

- avoidance and mitigation measures for threatened species and communities
- detailed vegetation mapping and condition sampling of all impacted PCTs
- targeted species surveys
- prescribed and indirect impacts associated with transmission lines, including connectivity, line strike and direct impacts to caves
- partial impacts and the assessment of operational maintenance areas, hazard trees, spanned valley floors
- biosecurity and management of key threats to threatened species, including spread and control of Myrtle rust on the *Rhodamnia* and Chytrid fungus for amphibians species within the forest plateau.
- offsetting in accordance with the NSW BOS for any residual biodiversity impacts.

Hunter Transmission Project
Figure E1

Biodiversity Constraints and Avoidance Considerations

Legend

- Project Area
- NPWS Reserve (all managed land)
- Mining Biodiversity Offset Area (EMM)
- Existing transmission line
- Highways
- Railway
- Water course
- Waterbody

Biodiversity constraints

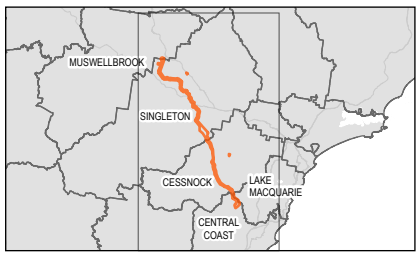
- Tier 1 biodiversity constraint – Areas to avoid
- Tier 2 biodiversity constraint – Areas to be avoided if reasonable, or minimise impact
- Tier 3 biodiversity constraint – Areas to minimise impact

TIER 2 species listed under the BC Act as SAII entities

- Significant Flora Species - Bionet (Tier 2 / SAII species)
- Significant Flora Species - WSP (Tier 2 / SAII species)
- Significant Fauna Species - WSP (Tier 2 / SAII species)

TIER 3 species other than SAII entities listed under the BC Act and EPBC Act

- Significant Flora Species - WSP (Tier 3 / BC Act and/or EPBC Act listed)
- Significant Fauna Species - WSP (Tier 3 / BC Act and/or EPBC Act listed)



0 5 10 15
Kilometers

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:330,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Earthstar Geographics

1 Introduction

1.1 Project overview

EnergyCo is proposing the construction and operation of new high voltage electricity transmission infrastructure, including new substation infrastructure and ancillary works, required to connect energy generation and storage projects to the existing electricity network within the Hunter. The project will strengthen energy security in New South Wales and the core electricity grid for the Hunter, Sydney, and Illawarra regions for generations to come. The project will achieve this by connecting a new overhead 500 kV transmission line between 2 new 500 kV substations at Bayswater and in Olney State Forest. The new substations will be connected to the existing 500 kV transmission lines near Bayswater and Eraring to unlock electricity supply from the Central West Orana and New England Renewable Energy Zones.

The nominal distance of the new transmission line will be approximately 100 km.

From the new 500 kV Bayswater substation, the line will maximise use of existing disturbed mining areas to run south-easterly to Lemington before making several crossings of the Hunter River to pass through the Hunter Valley Operations (HVO) coal mine between the HVO North and HVO South operational areas. The line then heads south-east crossing Wollombi Brook and avoiding vegetation constraints in Gouldsville. The line continues southward through Mount Thorley, keeping east of Jerrys Plains Road, and into Broke, crossing Putty Road, a rail corridor, and Broke Road. The line navigates around Bulga Coal mine operations, continuing south to cross over the existing 330 kV lines – Lines 81 and 82, and then co-locates for approximately 4.5 km.

The line then continues south to maximise the use of public land into Pokolbin State Forest, emerging just east of Cedar Creek. It then traverses the Corrabare State Forest, Watagan State Forest and Olney State Forest before truncating at a the new 500 kV Olney substation and connection to the existing Eraring-Kemps Creek double circuit 500 kV transmission line.

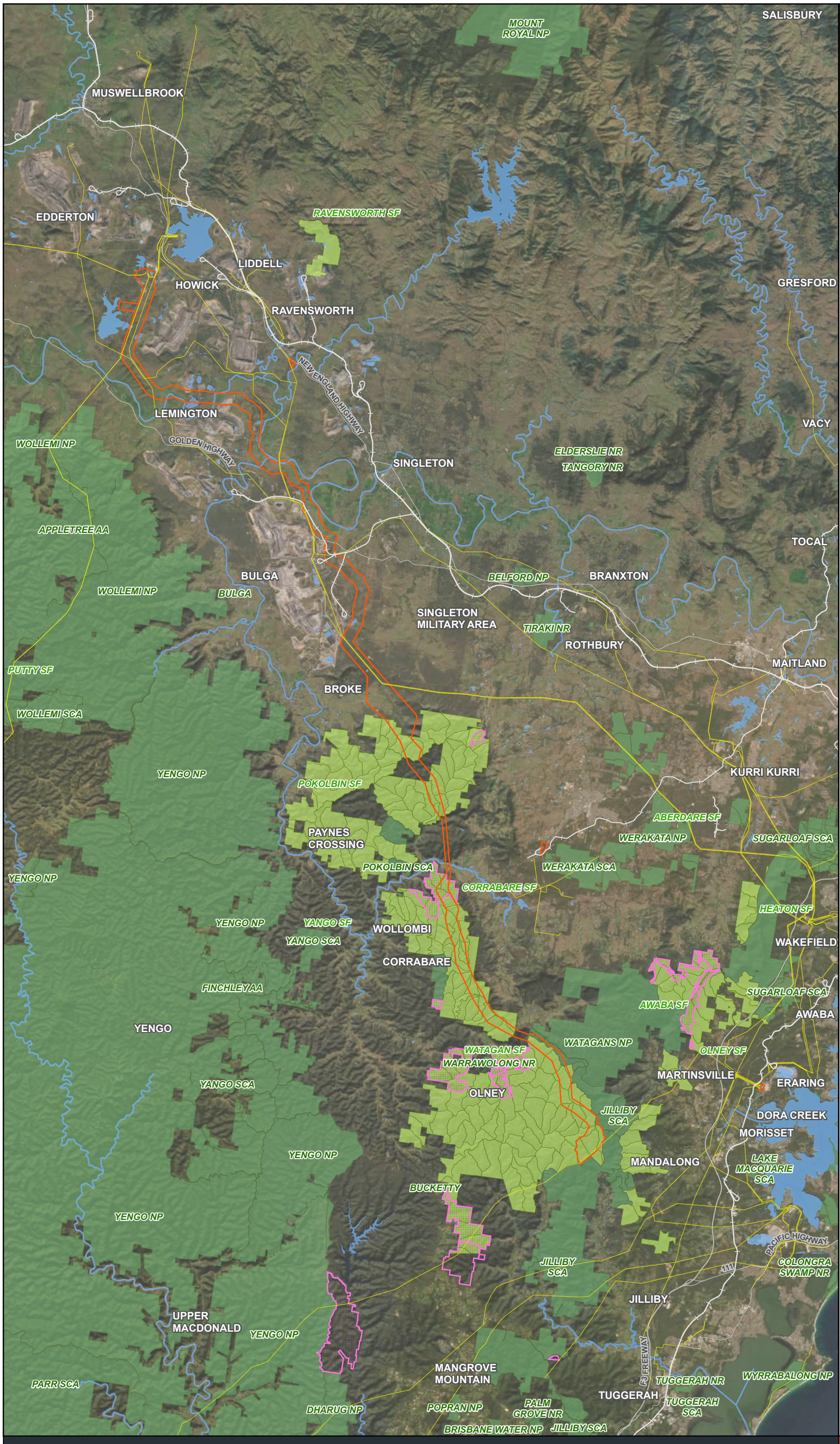
The transmission line corridor has been developed to avoid and or minimise impacts on important environmental, land use and social values, where practical to do so. The final alignment of the transmission line within the transmission line corridor will be confirmed during detailed design with a view to further minimising environmental impacts, wherever practicable.

An overview of the project is shown in Figure 1.1 and key features include:

- a new double circuit 500 kV above-ground transmission line between Bayswater and Olney State Forest where it will join the existing 500 kV transmission line that connects Eraring and Kemps Creek
- adjustments to existing transmission lines to facilitate construction and operation of the project
- two new 500 kV substations at Bayswater (Bayswater substation) and in Olney State Forest (Olney substation)
- upgrades to the existing substations at Bayswater Power Station and Eraring Power Station
- upgrades to the existing public road network and new and upgraded access tracks for construction and operation of the project
- temporary construction infrastructure including four construction support sites including workforce accommodation, laydown areas, stringing sites, and utility adjustments and connections.

With projected commencement of construction for early 2026 and completion by late 2028 to ensure energy security, the project is subject to NSW Government and Australian Government planning approvals.

The project area includes a transmission line corridor of varying width in which the proposed transmission line and new substations would be located. A refined corridor for the project will be identified in the Environmental Impact Statement (EIS). Additional locations that may be required for specific uses (such as access tracks, construction compounds and workforce accommodation camps) will also be identified in the EIS.

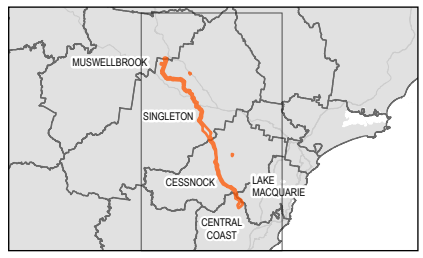


Hunter Transmission Project
Figure 1-1

Location of Project Area

Legend

- Project Area
- Highways
- Railway
- Existing Transmission Line
- Flora Reserve
- NPWS Reserve (all managed land)
- State Forest
- Watercourse
- Waterbody



0 5 10 15
Kilometers

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:330,000 Date: 2/04/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Earthstar Geographics

1.2 Purpose of the report

This Preliminary Biodiversity Assessment (this report) has been prepared by WSP Australia Pty Ltd on behalf of EnergyCo. The purpose of this report is to present preliminary biodiversity findings within the project area used to inform avoidance considerations and the preparation of a scoping report for the Department of Planning, Housing and Infrastructure (DPHI) and is based primarily on desktop assessment, supplemented with field surveys undertaken in 2023 and early 2024.

This report identifies potential seasonal survey requirements and species likely to be addressed as part of a detailed Biodiversity Development Assessment Report (BDAR) prepared in accordance with the Biodiversity Assessment Method 2020 (BAM 2020) (EES 2020a). The BDAR will support an Environmental Impact Statement (EIS) for the project and assess the projects impacts on biodiversity with regards to the *Biodiversity Conservation Act 2016* (BC Act). The Minister for Planning is required to consider the BDAR in making a determination under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) on the CSSI Application.

The report also presents biodiversity constraints requiring assessment and/or consideration as part of project development and preparation of the EIS, under the BC Act and provides recommendations for detailed studies and assessment to be completed in the future in accordance with the requirements of the BC Act and relevant determining authorities.

2 Methods

This chapter outlines the methods used to compile known or predicted biodiversity values within the project area. All work for this report was carried out under the appropriate licences, including a scientific licence as required under Part 2 of the BC Act (License Number: SL100630) and an Animal Research Authority (ACEC ARA Number 18/195) issued by the Department of Primary Industries (Agriculture).

2.1 Personnel

The contributors to the preparation of this report, their qualification and roles are provided below in Table 2.1

Table 2.1 Contributors and their roles

Name	Qualifications	Role
Alex Cockerill	Bachelor of Science (Hons), BAM Accredited Assessor (BAAS17020)	Technical Executive – technical review
Toby Lambert	Bachelor of Environmental Science, BAM Accredited Assessor (BAAS17046)	Principal Ecologist – technical review
Mark Stables	Bachelor of Science (Hons) Accredited BAM Assessor (BAAS18097)	Principal Ecologist – report preparation
Taylor Stein	Bachelor of Environmental Science and Management (Hons)	Ecologist – report preparation
Tasman Carr	Bachelor of Science	Ecologist – report preparation
Christie Malyon	Bachelor of Environmental Science & Management	Ecologist – report preparation
Olivia Zadro	Bachelor of Science	Ecologist – report preparation

2.2 Nomenclature

Names of vegetation communities used in this report are based on the Plant Community Type (PCT) used in the NSW BioNet Vegetation Classification (DPIE 2023a).

These names are cross-referenced with those used for threatened ecological communities (TECs) listed under the BC Act. They are also cross-referenced with previous vegetation mapping using dominant species and structure of the community.

Names of plants used in this document follow PlantNet (Royal Botanic Gardens, 2023). Scientific names are used in this report for species of plant. The names of introduced species are denoted with an asterisk (*).

For threatened species of plants, the names used in the BioNet Atlas of NSW Wildlife (DPE 2023b) are also provided where these differ from the names used in the PlantNet database.

Names of vertebrate fauna follow the Australian Faunal Directory maintained by the Department of Agriculture, Water and the Environment (2023a). Common names are used in the report for species of animal. Both common and scientific names are provided in appendices.

For threatened species of animals, the names used in the BioNet Atlas of NSW Wildlife (DPE 2023b) and NSW Department Primary Industries (DPI 2023a) are provided.

2.3 Database and literature review

2.3.1 *Database searches*

The aim of the database searches was to identify threatened flora and fauna species, populations and ecological communities, or critical habitat recorded previously or predicted to occur near the project area.

This allowed for known habitat characteristics to be compared with those present within the project area to determine the likelihood of occurrence of each species or populations. These results informed the identification of appropriate field survey effort and the groups likely to occur.

Records of threatened species, populations and ecological communities known or predicted to occur in the locality of the project area were obtained from a range of databases, as detailed in Table 2.2

Table 2.2 Database searches undertaken

Database	Search date	Area searched	Reference
Bionet Atlas of NSW Wildlife	26 May 2023	20 km search around the project area	DPE (2023b)
Atlas of Living Australia	26 May 2023	Locality search around the project area	Atlas of Living Australia (2023)
NSW Department of Primary Industries Critical Habitat register	26 May 2023	Search of the register	DPI (2023a)

2.3.2 *Literature and spatial data review*

The background research included analysis of the following information sources:

- Aerial photographic imagery (Land and Property Information)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) (Department of Environment & Energy 2016)
- Atlas of Groundwater Dependent Ecosystems (GDE) (Australian Bureau of Meteorology 2023)
- Biodiversity Values Map
- BioNet Vegetation Classification (DPE 2023a)
- BioNet Threatened Species Profile Database and data collection (DPE 2023c)
- Atlas of Living Australia – interactive map search (Atlas of living Australia 2023)
- State Vegetation Type Map (SVTM) version C1.1.M1 (Department of Planning and Environment 2022)
- Fisheries Spatial Data Portal (DPI 2023a)
- DPI register of critical habitat (DPI 2023b).

2.4 Likelihood of occurrence assessment

An assessment was completed to assess the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) identified with the potential to occur in the project area. All threatened species, populations and communities identified during background research were considered.

Field surveys and habitat assessments were also utilised to inform the likelihood of occurrence assessment. Assessments were based on the habitat profile for the species and other habitat information in the Threatened Biodiversity Data Collection (TBDC) and the Species Profile and Threats Database (DPE 2023c).

The assessment also included consideration of the dates and locations of nearby records and information about species populations in the locality of the project area. The assessment results are summarised in Appendix A and Appendix B.

For this study, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in Table 2.3 below.

Table 2.3 Likelihood of occurrence criteria for threatened species and populations

Classification	Definition
Present	Species has been recorded within the last 5 years within the project area by ecological survey.
High	It is highly likely that a species inhabits the project area and is dependent on identified suitable habitat (i.e., for breeding or important life cycle periods such as winter flowing resources), has been recorded recently within the locality and is known or likely to maintain resident populations in the project area. Also, includes known or likely to visit the project area during regular seasonal movements or migration.
Moderate	Potential habitat is present within the project area. Species unlikely to maintain sedentary populations; however, may seasonally use resources within the project area opportunistically or during migration. The species is unlikely to be dependent (i.e., for breeding or important life cycle periods such as winter flowing resources) on habitat within the project area, or habitat in a modified or degraded state. Includes cryptic flowering flora species that were seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the project area and has not been recorded recently in the locality (over 20 km). It may be an occasional visitor, but habitat similar to the project area is widely distributed in the local areas, meaning that the species is not dependent (i.e., for breeding or important life cycle periods such as winter flowing resources) on available habitat. Specific habitat is not present in the project area or the species are a non-cryptic perennial flora species that were specially targeted by surveys and not recorded.
None	Suitable habitat is absent from project area.

2.5 Field survey undertaken to date

Field survey has been conducted within parts of the project area by WSP in 2023 and early 2024. Survey dates account for both flora and fauna survey data. Teams ranged from two to three people.

Data obtained during these surveys has been incorporated into this report to inform the assessment of likelihood of occurrence for threatened species, populations, and communities.

Table 2.4 summarises the field surveys that have been undertaken to date with further description of methodology provided in section Methods

Table 2.4 Survey summary within the project area

Survey dates	Flora survey type and effort	Fauna survey type and effort
May:	Rapid data points, vegetation mapping, vegetation integrity plots and targeted threatened flora surveys. (Total 1 day surveyed)	-
August:	Rapid data points, vegetation mapping, vegetation integrity plots and targeted threatened flora surveys. (Total 15 days surveyed)	Owl Surveys, Spotlighting, habitat assessments, Koala SATs (Total 12 days surveyed)
September:	Rapid data points, vegetation mapping, vegetation integrity plots and targeted threatened flora surveys. (Total 16 days surveyed)	Bird Surveys, Spotlighting, Koala SATs, habitat assessments, Camera traps (Total 8 days surveyed)
October:	Rapid data points, vegetation mapping, vegetation integrity plots and targeted threatened flora surveys. (Total 13 days surveyed)	Bird Survey, habitat assessments, Camera traps (Total 6 days surveyed)
November:	Rapid data points, vegetation mapping, vegetation integrity plots and targeted threatened flora surveys. (Total 6 days surveyed)	Bird Survey, habitat assessments, Camera traps, Reptile Tile Grids (Total 3 days surveyed)
December:	Rapid data points, vegetation mapping, vegetation integrity plots and targeted threatened flora surveys. (Total 4 days surveyed)	-
January	Opportunistic threatened flora surveys, Rapid Flora Survey, Veg Integrity Plots, and Vegetation mapping (total 3 days surveyed)	Owl Surveys, Spotlighting, habitat assessments, Koala SATs, Frog Surveys, Camera traps, Anabats/harp traps (total 7 days surveyed)

Survey dates	Flora survey type and effort	Fauna survey type and effort
February	Opportunistic threatened flora surveys, Rapid Flora Survey, Species Surveyed, Veg Integrity Plots, and Vegetation mapping (total 14 days surveyed)	Owl Surveys, Spotlighting, habitat assessments, Koala SATs, Frog Surveys, Camera traps, Anabats/harp traps (21 days surveyed)
March	Opportunistic threatened flora surveys, Rapid Flora Survey, Species Surveyed, Veg Integrity Plots, and Vegetation mapping (Total 4 days surveyed)	-

2.5.1 *Vegetation surveys*

2.5.1.1 Rapid data points

Rapid data points (RDPs) record the following:

- dominant exotic and native plant species present
- percent cover of native groundcover
- photograph of each location
- assessment of vegetation against threatened ecological community Scientific Determinations
- threatened flora and/or fauna species identified
- other opportunistic fauna sightings including any significant fauna habitat resources (such as tree hollow, rock piles, and cracks and fissures present in wooden poles).

2.5.1.2 Vegetation mapping

Vegetation within the project area had been previously mapped at the regional scale by broad-scale vegetation mapping that is published as State Vegetation Type Map (SVTM) version C1.1.M1 (Department of Planning and Environment 2022). Due to the limited extent of available field validation, SVTM has been relied on. Field data was compared and analysed against the regional vegetation mapping key diagnostic species to confirm each vegetation type.

2.5.1.3 Vegetation integrity plots

Vegetation integrity plots, as described in the BAM (Department of Planning Industry and Environment, 2020) have been completed across vegetation types recorded throughout the project area. The vegetation integrity plots included a full floristic survey within a 20 m x 20 m quadrat, with function data collected using and 20 m x 50 m plot. A schematic diagram illustrating the layout of each Vegetation Integrity plot is provided in Figure 2.1

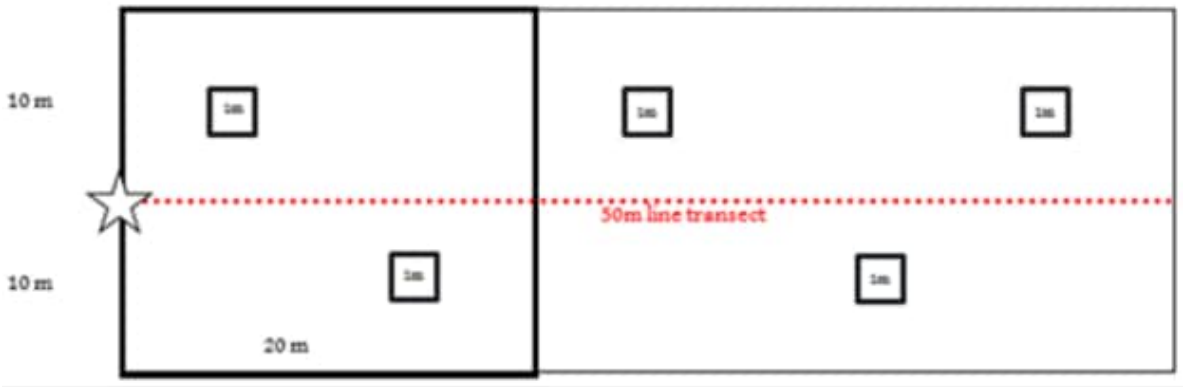


Figure 2.1 Vegetation integrity plot layout

2.5.2 *Targeted flora surveys*

Targeted threatened flora surveys have included a number of methods including those provided in *Surveying Threatened Plants and Their Habitats* (Department for Planning Industry and Environment 2020). A description of each is described below. Due to the scale of the project, a systematic approach was taken, and two distinct survey techniques (methods) were used. Additional surveys in 2023-2024 will continue to add to the coverage of the project area to enable detailed assessment.

2.5.2.1 Parallel field transverses

Parallel field transverses were used in vegetation types for large areas. This involved two botanists walking on a fixed bearing at 30 metres apart, covering 60 metres each side of the centreline of the project area that allowed for a total coverage of a 120-metre corridor.

2.5.2.2 Two-phase grid-based systematic survey

It is recognised that the parallel field traverses survey method is impractical for large scale project, particularly the current project, which has a regional-scale sized assessment area. The two-phase grid-based systematic survey method has been developed for large areas of suitable potential threatened species habitat that generally exceed 50 hectares in area. The method involves phase-one establishing a grid spaced at 100 square metres that is nested within a one-square-kilometre grid. Surveys are then conducted at each survey location (100 metre grid intersect or greater if open woodland structure occurred), where a 40-metre diameter search area is undertaken (1256-square-metre circular area). If a target threatened species is located, finer-scale grid surveys (phase-two) is used to locate population extent, which allows a species polygon to be defined. This subsequent phase ensures a greater intensity of survey effort in locations where the target threatened species occurs (Department for Planning Industry and Environment 2020).

Given the linear nature of the project, a modified two-phase grid-based systematic survey method was adopted. A minimum 220 m wide survey corridor was established. Within the survey corridor, a linear 100 m survey effort line was established where a 40-metre diameter search area is undertaken (1,256-square-metre circular area) at each 100-metre survey location along the length of the corridor. In non-linear site-based locations a regular 100 m grid was used. Survey locations were pre-loaded onto a handheld GPS to enable an accurate approach to the survey effort.

If a target threatened species was located, a finer-scale grid survey (phase-two) was undertaken to locate population extent and enable a species polygon to be defined. Where a species could not be positively identified in the field and was suspected of being a threatened species, a voucher specimen was collected and preserved for later identification. These samples were sent to the Royal Botanic Gardens in Sydney and/or the Australian National Botanic Gardens for confirmation of identification.

2.5.3 *Targeted fauna surveys*

2.5.3.1 Diurnal bird surveys

Formal 20-minute diurnal bird searches were completed within the project area. Diurnal bird surveys were completed by actively walking through the nominated site (transect) over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls. Diurnal bird surveys were completed during different times of the day, but generally occurred during morning hours or evening. Birds were also recorded opportunistically during other on-site surveys.

Wherever threatened bird species were absent from the site, habitat assessments were conducted to determine the likelihood that the project area might support those species that are known to occur in the region.

Opportunistic observation was used to identify any large stick nests in the canopy of large trees, with these stick nests consequently becoming the focus of further observational periods for threatened bird species (e.g. Little Eagle, Square-tailed Kite and White-bellied Sea-eagle). Where no bird was observed using the nest, the surrounding area beneath was searched for distinguishing features including feathers and/or prey remains.

Sixteen formal diurnal bird surveys were undertaken across the project area to date.

2.5.3.2 Koala Spot Assessments

Spot Assessment Technique (SAT) was undertaken within the subject land to identify the presence of Koala usage within native vegetation in accordance with the NSW Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide, 2022. As well as identifying presence, the SAT also has the potential to identify local Koala tree species preferences, by measuring the rate at which each species is utilised by Koalas.

To initiate the SAT a centre tree, of any species, was located and marked. Moving outward from the centre tree, a minimum of 29 surrounding trees were systematically searched for Koala faecal pellets. A radial search area of 1 metre around the base of each tree was inspected for a minimum of 2 minutes/tree. Initial inspection of undisturbed ground cover was followed by disturbance of the ground cover as required.

If Koala was recorded, then activity usage for each SAT was then expressed as the percentage equivalent of the proportion of the surveyed trees within each SAT. The percentage was then compared to prescribed ranges for activity levels for Koalas within NSW (Phillips and Callaghan, 2011).

Fifty-one Koala SAT's, 23 spotlighting surveys and 23 Koala call-playbacks have been undertaken across the project area thus far.

2.5.3.3 Herpetofauna artificial habitat surveys

Artificial cover, in the form of roof tiles, was also used for target species' observation including for Striped Legless Lizards. This includes the placement of 2 grids of 10 x 5 tiles (5 m spacing between tiles) 3 months prior to survey inspections, within areas of suitable habitat. Tiles will be turned over at optimum times for shallow cover, at temperatures less than 28°C, with visual observation of specimens used as well as the collection of any sloughed/shed skin for potential identification.

Two artificial habitat grids have been laid out, however have not reached optimum period for inspection.

2.5.3.4 Spotlighting and Stag Watches

Spotlighting was used to target threatened nocturnal arboreal, flying and ground-dwelling mammals, birds, reptiles and amphibians. Spotlighting was completed after dusk generally following the targeted nocturnal searches and was undertaken for at least 1 hour at each survey spot. Surveys were completed on foot using high-powered headlamps and hand torches. Sighted animals were identified to the species level.

Stag watches were undertaken at dusk in areas where hollow-bearing trees were identified within the project area. The aim of dusk stag watches was to identify hollow dwelling fauna including owls (e.g. Barking Owl, Masked Owl and

Powerful Owl), microchiropteran bats (e.g. Corben's Long-eared Bat and Little Pied Bat) and mammals (e.g. Greater Glider, Squirrel Glider) that were utilising any hollow-bearing trees within the project area for denning and breeding purposes. Following stag watches spotlighting transects were also undertaken near known hollow-bearing trees.

Forty-two spotlighting surveys and four stag watches have been undertaken across the project area thus far.

2.5.3.5 Remote Camera

Remote motion sensing infra-red cameras were used as a survey method, in place of terrestrial and arboreal traps, due to increased potential for fauna to be attracted to baited traps with a high likelihood of the specimen being photographed (unharmed), as compared to the lesser successful and more dangerous traditional trapping methods. Should a cryptic animal species appear similar to a target species, but not be clearly identified by camera, the species could then be further targeted with traps at the specific locations where they had been recorded.

Remote camera traps were set in trees and large shrubs (at minimum heights of 1.5–2 m) with a suitable baited food source used to entice target species e.g. bait containing either raw chicken necks and sardines (e.g. Brush-tailed Phascogale) or a mix of rolled oats, peanut butter, honey and vanilla essence (e.g. Eastern Pygmy-possum, Greater Glider and Squirrel Glider) within the appropriate microhabitat. Baits were refreshed at the half-way point of camera trap deployment.

Baited cameras at lower heights were also used to target terrestrial species occurring within specific target sites (Brush-tailed rock-wallaby).

Remote camera surveys have been undertaken at twelve sites with a total of 3,404 trap nights across the project area thus far.

2.5.3.6 Opportunistic sightings

Opportunistic sightings of animals were recorded including birds, mammals, frogs, and reptiles throughout all survey periods. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc., were also noted. This provided indirect information on animal presence and activity.

2.5.3.7 Fauna habitat assessment

Fauna habitat assessments were completed to assess the likelihood of species of animal occurring in the project area. Habitat assessments included the assessment and identification of habitat features through targeted meander surveys where works were proposed at the time of survey.

Opportunistic recordings of species were made through incidental sightings, aural recognition of calls and observations of indirect evidence of species presence (such as feeding signs, scratchings, nests/dreys, whitewash, owl pellets, burrows, and scats). This provided supplementary information on faunal species presence.

Fauna habitats were assessed generally by examining characteristics such as the structure and floristics of the canopy, understorey and ground vegetation, the structure and composition of the litter layer, and other habitat attributes important for feeding, shelter roosting and breeding. The following criteria were used to evaluate habitat values:

- **Good:** a full range of fauna habitat components are usually present (for example, old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
- **Moderate:** some fauna habitat components are missing (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.
- **Poor:** many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive past clearing.

3 Existing environment

An overview of the existing environment has been undertaken based on a combination of broad scale State vegetation type mapping (SVTM), threatened species database searches, literature review and field survey.

The project area traverses a range of native vegetation formations including Dry Sclerophyll Forests, Forested Wetlands, Freshwater Wetlands, Grassy Woodlands, Rainforests, Wet Sclerophyll, and partially to wholly cleared agricultural and mining land.

The project area transects two generally distinct environmental landforms in the Hunter valley floor and forested plateau and ranges, each with unique biodiversity values and ecosystems.

The valley floor environment and riverine floodplains of the Hunter River and its tributaries dominate the first half of the corridor from its northern starting point of the Baywater Power Station through to the township of Bulga. The predominant land use within this landscape is open cut coal mining and agriculture, which have generally resulted in highly disturbed environments, and isolated areas of remaining biodiversity associated with TECs, including the Central Hunter Valley eucalypt forest and woodland and Warkworth Sands Woodland of the Hunter Valley.

These plateau and ranges are dominated by a mixture of moist sclerophyll vegetation within the sheltered valleys and dry sclerophyll forests on the ridges lines and upper slopes, with both ecosystems well represented within the National Park Estate. The corridor within this landscape avoids and minimises impacts to areas of existing National Park Estate and managed flora reserves and maximising the location within State forest management zones and existing access tracks.

3.1 Regional landscape and areas of high conservation significance

Within the project area and broader locality, important biodiversity values are known to occur within a range of conservation areas including National Parks, State forest, and other protected areas.

3.1.1.1 NSW National Parks

The Watagans National Park is located adjacent to the project area. However, the design of the project has been developed to avoid direct impacts to this national park.

3.1.1.2 NSW Conservation areas

The project area avoids direct impacts to the Jilliby State Conservation Area (SCA) located adjacent to the Olney substation location.

3.1.1.3 Mining Offset Areas

Mining biodiversity offset areas throughout the valley floor landscape have been identified through consultation with the various mining companies and these have been avoided.

3.1.1.4 NSW State Forests and flora reserves

The project area traverses a total of four NSW State forests within the forest plateau landscape. These include:

- Corrabare State Forest
    - Pokolbin Flora Reserve
- Olney State Forest
    - Bar Flora Reserve
    - Olney Flora Reserve
- Pokolbin State Forest

    - Pokolbin Flora Reserve
- Watagan State Forest.
    - Warrawolong Flora Reserve

Within these State forests, the project area avoids a series of flora reserves managed by NPWS for conservation however, residual unavoidable impacts remain for the Corrabare North Flora Reserve.

3.2 Native vegetation

The project area includes a diversity of native vegetation types that fall into the following broad NSW vegetation formations:

- Dry Sclerophyll Forests (Shrub/grass sub-formation)
- Dry Sclerophyll Forests (Shrubby sub-formation)
- Forested Wetlands
- Grassy Woodlands
- Rainforests
- Wet Sclerophyll Forests (Grassy sub-formation)
- Wet Sclerophyll Forests (Shrubby sub-formation)

SVTM was used to generate a list of potential native PCTs, being:

- SVTM version C1.1.M1 (Department of Planning and Environment 2022)

The vegetation formations based wholly on SVTM within the project area contain a total of 42 native PCTs, which are illustrated in Figure 3.1. An overview of each PCT, its associated vegetation formation and class, threat status under the BC Act and estimated percentage cleared (in NSW) and an indicative project disturbance area for initial significance assessments is presented in Table 3.1.

The relationship between the PCTs that have been mapped in the project area by SVTM and threatened ecological communities (TECs) is shown in Table 3.2. This is based on both the BioNet Vegetation Classification and assessment by WSP ecologists.

Table 3.1 Overview of native plant community types (PCT) within the indicative project disturbance area (ha) (mapped by SVTM)

PCT No.	Plant Community Type (PCT)	Vegetation class	Percent cleared	TEC fit[1]	EPBC Act[2]	SAII	Estimated construction disturbance footprint (ha)[4]
Dry Sclerophyll Forests (Shrub/grass sub-formation)							
3431	Central Hunter Ironbark Grassy Woodland	Hunter-Macleay Dry Sclerophyll Forests	86%	Part	CE	-	246.81
3433	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Hunter-Macleay Dry Sclerophyll Forests	69%	Part	-	-	6.91
3438	Hunter Escarpment Footslopes Ironbark Forest	Hunter-Macleay Dry Sclerophyll Forests	24%	-	CE	-	35.03
3444	Lower Hunter Spotted Gum-Ironbark Forest	Hunter-Macleay Dry Sclerophyll Forests	62%	Part	-	-	34.94
3446	Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter-Macleay Dry Sclerophyll Forests	75%	Part	CE	-	14.12
3489	Hunter Escarpment Grey Box Forest	Central Gorge Dry Sclerophyll Forests	2%	-	-	-	6.86
Dry Sclerophyll Forests (Shrubby sub-formation)							
3583	Hunter Coast Lowland Scribbly Gum Forest	Sydney Coastal Dry Sclerophyll Forests	64%	-	-	-	0.60
3596	Sydney Coastal Sandstone Riparian Forest	Sydney Coastal Dry Sclerophyll Forests	15%	-	-	-	0.21
3599	Blue Mountains Peppermint Shrub Forest	Sydney Hinterland Dry Sclerophyll Forests	0%	-	-	-	14.96
3604	Hunter Range Grey Gum-Stringybark Forest	Sydney Hinterland Dry Sclerophyll Forests	1%	-	-	-	6.96

PCT No.	Plant Community Type (PCT)	Vegetation class	Percent cleared	TEC fit[1]	EPBC Act[2]	SAII	Estimated construction disturbance footprint (ha)[4]
3605	Hunter Range Ironbark Forest	Sydney Hinterland Dry Sclerophyll Forests	2%	-	-	-	162.54
3617	Sydney Hinterland Peppermint-Apple Forest	Sydney Hinterland Dry Sclerophyll Forests	2%	-	-	-	37.32
3620	Sydney Hinterland Turpentine Sheltered Forest	Sydney Hinterland Dry Sclerophyll Forests	4%	-	-	-	13.19
3621	Sydney Hinterland Turpentine-Apple Gully Forest	Sydney Hinterland Dry Sclerophyll Forests	3%	-	-	-	5.01
3634	Quorrobolong Sand Flats Forest	Sydney Sand Flats Dry Sclerophyll Forests	78%	Part	-	Yes	0.06
3636	Warkworth Sands Woodland	Sydney Sand Flats Dry Sclerophyll Forests	61%	Equivalent	CE	Yes	17.36
Forested Wetlands							
4015	Central Hunter Swamp Oak Riparian Forest	Coastal Floodplain Wetlands	88%	-	-	-	23.12
4039	Hunter Range Creekflat Apple-Red Gum Forest	Coastal Floodplain Wetlands	40%	Part	CE	-	1.81
4044	Northern Creekflat Eucalypt-Paperbark Mesic Swamp Forest	Coastal Floodplain Wetlands	70%	Part	E	-	0.10
4058	Sydney Hinterland Red Gum Riverflat Forest	Coastal Floodplain Wetlands	28%	Part	CE	-	2.30
4073	Lower North Hinterland River Oak Forest	Eastern Riverine Forests	80%	-	-	-	2.11
4089	Namoi-Upper Hunter River Red Gum Forest	Inland Riverine Forests	94%	Part	-	Yes	1.72
Grassy Woodlands							

PCT No.	Plant Community Type (PCT)	Vegetation class	Percent cleared	TEC fit[1]	EPBC Act[2]	SAII	Estimated construction disturbance footprint (ha)[4]
3314	Central Hunter Slopes Grey Box Forest	Coastal Valley Grassy Woodlands	71%	Part	CE	Yes	57.58
3315	Central Hunter Ironbark-Spotted Gum Forest	Coastal Valley Grassy Woodlands	78%	Equivalent	CE		32.02
Rainforests							
3029	Lower North Wet Gully Palm Rainforest	Northern Warm Temperate Rainforests	6%	Part	-	-	18.23
3037	Sydney Basin Warm Temperate Rainforest	Northern Warm Temperate Rainforests	1%	-	-	-	4.48
3041	Sydney Sandstone Coachwood-Grey Myrtle Rainforest	Northern Warm Temperate Rainforests	2%	-	-	-	12.33
3086	Lower North Hinterland Riparian Dry Rainforest	Dry Rainforests	46%	Part	-	-	2.45
3151	Northwest Sydney Sandstone Grey Myrtle Dry Rainforest	Dry Rainforests	2%	-	-	-	9.06
Wet Sclerophyll Forests (Grassy sub-formation)							
3152	Hunter Range Turpentine-Grey Myrtle Gully Forest	Northern Hinterland Wet Sclerophyll Forests	1%	-	-	-	21.20
3230	Central Coast Escarpment Moist Forest	Northern Hinterland Wet Sclerophyll Forests	25%	-	-	-	0.23
3237	Hunter Range Blue Gum Gully Forest	Northern Hinterland Wet Sclerophyll Forests	2%	-	-	-	7.24
3238	Hunter Range Colluvial Apple-Gum Forest	Northern Hinterland Wet Sclerophyll Forests	4%	-	-	-	1.06
3239	Hunter Range Sheltered Grey Gum Forest	Northern Hinterland Wet Sclerophyll Forests	1%	-	-	-	41.27

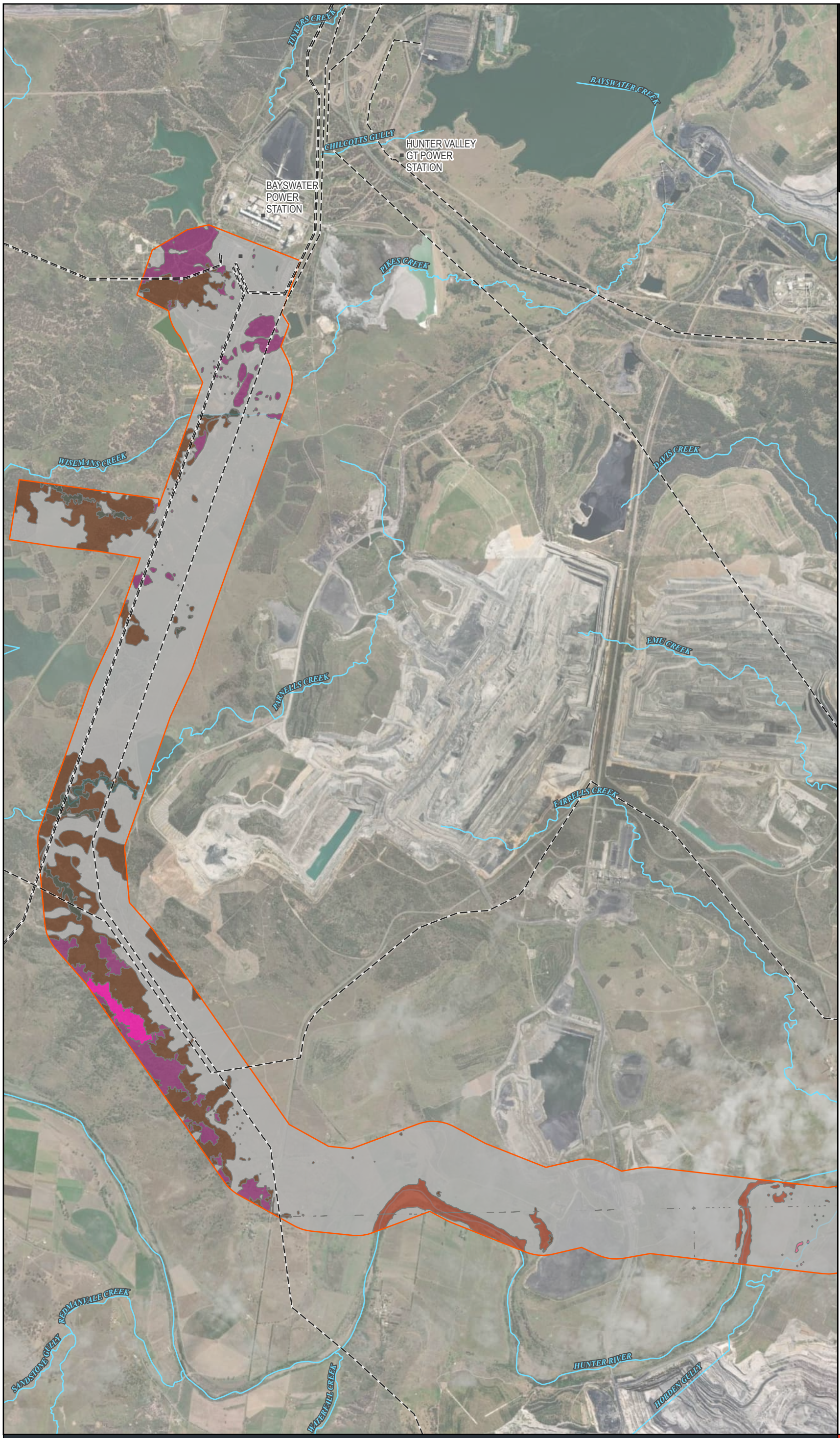
PCT No.	Plant Community Type (PCT)	Vegetation class	Percent cleared	TEC fit[1]	EPBC Act[2]	SAII	Estimated construction disturbance footprint (ha)[4]
3241	Lower North White Mahogany-Spotted Gum Moist Forest	Northern Hinterland Wet Sclerophyll Forests	31%	-	-	-	31.21
3242	Lower North Ranges Turpentine Moist Forest	Northern Hinterland Wet Sclerophyll Forests	13%	-	-	-	63.11
3244	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	Northern Hinterland Wet Sclerophyll Forests	39%	-	-	-	30.23
3250	Northern Foothills Blackbutt Grassy Forest	Northern Hinterland Wet Sclerophyll Forests	30%	-	-	-	13.17
3263	Watagan Range Turpentine-Mahogany Grassy Forest	Northern Hinterland Wet Sclerophyll Forests	10%	-	-	-	28.63
Wet Sclerophyll Forests (Shrubby sub-formation)							
3087	Lower North Ranges Riparian Turpentine Forest	North Coast Wet Sclerophyll Forests	27%	-	-	-	10.34
3150	Hunter Coast Ranges Turpentine Wet Forest	North Coast Wet Sclerophyll Forests	10%	-	-	-	101.25
3176	Sydney Enriched Sandstone Moist Forest	North Coast Wet Sclerophyll Forests	23%	Part	-	-	10.45
Total							**1129.54**

(1) TEC fit – from BioNet Vegetation Classification indicates the degree to which the PCT equates to the TEC – part=partially subset of the TEC, equivalent=wholly a subset of the TEC.

(2) BC Act – BC Act status: E=Endangered, CE=Critically Endangered under the *Biodiversity Conservation Act* (BC Act).

(3) SAII = Serious and Irreversible Impact under the *Biodiversity Conservation Act* (BC Act).

(4) Area in hectares of PCT that is mapped within the project area by the SVTM. This has not been confirmed by field survey.



Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

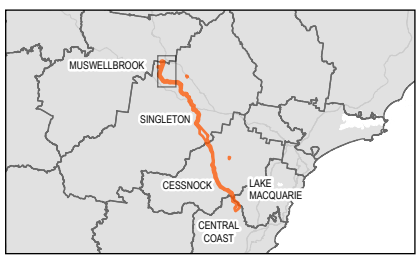
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3076,Hunter Valley Whalebone Dry Rainforest
- PCT : 3314,Central Hunter Slopes Grey Box Forest
- PCT : 3431,Central Hunter Ironbark Grassy Woodland
- PCT : 3438,Hunter Escarpment Footslopes Ironbark Forest
- PCT : 4015,Central Hunter Riparian Forest
- PCT : 4089,Namoi-Upper Hunter River Red Gum Forest



0 250 500 750 1,000 1,250 1,500 1,750 2,000

Metres

Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:43,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

GLENNIES CREEK
HUNTER RIVER
SINGLETON SUBTRANSMISSION SUBSTATION
WOLLOMBI BROOK
LONGFORD CREEK
SANDY HOLLOW CREEK
REDBANK POWER STATION
STYX CREEK
DOCTORS CREEK
MOUNT THORLEY ZONE SUBSTATION

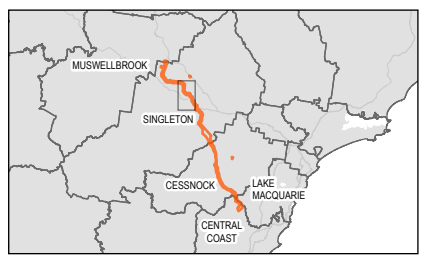
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3431,Central Hunter Ironbark Grassy Woodland
- PCT : 3438,Hunter Escarpment Footslopes Ironbark Forest
- PCT : 3485,Central Hunter Slaty Gum Grassy Forest
- PCT : 3636,Warkworth Sands Woodland
- PCT : 3975,Southern Lower Floodplain Freshwater Wetland
- PCT : 3981,Tableland Semi-permanent Shallow Wetlands
- PCT : 4015,Central Hunter Riparian Forest
- PCT : 4073,Lower North Hinterland River Oak Forest
- PCT : 4089,Namoi-Upper Hunter River Red Gum Forest



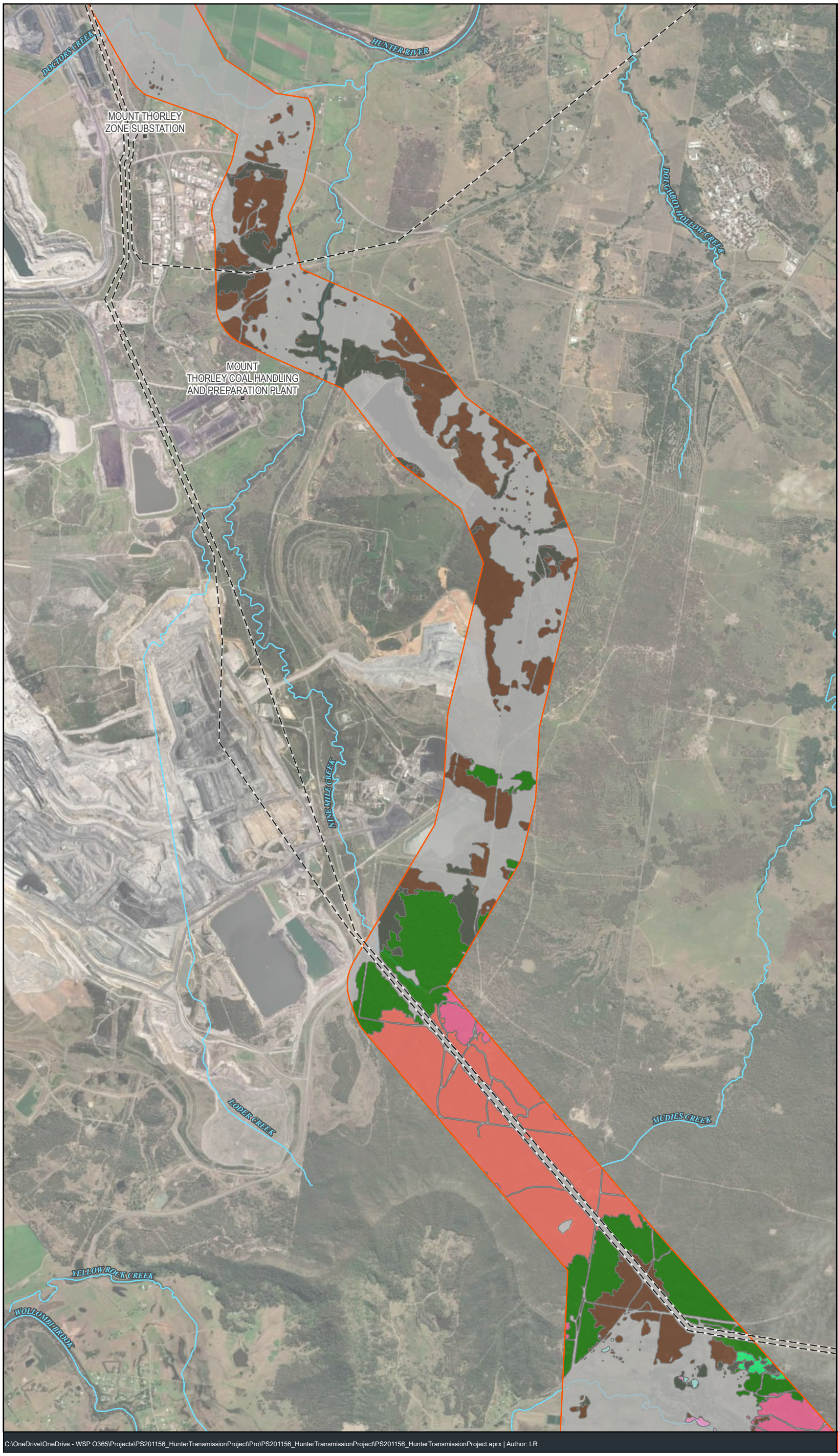
0 250 500 750 1,000 1,250 1,500 1,750 2,000
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

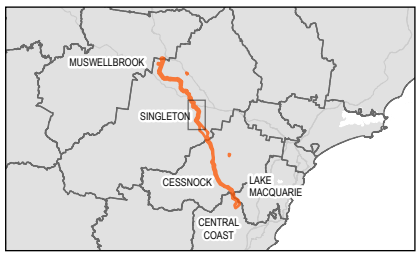
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3315,Central Hunter Ironbark-Spotted Gum Forest
- PCT : 3431,Central Hunter Ironbark Grassy Woodland
- PCT : 3438,Hunter Escarpment Footslopes Ironbark Forest
- PCT : 3444,Lower Hunter Spotted Gum-Ironbark Forest
- PCT : 3446,Lower North Foothills Ironbark-Box-Gum Grassy Forest
- PCT : 4015,Central Hunter Riparian Forest
- PCT : 4039,Hunter Range Creekflat Apple-Red Gum Forest
- PCT : 4072,Hunter River Oak Mesic Forest
- PCT : 4073,Lower North Hinterland River Oak Forest



0 250 500 750 1,000 1,250 1,500 1,750 2,000
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

POKOLBIN STATE FOREST
PEACH TREE CREEK
MONKEY PLACE CREEK
POTHOLES GULLY
YELLOW ROCK CREEK
DEEP CREEK
SAWPIT GULLY
BALDY CREEK
LITTLE BALDY CREEK
CEDAR CREEK
FLYING FOX CREEK
MULVANES CREEK
CONGEWAI CREEK
CORRABARE STATE FOREST

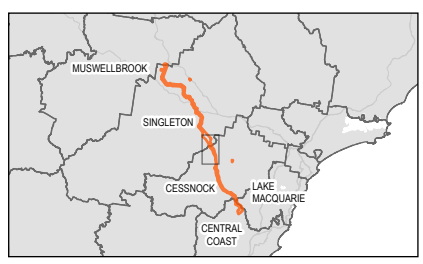
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3086,Lower North Hinterland Riparian Dry Rainforest
- PCT : 3087,Lower North Ranges Riparian Turpentine Forest
- PCT : 3151,Northwest Sydney Sandstone Grey Myrtle Dry Rainforest
- PCT : 3152,Hunter Range Turpentine-Grey Myrtle Gully Forest
- PCT : 3237,Hunter Range Blue Gum Gully Forest
- PCT : 3238,Hunter Range Colluvial Apple-Gum Forest
- PCT : 3239,Hunter Range Sheltered Grey Gum Forest
- PCT : 3241,Lower North White Mahogany-Spotted Gum Moist Forest
- PCT : 3242,Lower North Ranges Turpentine Moist Forest
- PCT : 3244,Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
- PCT : 3258,Sydney Basin Creekflat Blue Gum-Apple Forest
- PCT : 3315,Central Hunter Ironbark-Spotted Gum Forest
- PCT : 3431,Central Hunter Ironbark Grassy Woodland
- PCT : 3438,Hunter Escarpment Footslopes Ironbark Forest
- PCT : 3444,Lower Hunter Spotted Gum-Ironbark Forest
- PCT : 3446,Lower North Foothills Ironbark-Box-Gum Grassy Forest
- PCT : 3489,Hunter Escarpment Grey Box Forest
- PCT : 3604,Hunter Range Grey Gum-Stringybark Forest
- PCT : 3605,Hunter Range Ironbark Forest
- PCT : 3620,Sydney Hinterland Turpentine Sheltered Forest
- PCT : 3634,Quorrobolong Sand Flats Forest
- PCT : 4015,Central Hunter Riparian Forest
- PCT : 4039,Hunter Range Creekflat Apple-Red Gum Forest
- PCT : 4058,Sydney Hinterland Red Gum Riverflat Forest
- PCT : 4072,Hunter River Oak Mesic Forest
- PCT : 4073,Lower North Hinterland River Oak Forest
- PCT : 4079,Northern Hinterland Grassy River Oak Forest
- PCT : 4158,Hunter Escarpment Pokolbin Ironbark Woodland



0 250 500 750 1,000 1,250 1,500 1,750 2,000
Metres

Coordinate system: GDA2020 MGA Zone 56

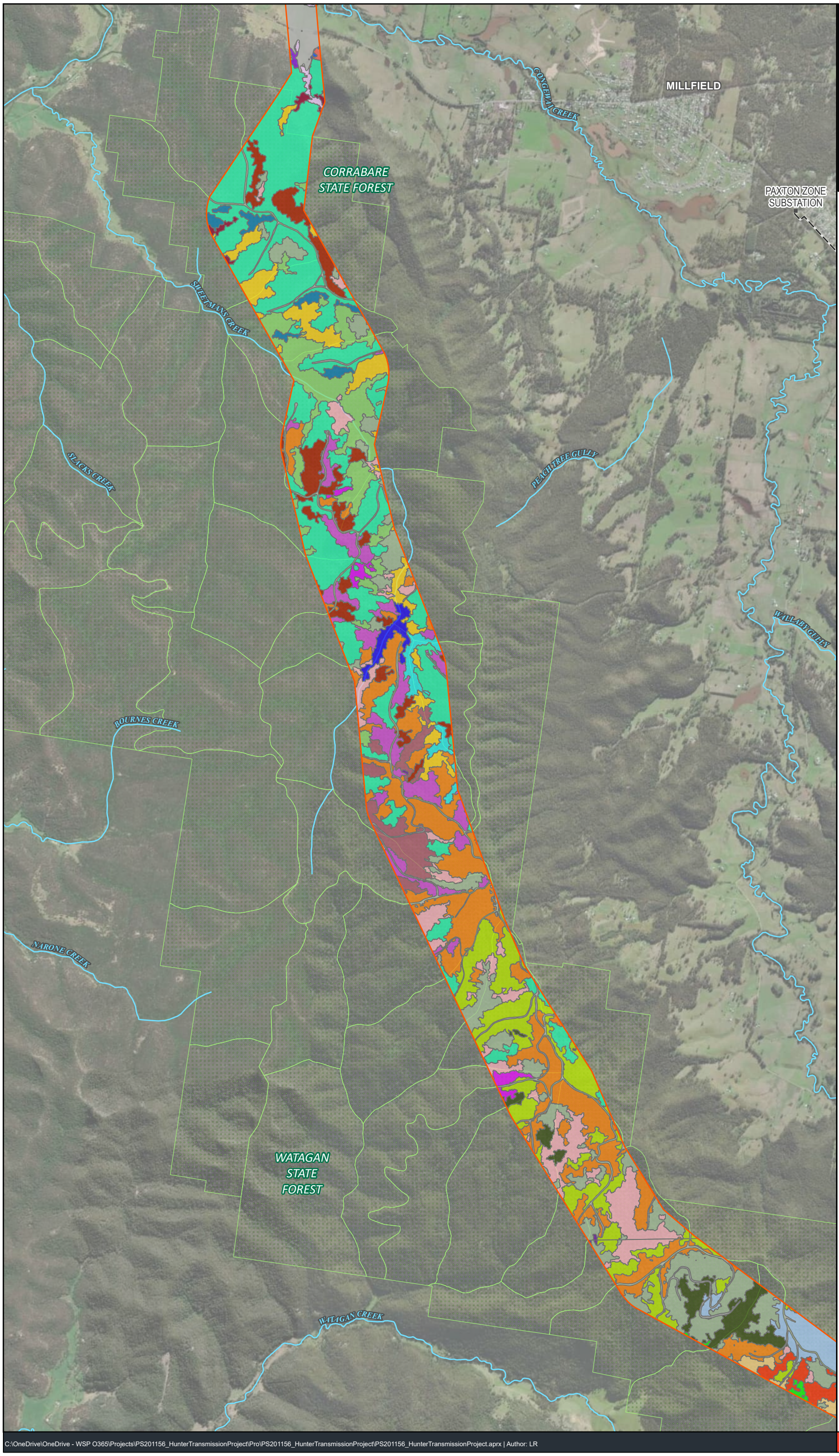
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area



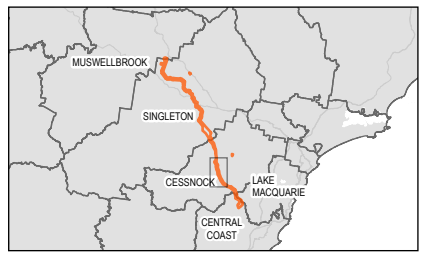
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3029,Lower North Wet Gully Palm Rainforest
- PCT : 3037,Sydney Basin Warm Temperate Rainforest
- PCT : 3041,Sydney Sandstone Coachwood-Grey Myrtle Rainforest
- PCT : 3086,Lower North Hinterland Riparian Dry Rainforest
- PCT : 3087,Lower North Ranges Riparian Turpentine Forest
- PCT : 3110,Greater Sydney Enriched Grey Myrtle Dry Rainforest
- PCT : 3150,Hunter Coast Ranges Turpentine Wet Forest
- PCT : 3151,Northwest Sydney Sandstone Grey Myrtle Dry Rainforest
- PCT : 3152,Hunter Range Turpentine-Grey Myrtle Gully Forest
- PCT : 3230,Central Coast Escarpment Moist Forest
- PCT : 3238,Hunter Range Colluvial Apple-Gum Forest
- PCT : 3239,Hunter Range Sheltered Grey Gum Forest
- PCT : 3241,Lower North White Mahogany-Spotted Gum Moist Forest
- PCT : 3242,Lower North Ranges Turpentine Moist Forest
- PCT : 3244,Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
- PCT : 3263,Watagan Range Turpentine-Mahogany Grassy Forest
- PCT : 3433,Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
- PCT : 3444,Lower Hunter Spotted Gum-Ironbark Forest
- PCT : 3489,Hunter Escarpment Grey Box Forest
- PCT : 3599,Blue Mountains Peppermint Shrub Forest
- PCT : 3605,Hunter Range Ironbark Forest
- PCT : 3617,Sydney Hinterland Peppermint-Apple Forest
- PCT : 3620,Sydney Hinterland Turpentine Sheltered Forest
- PCT : 3621,Sydney Hinterland Turpentine-Apple Gully Forest
- PCT : 3634,Quorrobolong Sand Flats Forest
- PCT : 4039,Hunter Range Creekflat Apple-Red Gum Forest
- PCT : 4058,Sydney Hinterland Red Gum Riverflat Forest



0 250 500 750 1,000 1,250 1,500 1,750 2,000
Metres

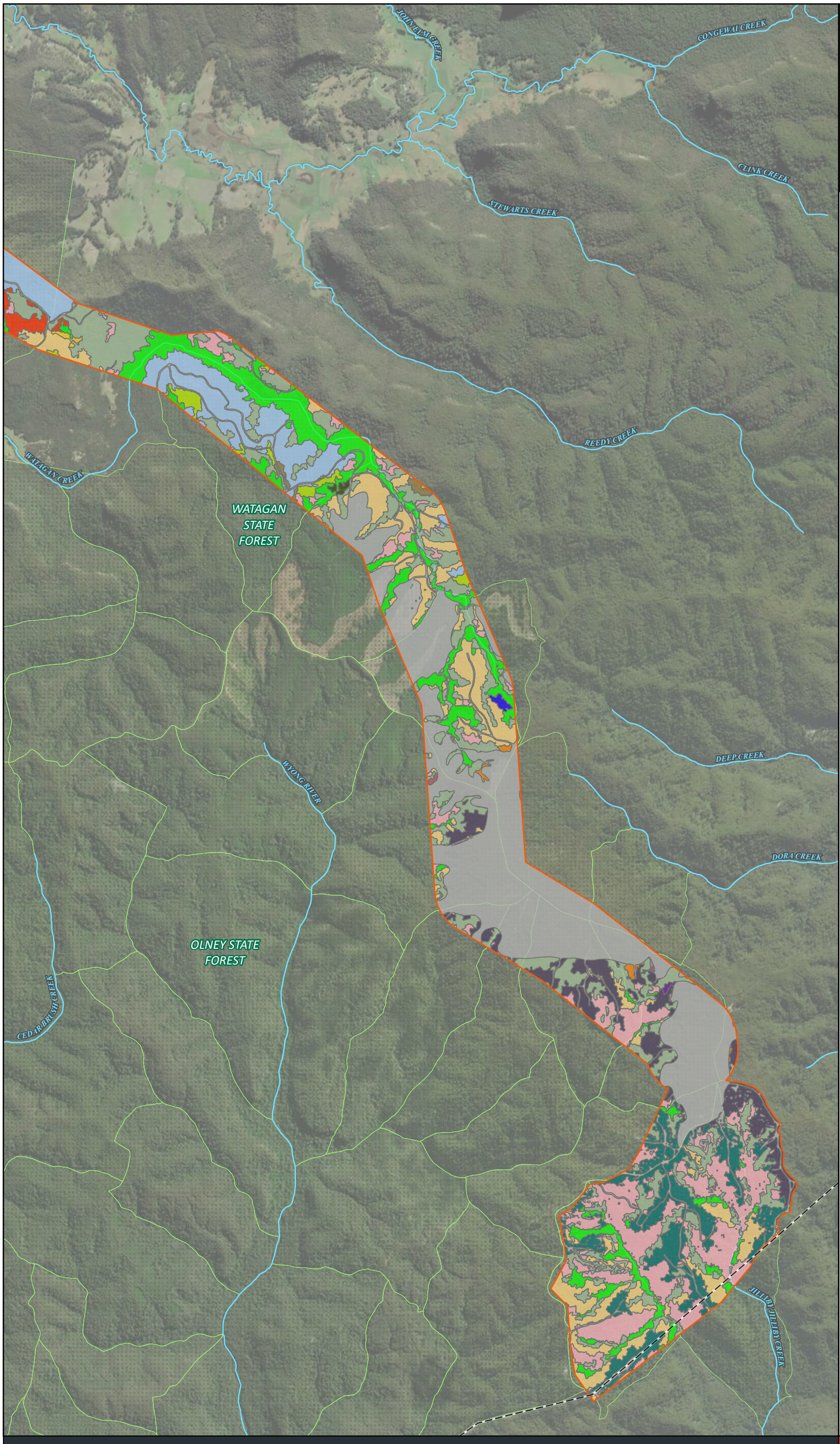
Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

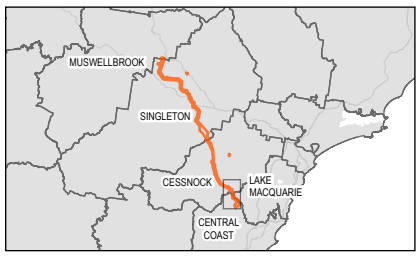
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3029,Lower North Wet Gully Palm Rainforest
- PCT : 3037,Sydney Basin Warm Temperate Rainforest
- PCT : 3041,Sydney Sandstone Coachwood-Grey Myrtle Rainforest
- PCT : 3086,Lower North Hinterland Riparian Dry Rainforest
- PCT : 3087,Lower North Ranges Riparian Turpentine Forest
- PCT : 3150,Hunter Coast Ranges Turpentine Wet Forest
- PCT : 3176,Sydney Enriched Sandstone Moist Forest
- PCT : 3230,Central Coast Escarpment Moist Forest
- PCT : 3241,Lower North White Mahogany-Spotted Gum Moist Forest
- PCT : 3242,Lower North Ranges Turpentine Moist Forest
- PCT : 3244,Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
- PCT : 3250,Northern Foothills Blackbutt Grassy Forest
- PCT : 3263,Watagan Range Turpentine-Mahogany Grassy Forest
- PCT : 3581,Hunter Coast Foothills Apple Forest
- PCT : 3595,Sydney Coastal Sandstone Gully Forest
- PCT : 3617,Sydney Hinterland Peppermint-Apple Forest
- PCT : 3621,Sydney Hinterland Turpentine-Apple Gully Forest



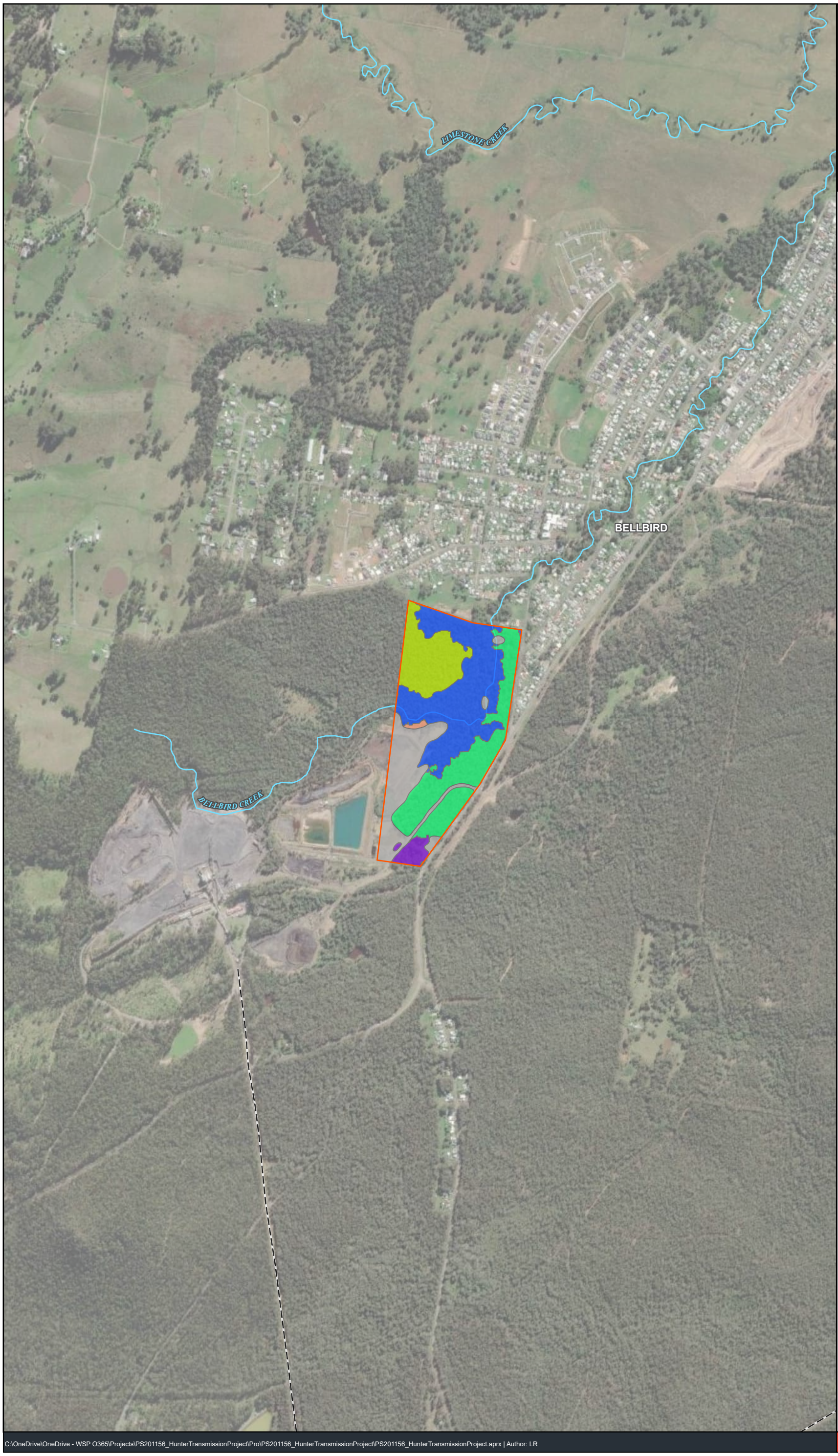
0 250 500 750 1,000 1,250 1,500 1,750 2,000
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

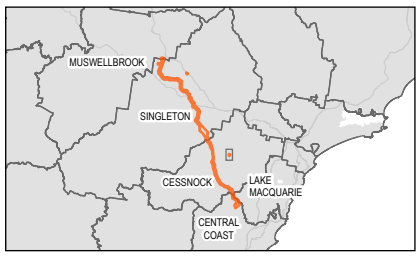
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3244,Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
- PCT : 3433,Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
- PCT : 3446,Lower North Foothills Ironbark-Box-Gum Grassy Forest
- PCT : 3634,Quorrobolong Sand Flats Forest
- PCT : 4023,Coastal Valleys Riparian Forest

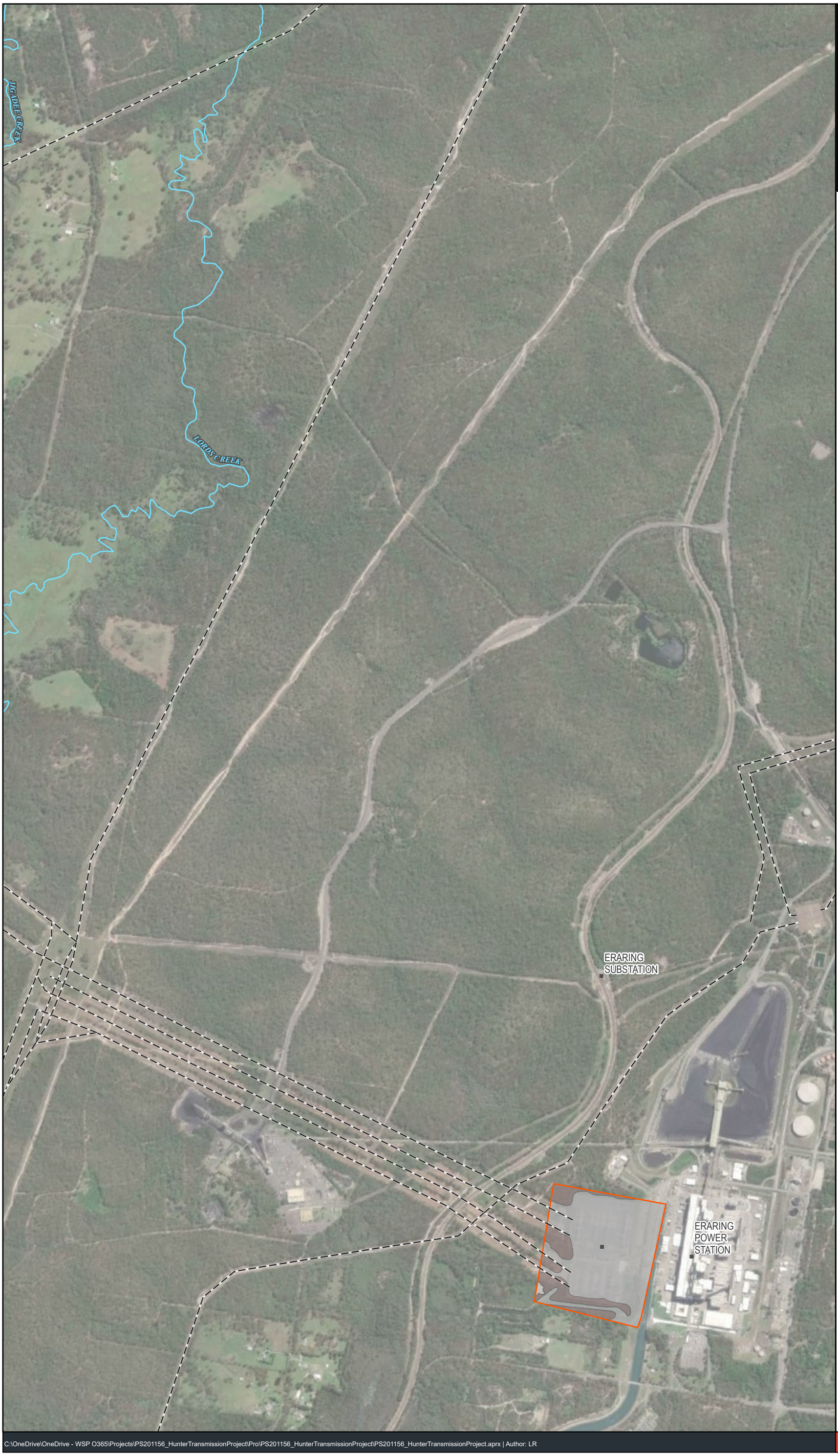


0 250 500 750
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-1

Plant Community Types within Project Area

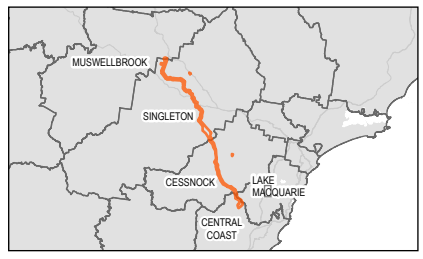
Legend

- Project Area
- Existing transmission line
- Watercourse
- State Forest

NSW State Vegetation Type Map (SVTM)

PCT Number and Name

- PCT : 0,Not classified
- PCT : 3436,Hunter Coast Sandy Creekflat Low Paperbark Scrub
- PCT : 3583,Hunter Coast Lowland Scribbly Gum Forest
- PCT : 4038,Hunter Estuarine Melaleuca nodosa Scrub



0 250 500 750
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

3.3 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are communities of plants, animals, and other organisms whose extent and life processes are dependent on groundwater. When considering GDEs, groundwater is generally defined as the saturated zone of the regolith (the layer of loose rock resting on bedrock, constituting the surface of most land) and its associated capillary fringe, but it excludes soil water held under tension in soil pore spaces (the unsaturated zone or vadose zone) (Eamus *et al*. 2006).

GDEs include a diverse range of ecosystems, from those entirely dependent on groundwater to those that may use groundwater while not having a dependency on it for survival (i.e., ecosystems or organisms that use groundwater opportunistically or as a supplementary source of water) (Hatton and Evans 1998). Broad classes of GDEs that have the potential to be present within or near the project area include:

- Ecosystems dependent on the surface expression of groundwater may be present in the project area. This category of GDE includes base-flow rivers and watercourses, wetlands, some floodplains and mound springs and estuarine seagrass beds. Although plant roots are generally below ground, this class of groundwater dependent ecosystems requires a surface expression of groundwater, which may, in many cases, then soak below the soil surface and thereby become available to plant roots.
- Ecosystems dependent on the subsurface presence of groundwater, often accessed via the capillary fringe (non-saturated zone above the saturated zone of the water table) when roots penetrate this zone, are likely to be present in the project area. No surface expression of groundwater is required in this class of groundwater dependent ecosystems.

Groundwater levels on alluvial floodplains that support the forested wetland PCTs are expected to be moderately shallow. The groundwater systems within the project area are recharged via the infiltration of rainfall and surface water runoff. Infiltration is thought to occur primarily through the profile of the Hunter Region and its Ground Water Sources.

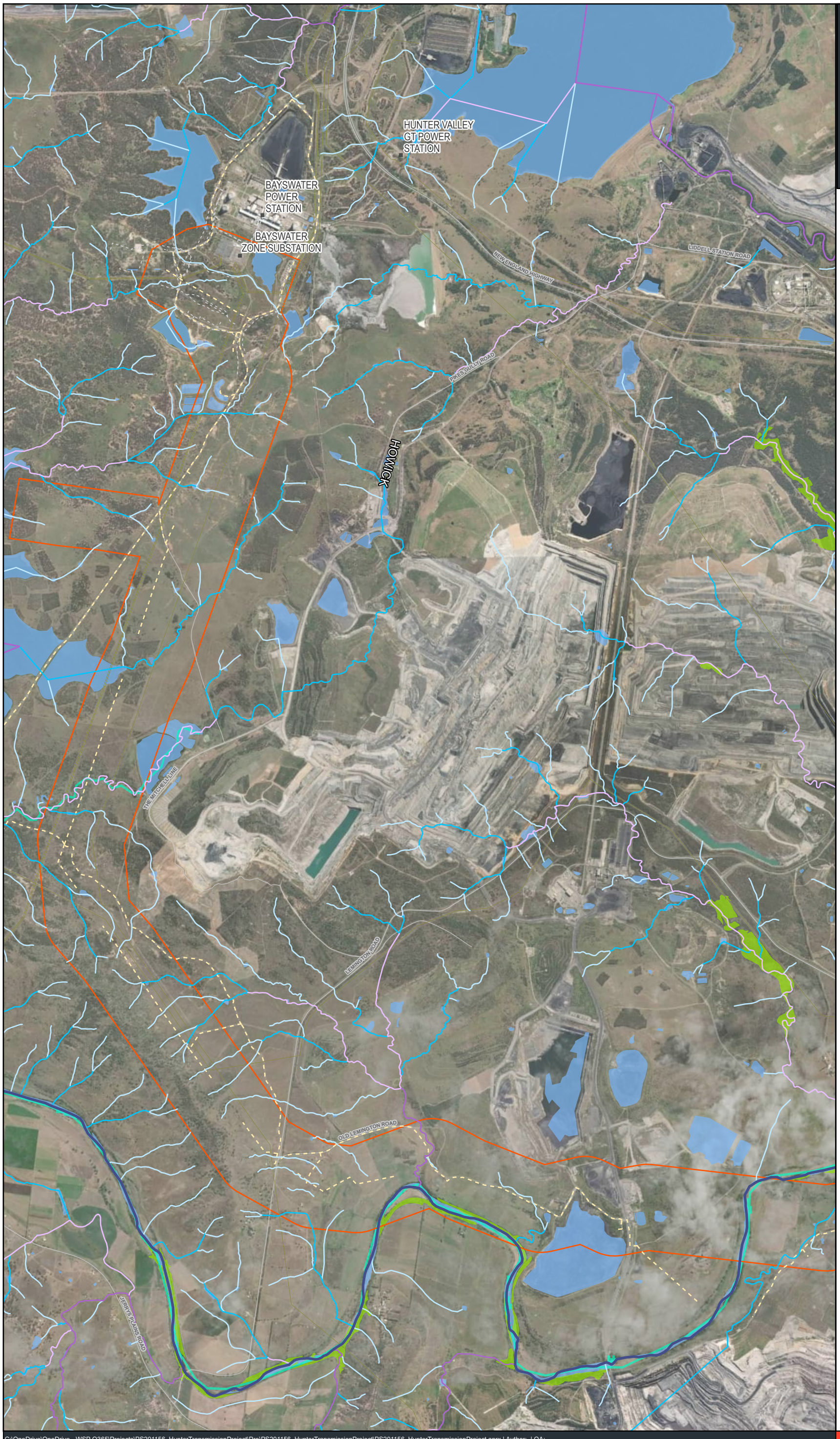
The Groundwater Dependent Ecosystems Atlas provides a national dataset of Australian GDEs based on a methodology that incorporates data from multiple sources including climate, river basins, groundwater systems, vegetation mapping, surface water mapping and conceptual understanding of how groundwater and ecosystems interact (Australian Bureau of Meteorology, 2023). Review of the GDE Atlas in the project area indicates likelihoods of GDAs being present. Australian Bureau of Meteorology GDE mapping in the project area is illustrated in Figure 3.2.

Preliminary assessment of the possible relationships of PCTs and GDEs in the project area indicates that several PCTs in the project area have a high or moderate potential to be GDEs. Figure 3.2 provides a summary of this preliminary assessment.

The terrestrial GDE mapping indicates that the Forested Wetlands have high potential terrestrial GDEs (i.e., have a high potential for groundwater interaction) that may rely on surface expression of groundwater. Some Rainforests PCTs are also considered high potential terrestrial GDEs. The Forested Wetlands are most likely to rely on subsurface presence of groundwater.

Some portions of the Wet Sclerophyll Forest and Dry Sclerophyll Forest PCTs within the project area are likely Moderate Potential GDEs (i.e., have a moderate potential for groundwater interaction).

All remaining Dry Sclerophyll Forest, Wet Sclerophyll Forest, Rainforest, Freshwater Wetlands, Grassy Woodland and Semi-arid Woodland PCTs within the project area are likely to be Low Potential GDEs (i.e., have a Low potential for groundwater interaction). These drier forest types are not obligate GDEs (i.e., they are not entirely dependent on groundwater (often accessed via the capillary fringe – subsurface water just above the water table) in some locations but not others, particularly where an alternative source of water (i.e., rainfall) cannot be accessed to maintain ecological function. The plants within these PCTs would use shallow soil water before seeking deeper soil water or groundwater. The trees may take up groundwater from the capillary fringe when necessary (e.g., during dry seasons or in extended drought). The survival and position of these Forested Wetland PCTs rely on the current hydrology of the area. Anything that impacts hydrology will impact these High Potential GDEs.



Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

Legend

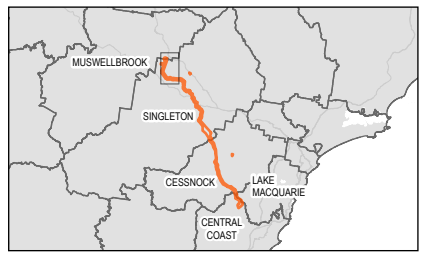
- Project Area
- Bayswater Eraring - Infrastructure
- Existing transmission line
- Access roads
- Road
- Waterbody

Groundwater Dependent Ecosystems

- High potential Aquatic GDE
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 9



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:43,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

ARCHERFIELD ROAD
SHEARERS LANE
MAISON DIEU ROAD
SINGLETON SUBTRANSMISSION SUBSTATION
KNODLERS LANE
COMLEROI ROAD
DIGHTS CROSSING ROAD
LONG POINT ROAD EAST
HIGH ROAD
WATTS STREET
LONG POINT ROAD WEST
REDBANK POWER STATION
JERRYS PLAINS ROAD
WALLABY SCRUB ROAD
GOULDSVILLE ROAD
LYDES LANE
MOUNT THORLEY ZONE SUBSTATION
MOUNT THORLEY ROAD
PUTTY ROAD

Legend

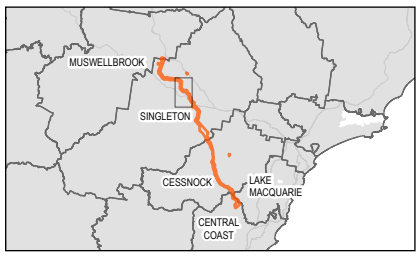
- Project Area
- Existing transmission line
- Access roads
- Road
- Waterbody

Groundwater Dependent Ecosystems

- High potential Aquatic GDE
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4
- 7
- 8
- 9



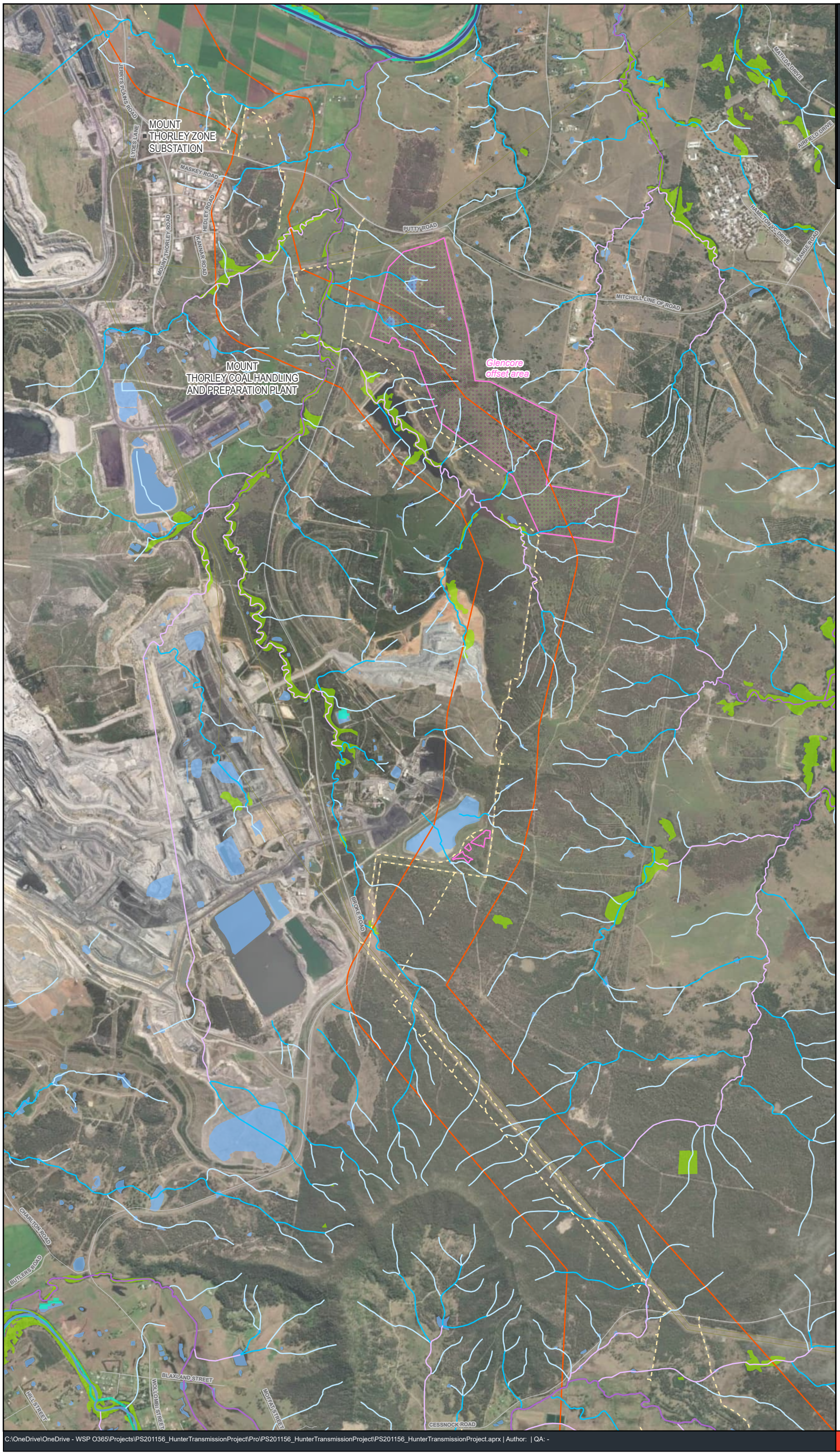
0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

Legend

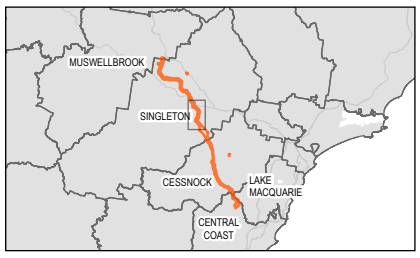
- Project Area
- Existing transmission line
- Access roads
- Road
- Glencore offset area
- Waterbody

Groundwater Dependent Ecosystems

- High potential Aquatic GDE
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 8
- 9



0 1,000 2,000

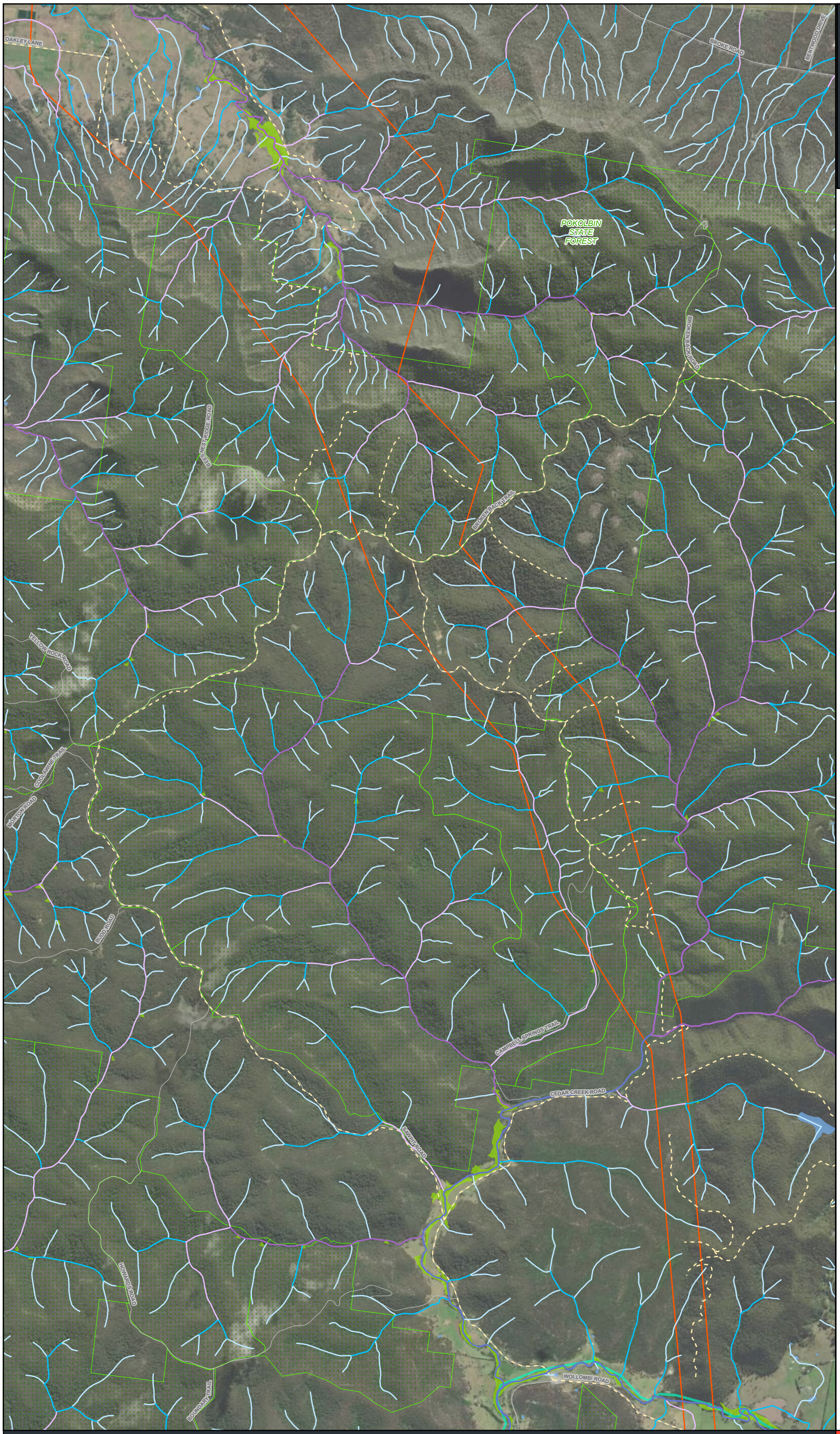
Meters

Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

Legend

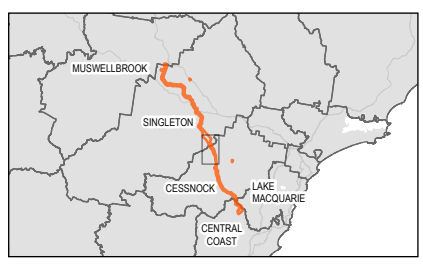
- Project Area
- Existing transmission line
- Access roads
- Road
- State forest
- Waterbody

Groundwater Dependent Ecosystems

- High potential Aquatic GDE
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 6
- 7

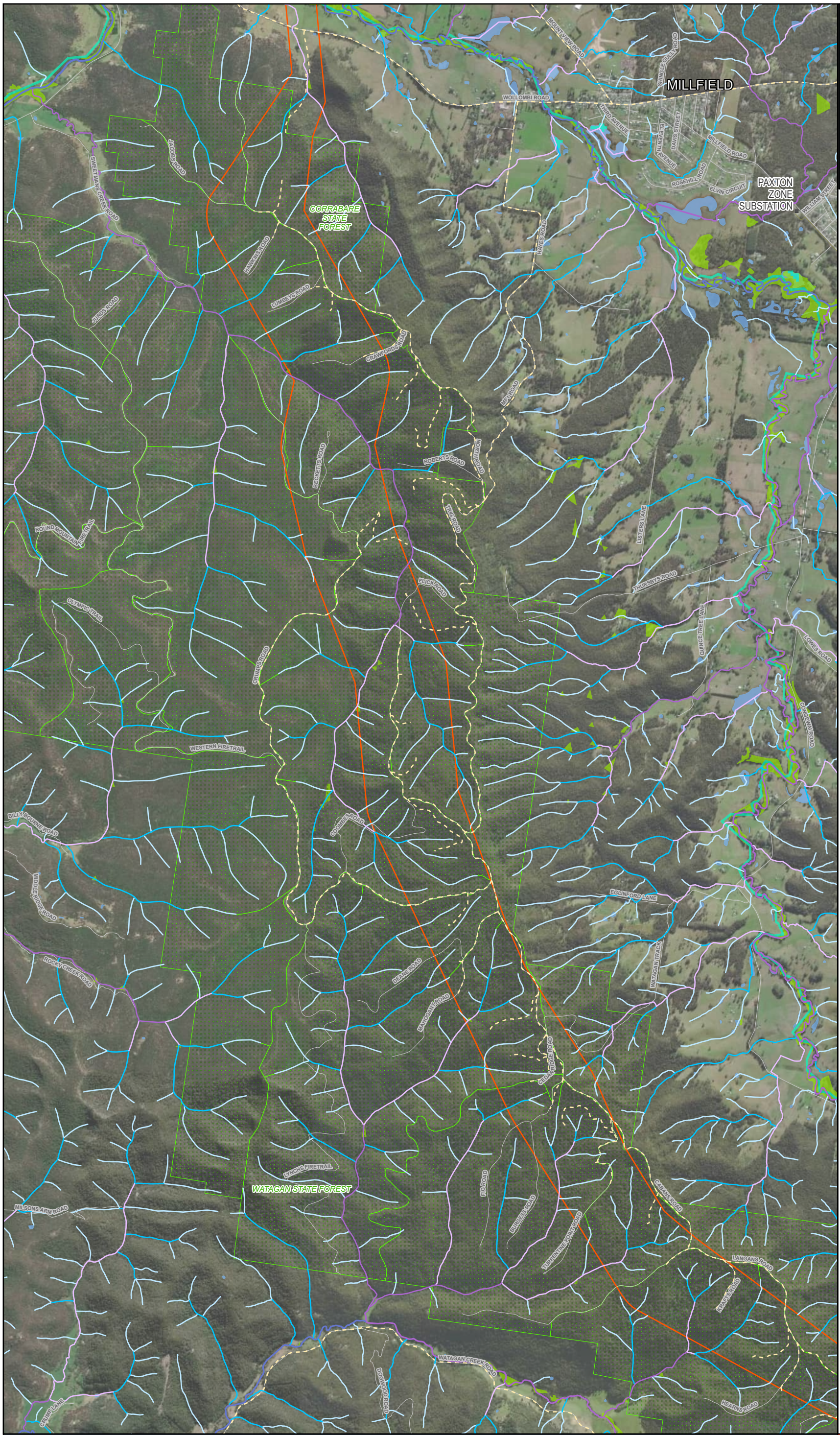


0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

Legend

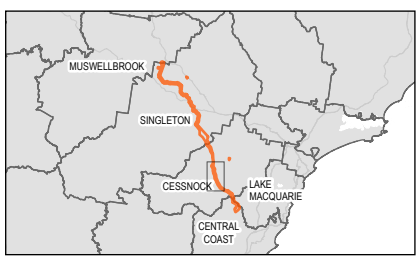
- Project Area
- Existing transmission line
- Access roads
- Road
- State forest
- Waterbody

Groundwater Dependent Ecosystems

- High potential Aquatic GDE
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 6
- 7



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

wsp

Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

Legend

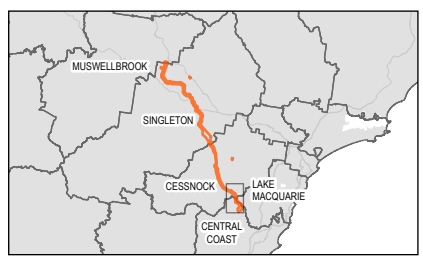
- Project Area
- Existing transmission line
- Access roads
- Road
- NPWS Estate
- State forest
- Waterbody

Groundwater Dependent Ecosystems

- High potential Aquatic GDE
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-2

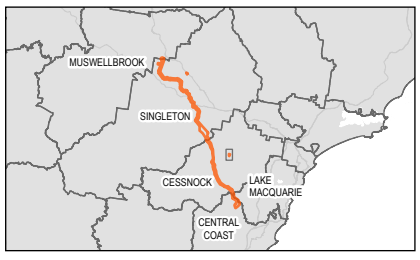
Groundwater Dependent Ecosystems Within the Project Study Area

Legend

- Project Area
- Existing transmission line
- Access roads
- Road
- NPWS Estate
- Waterbody
- High potential Terrrestrial GDE

Strahler Stream Order

- 1
- 2
- 3
- 4



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-2

Groundwater Dependent Ecosystems Within the Project Study Area

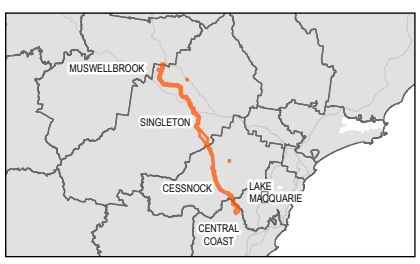
FREEMANS DRIVE
NEWSTAN-ERARING PRIVATE COAL ROAD
ERARING SUBSTATION
HAWKE MOUNT ROAD
JUNCTION ROAD
SIMPSON ROAD
GRADWELLS ROAD
ROCKY POINT ROAD
SWITCHYARD ROAD
CONSTRUCTION ROAD
ERARING SUBTRANSMISSION SUBSTATION
ERARING POWER STATION

Legend

- Project Area
- Existing transmission line
- Road
- Waterbody

Strahler Stream Order

- 1
- 2
- 3
- 4
- 5
- 6



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

3.4 Threatened Biodiversity – *Biodiversity Conservation Act 2016*

An overview of threatened biodiversity entities listed under the BC Act are presented below, including those candidate entities identified under the BC Act for Serious and Irreversible Impacts (SAII). SAII entities are threatened biodiversity considered to be most at risk of extinction and any assessment of proposed State Significant Infrastructure with SAII impacts requires specific consideration of any additional and appropriate measures that will minimise those impacts prior to approval.

3.4.1 *Threatened ecological communities*

A total of seven threatened ecological communities listed under the BC Act have been identified as potentially occurring within the project area based on their alliance to native vegetation recorded either through field verification or broad scale mapping (SVMT). These communities are considered candidate threatened ecological communities and include:

- Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions
- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Warkworth Sands Woodland in the Sydney Basin Bioregion.

An overview of each threatened ecological community, its threat status, associated PCTs and indicative project disturbance area is presented in Table 3.2. TECs as recorded during preliminary field surveys and/or predicted using broad scale mapping are shown within the project area in Figure 3.3.

An additional three threatened ecological communities that have a lower likelihood of occurring in the project area include;

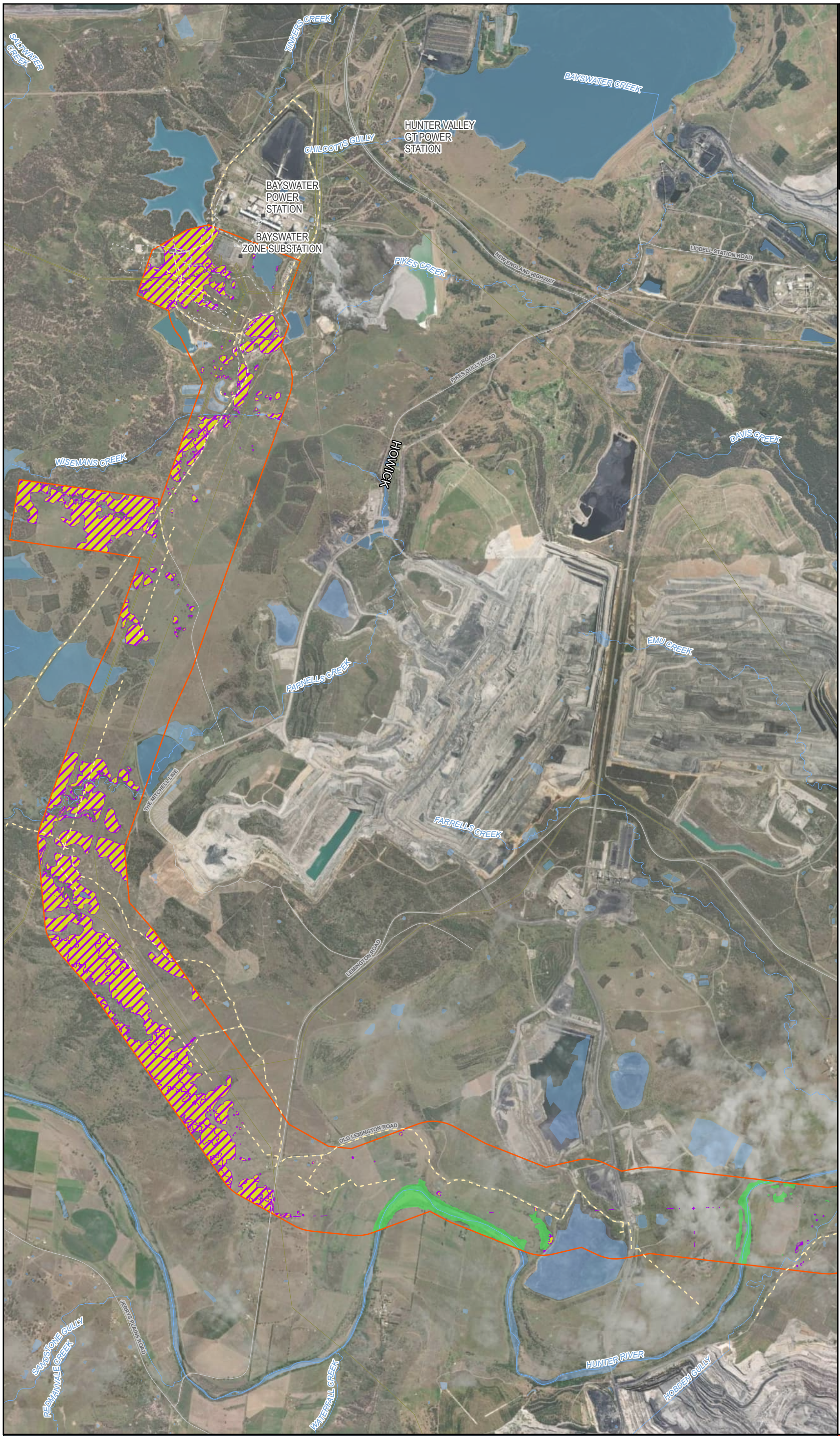
- Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions
- Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, Southeastern Highlands, NSW Southwestern Slopes, Southeast Corner and Riverina Bioregions.

Detailed field surveys are required to determine their presence/absence of these threatened ecological communities in the project area.

Table 3.2 Threatened ecological communities listed under the BC Act and associated PCTs

Threatened ecological community	SAII	BC Act[1]	Associated Plant Community Type	Estimated construction disturbance footprint (ha)
Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	No	E	3314, 3431	304.39
Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	No	E	3315	32.02
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	Yes	E	4089	1.72
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	No	E	3446	14.12
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	No	E	3634, 3444	35.00
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	No	E	4039, 4058	4.11
Warkworth Sands Woodland in the Sydney Basin Bioregion	Yes	E	3636	17.36
Total				**408.72**

(1) Critically Endangered (CE), Endangered (E), and SAII = Serious and Irreversible Impact under the *Biodiversity Conservation Act* (BC Act)



Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area

Legend

- Project area
- Bayswater Eraring - Infrastructure
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

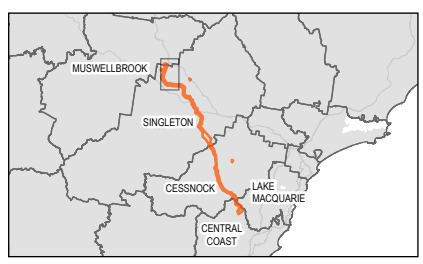
Threatened Ecological Communities (TECs)

BC Act

- Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:43,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area

HOBDEN GULLY
GLENNIES CREEK
ARCHERFIELD ROAD
HUNTER RIVER
SHEARERS LANE
MAISON DIEU ROAD
SINGLETON SUBTRANSMISSION SUBSTATION
KNODLERS LANE
COMLEROI ROAD
REDBANK CREEK
WOLLOMBI BROOK
HIGH ROAD
WATTS STREET
WALLABY SCRUB ROAD
LONGFORD CREEK
SANDY HOLLOW CREEK
JERRYS PLAINS ROAD
LONG POINT ROAD WEST
REDBANK POWER STATION
DIGHTS CROSSING ROAD
RIX'S CREEK
LONG POINT ROAD EAST
HUNTER RIVER
GOULDSTVILLE ROAD
LYDES LANE
MOUNT THORLEY ZONE SUBSTATION
MOUNT THORLEY ROAD
WOLLOMBI BROOK
DOCTORS CREEK
PUTTY ROAD

Legend

- Project area
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

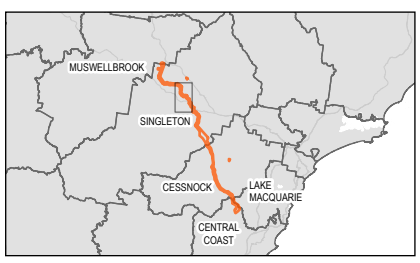
Threatened Ecological Communities (TECs)

BC Act

- Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions
- Warkworth Sands Woodland in the Sydney Basin Bioregion

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



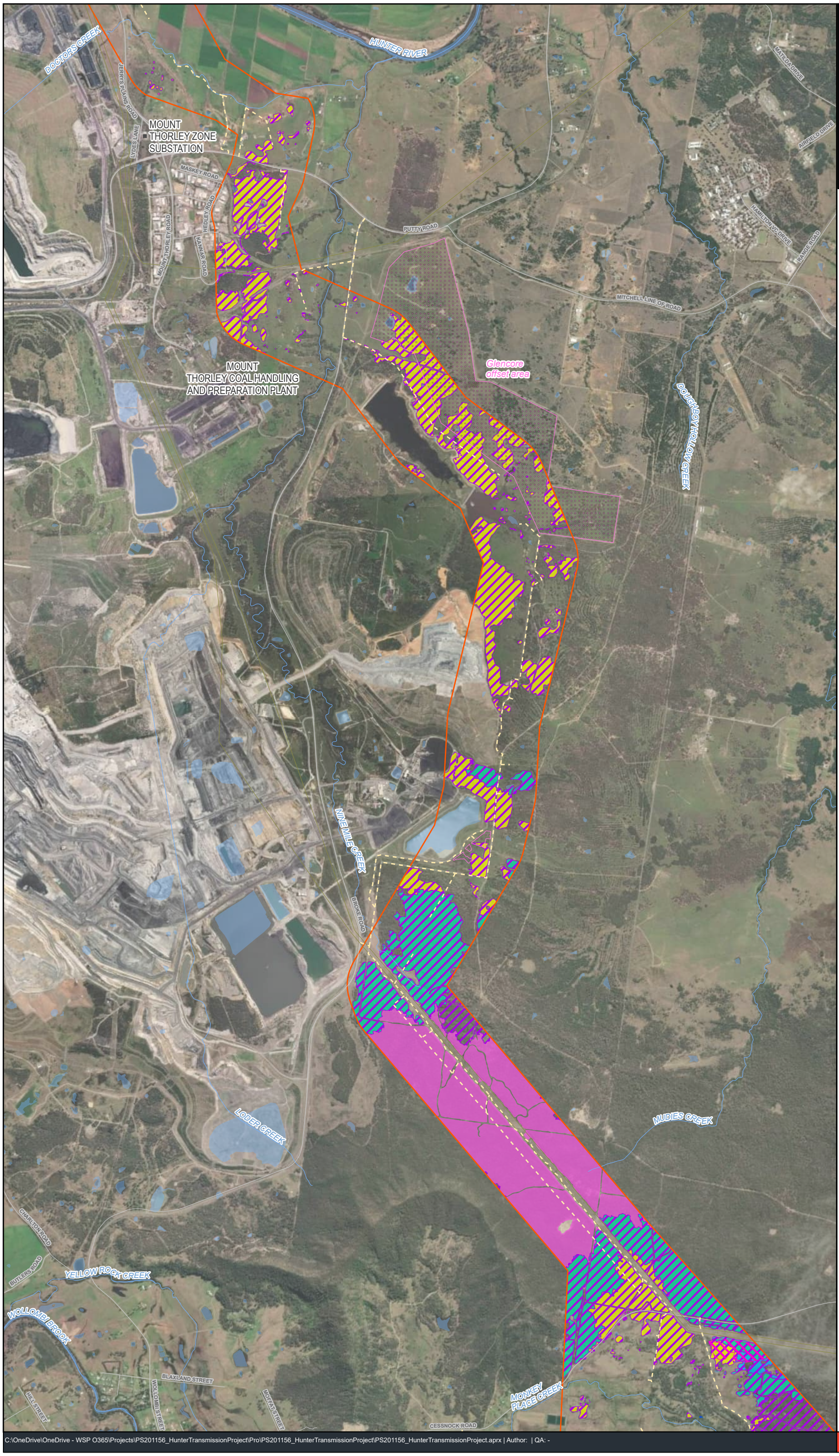
0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area

Legend

- Project area
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

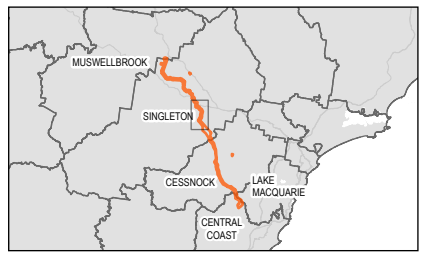
Threatened Ecological Communities (TECs)

BC Act

- Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56

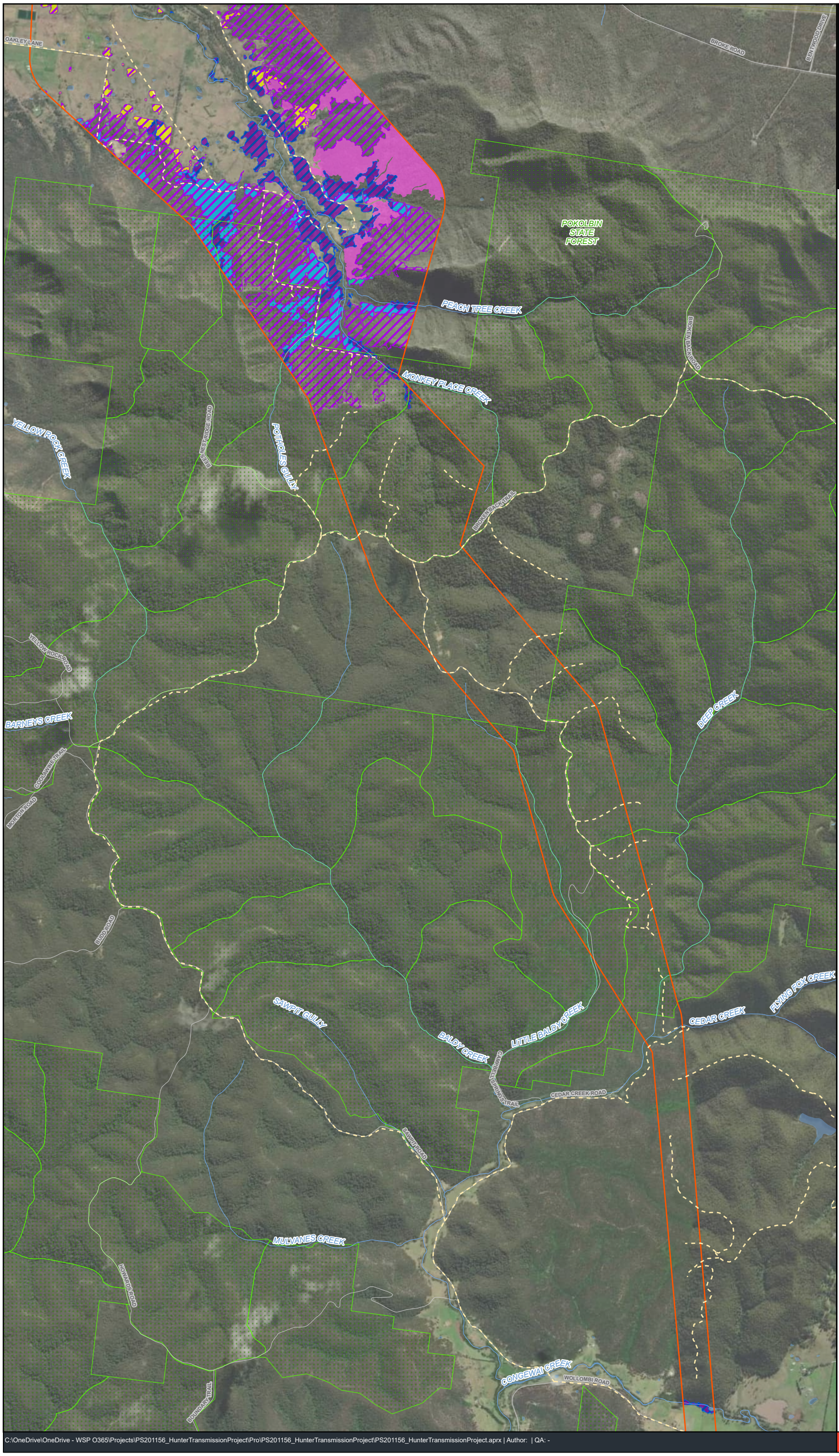
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area



Legend

- Project area
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

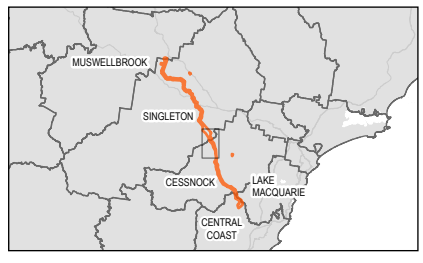
Threatened Ecological Communities (TECs)

BC Act

- Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
- Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area

Legend

- Project area
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

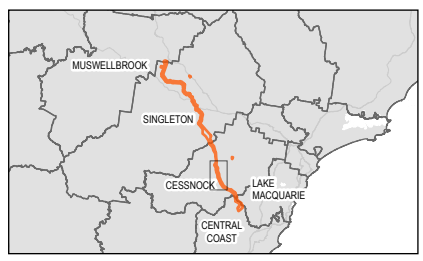
Threatened Ecological Communities (TECs)

BC Act

- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-3

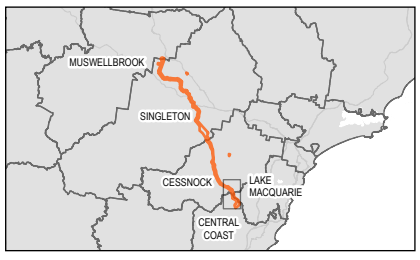
Vegetation (TECs) in the Project Area

Legend

- Project area
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 1,000 2,000
Meters

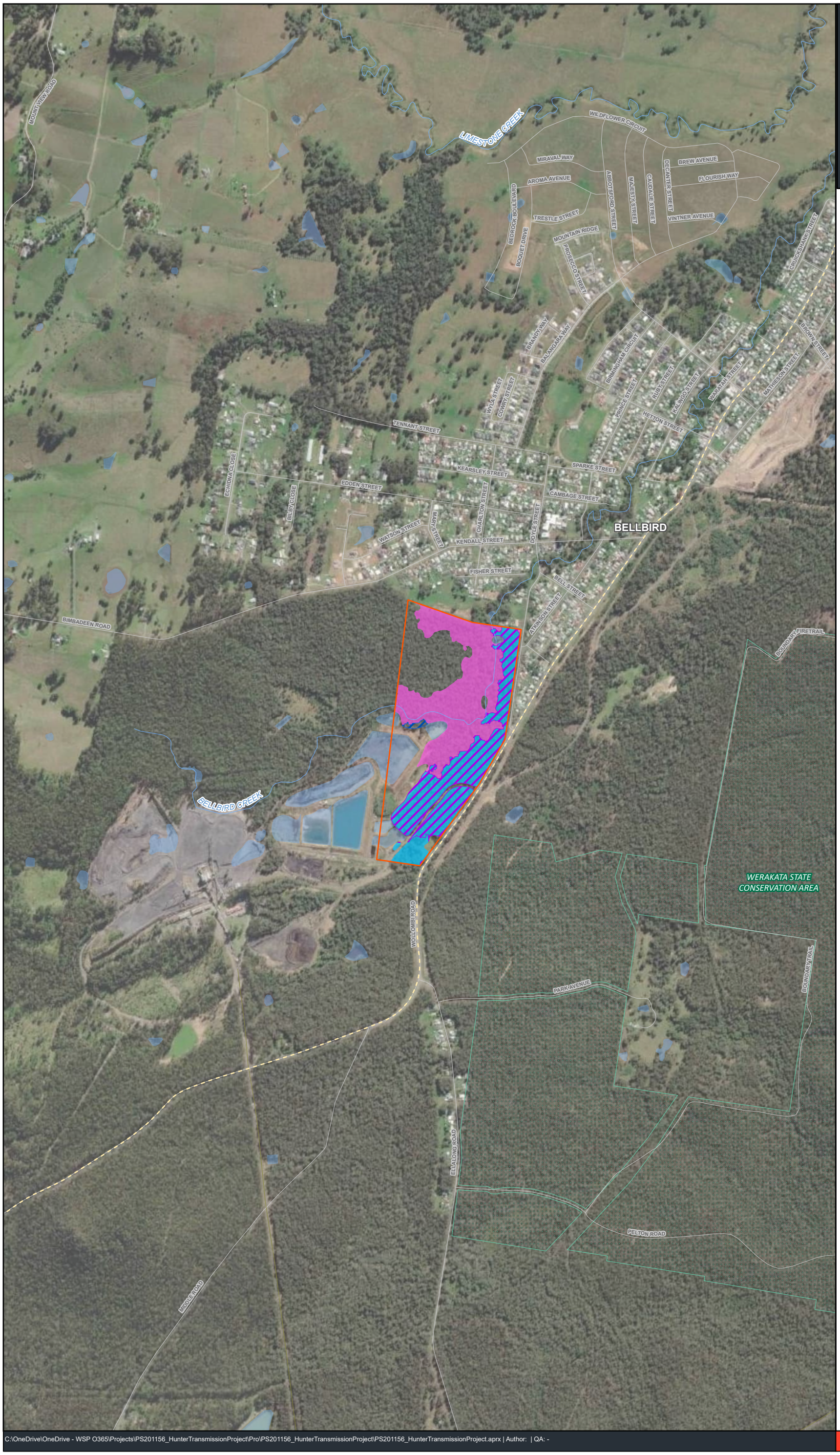
Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area



Legend

- Project area
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

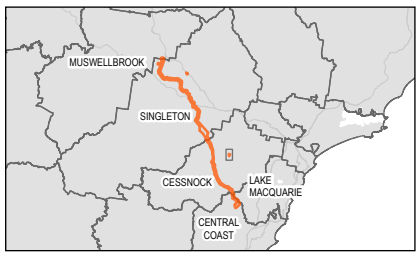
Threatened Ecological Communities (TECs)

BC Act

- Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-3

Vegetation (TECs) in the Project Area

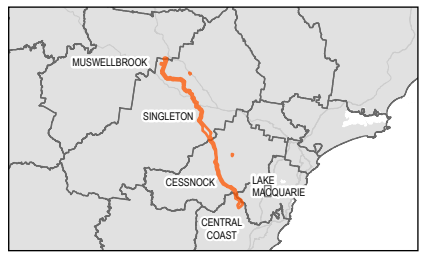
FREEMANS DRIVE
LORDS CREEK
JIGADEE CREEK
NEWSTAN-ERARING PRIVATE COAL ROAD
ERARING SUBSTATION
HAWKE MOUNT ROAD
SIMPSON ROAD
GRADWELLS ROAD
JUNCTION ROAD
ERARING SUBTRANSMISSION SUBSTATION
ERARING POWER STATION
CONSTRUCTION ROAD
SWITCHYARD ROAD
ROCKY POINT ROAD

Legend

- Project area
- Existing transmission line
- Road
- Water course
- Waterbody
- NPWS Estate
- State forest
- Glencore offset area

EPBC Act

- Central Hunter Valley eucalypt forest and woodland
- River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria
- Warkworth Sands Woodland



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

3.4.2 *Threatened species*

An overview of the likelihood of occurrence assessment for threatened flora and fauna species listed under the BC Act, that are predicted or known to occur within the project area, are presented below.

3.4.2.1 Threatened flora species

Database searches have identified a total of 81 threatened flora species that are predicted or known to occur within the locality of the project area that are listed as threatened under the BC Act. Of these, nine threatened flora species are considered present within the project area based on preliminary field surveys and are listed in Table 3.3 with their locations shown in Figure 3.4.

Table 3.3 Threatened flora species listed under the BC Act present within the project area

Species name	Common name	BC Act[1]	SAII[3]
Cymbidium canaliculatum	Tiger Orchid	EP	No
Eucalyptus camaldulensis	*Eucalyptus camaldulensis* population in the Hunter Catchment.	EP	No
Eucalyptus fracta	Broken Back Ironbark	V	Yes
Eucalyptus glaucina	Slaty Red Gum	V	No
Prostanthera cineolifera	Singleton Mint Bush	V	No
Rhodamnia rubescens	Scrub Turpentine	CE	Yes
Rhodomyrtus psidioides	Native Guava	CE	Yes
Rutidosis heterogama	Heath Wrinklewort	V	No
Tetratheca juncea	Black-eyed Susan	V	No

(1) BC Act – BC Act status: V=Vulnerable, E=Endangered EP=Endangered Population, CE=Critically Endangered, under the *Biodiversity Conservation Act* (BC Act)
(2) SAII = Serious and Irreversible Impact

The results of likelihood of occurrence assessments identified that six species are considered to have a high likelihood of occurrence. These species are outlined in Table 3.4 with further details provided in Appendix A.

Table 3.4 Threatened flora species listed under the BC Act that are considered to have a high likelihood of occurrence within the project area

Species name	Common name	BC Act[1]	SAII
Eucalyptus pumila	Pokolbin Mallee	V	Yes
Diuris tricolor	Pine Donkey Orchid population in the Hunter Catchment.	EP	No
Grevillea parviflora subsp. *Parviflora*	Small-flower Grevillea	V	No
Leionema lamprophyllum subsp. *fractum*	-	CE	No
Melaleuca groveana	Grove's Paperbark	V	No
Ozothamnus tesselatus	-	V	No

(1) BC Act – BC Act status: V=Vulnerable, E=Endangered EP=Endangered Population, CE=Critically Endangered, under the *Biodiversity Conservation Act* (BC Act)
(2) SAII = Serious and Irreversible Impact

Further, an additional 17 threatened flora species are considered to have a moderate likelihood of occurrence within the project area (refer Appendix A for further detail).

SAII entities

Of the nine threatened flora species identified to be present within the project area three are SAII entities under the BC Act. These are:

- *Eucalyptus fracta*
- *Rhodamnia rubescens*
- *Rhodomyrtus psidioides*

A further one SAII threatened flora species are considered to have a high likelihood of occurrence, being:

- *Eucalyptus pumila*.

3.4.2.2 Threatened fauna species

Database searches have identified a total of 103 threatened fauna species that are predicted or known to occur within the project area that are listed on the BC Act. Of these, 23 threatened fauna species are considered present within the project area based on preliminary field surveys and are listed in Table 3.5 with their locations shown in Figure 3.4.

Table 3.5 Threatened fauna species recorded as present within the project area

Species name	Common name	BC Act[1]	SAII[2]
Amphibians			
Litoria littlejohni	Littlejohn's Tree Frog	E	No
Mixophyes balbus	Stuttering Frog	E	Yes
Mixophyes iteratus	Giant Barred Frog	E	No
Pseudophryne australis	Red-crowned Toadlet	V	No
Birds			
Callocephalon fimbriatum	Gang-gang Cockatoo	V	No
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	No
Chthonicola sagittate	Speckled Warbler	V	No
Glossopsitta pusilla	Little Lorikeet	V	No
Ninox strenua	Powerful Owl	V	No
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern)	V	No
Tyto novaehollandiae	Masked Owl	V	No
Tyto tenebricosa	Sooty Owl	V	Yes
Mammals			
Cercartetus nanus	Eastern Pygmy Possum	V	No
Dasyurus maculatus	Spotted-tail Quoll	V	No
Notamacropus parma	Parma Wallaby	V	No
Petauroides volans	Southern Greater Glider	E	No

Species name	Common name	BC Act[1]	SAII[2]
Petaurus australis	Yellow-bellied Glider	V	No
Petaurus norfolcensis	Squirrel Glider	V	No
Petrogale penicillate	Brush-tailed Rock-wallaby	E	Yes
Phascogale tapoatafa	Brush-tailed Phascogale	V	No
Phascolarctos cinereus	Koala	E	No
Potorous tridactylus	Long-nosed Potaroo	V	No
Reptiles			
Hoplpcephalus stephensii	Stephen's Banded Snake	V	No

(1) BC Act – BC Act status: V=Vulnerable, E=Endangered, under the Biodiversity Conservation Act (BC Act)
(2) SAII = Serious and Irreversible Impact

The results of likelihood of occurrence assessments identified that 10 species are considered to have a high likelihood of occurrence. These species are outlined in Table 3.6 with further details provided in Appendix A.

Table 3.6 Threatened fauna species listed under the BC Act that are considered to have a high likelihood of occurrence within the project area

Species name	Common name	BC Act[1]	SAII[2]
Birds			
Anthochaera Phrygia	Regent Honeyeater	CE	Yes (breeding & Foraging)
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	No
Climacteris picumnus	Brown Treecreeper (eastern)	V	No
Lathamus discolor	Swift Parrot	E	Yes (breeding & Foraging)
Mammals			
Chalinolobus dwyeri	Large-eared Pied Bat	V	Yes (Breeding)
Miniopterus australis	Little Bent-winged Bat	V	Yes (Breeding)
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	Yes (Breeding)
Pteropus poliocephalus	Grey-headed Flying-fox	V	No
Vespadelus troughtoni	Eastern Cave Bat	V	Yes
Reptiles			
Delma impar	Striped Legless Lizard	V	No

(1) BC Act – BC Act status: V=Vulnerable, E=Endangered, CE=Critically Endangered under the Biodiversity Conservation Act (BC Act)
(2) SAII = Serious and Irreversible Impact

3.4.3 *FM Act listed Endangered Ecological Communities*

No Endangered Ecological Communities listed under the FM Act have potential to occur within the project area.

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area

Legend

- Project Area
- Bayswater Eraring - Infrastructure
- Existing transmission line
- Mining biodiversity offset areas (EMM)
- Road
- Watercourse
- Waterbody

Significant Flora Species - WSP

- *Cymbidium canaliculatum*
- *Eucalyptus camaldulensis*

Significant Fauna Species - WSP

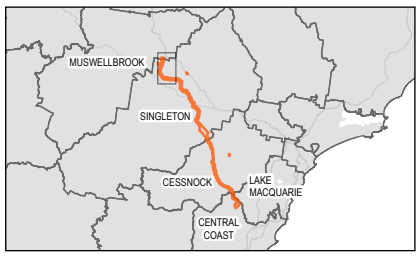
- Brush-tailed Phascogale
- Grey-crowned Babbler
- Squirrel Glider

Significant Flora Species - Bionet

- *Acacia pendula*
- *Cymbidium canaliculatum*
- *Eucalyptus camaldulensis*
- *Eucalyptus glaucina*
- *Ozothamnus tesselatus*

Significant Fauna Species - Bionet

- Black Falcon
- Blue-billed Duck
- Brown Treecreeper (eastern subspecies)
- Brush-tailed Phascogale
- Brush-tailed Rock-wallaby
- Caspian Tern
- Diamond Firetail
- Dusky Woodswallow
- Eastern Cave Bat
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Flame Robin
- Freckled Duck
- Green and Golden Bell Frog
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin (south-eastern form)
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Eagle
- Little Lorikeet
- Marsh Sandpiper
- Powerful Owl
- Red-necked Stint
- Southern Myotis
- Speckled Warbler
- Spotted Harrier
- Squirrel Glider
- Striped Legless Lizard
- Varied Sittella
- White-bellied Sea-Eagle
- Yellow-bellied Sheathtail-bat



0 1,000 2,000
Meters

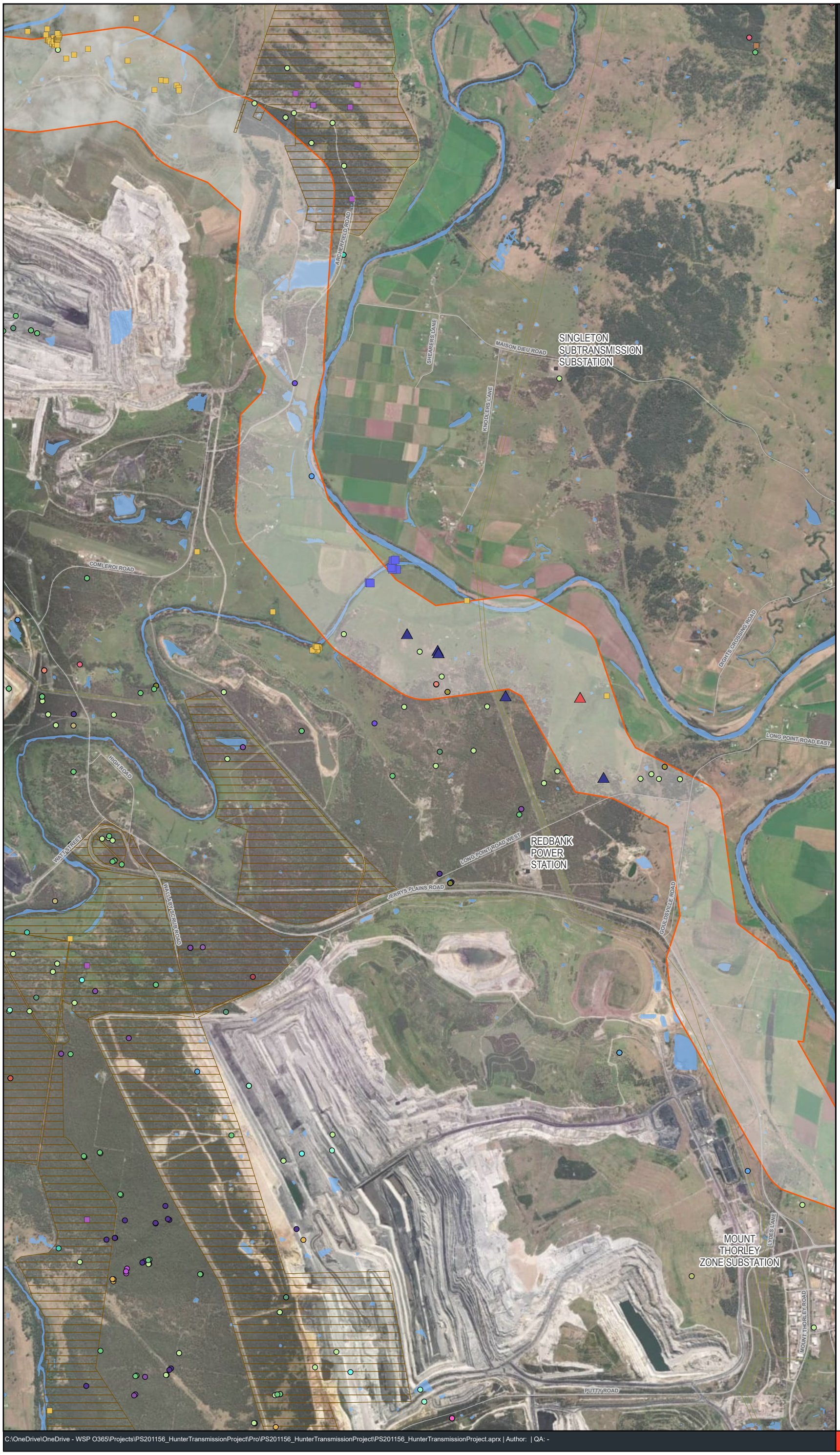
Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:43,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area



Legend

- Project Area
- Existing transmission line
- Mining biodiversity offset areas (EMM)
- Road
- Watercourse
- Waterbody

Significant Flora Species - WSP

- *Eucalyptus camaldulensis*

Significant Fauna Species - WSP

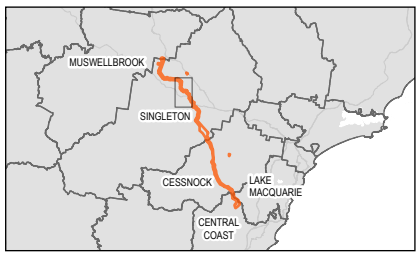
- Brown Falcon
- Grey-crowned Babbler

Significant Flora Species - Bionet

- *Cymbidium canaliculatum*
- *Eucalyptus camaldulensis*
- *Eucalyptus glaucina*

Significant Fauna Species - Bionet

- Black Falcon
- Brown Treecreeper (eastern subspecies)
- Brush-tailed Phascogale
- Dusky Woodswallow
- Eastern Cave Bat
- Eastern Coastal Free-tailed Bat
- Eastern Grass Owl
- Glossy Black-Cockatoo
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin (south-eastern form)
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Eagle
- Little Lorikeet
- Red-necked Stint
- Regent Honeyeater
- Southern Myotis
- Speckled Warbler
- Spotted Harrier
- Spotted-tailed Quoll
- Squirrel Glider
- Swift Parrot
- Turquoise Parrot
- Varied Sittella
- White-bellied Sea-Eagle
- White-throated Needletail
- Yellow-bellied Sheathtail-bat



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area

MOUNT THORLEY ZONE SUBSTATION

MOUNT THORLEY COAL HANDLING AND PREPARATION PLANT

Glencore offset area

JERRYS PLAINS ROAD
LYDES LANE
MASKEY ROAD
MOUNT THORLEY ROAD
HEDLEY ROAD
KANNAR ROAD
PUTTY ROAD
MATILDA DRIVE
AIRFIELD DRIVE
HAMILTON VC DRIVE
RANGE ROAD
MITCHELL LINE OF ROAD
BROKE ROAD
CHARLTON ROAD
BUTLERS ROAD
BLAXLAND STREET
WOLLOMBI STREET
HILL STREET
MOFFAT STREET
CESSNOCK ROAD

Legend

- Project Area
- Existing transmission line
- Glencore offset area
- Mining biodiversity offset areas (EMM)
- Road
- Watercourse
- Waterbody

Significant Fauna Species - WSP

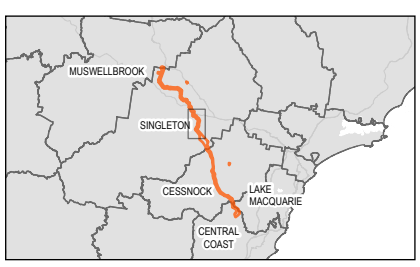
- Black-winged Stilt
- Glossy Black-cockatoo
- Grey-crowned Babbler
- Lathams Snipe
- Speckled Warbler

Significant Flora Species - Bionet

- *Cynanchum elegans*
- *Eucalyptus camaldulensis*
- *Eucalyptus glaucina*

Significant Fauna Species - Bionet

- Black Falcon
- Black-chinned Honeyeater (eastern subspecies)
- Black-necked Stork
- Brown Treecreeper (eastern subspecies)
- Crested Tern
- Diamond Firetail
- Dusky Woodswallow
- Eastern Cave Bat
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Eastern Grass Owl
- Fork-tailed Swift
- Gang-gang Cockatoo
- Glossy Black-Cockatoo
- Greater Broad-nosed Bat
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin (south-eastern form)
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Latham's Snipe
- Little Bent-winged Bat
- Little Eagle
- Little Lorikeet
- Masked Owl
- Painted Honeyeater
- Regent Honeyeater
- Scarlet Robin
- Southern Myotis
- Speckled Warbler
- Spotted Harrier
- Spotted-tailed Quoll
- Squirrel Glider
- Swift Parrot
- Varied Sittella
- White-throated Needletail
- Yellow-bellied Sheathtail-bat

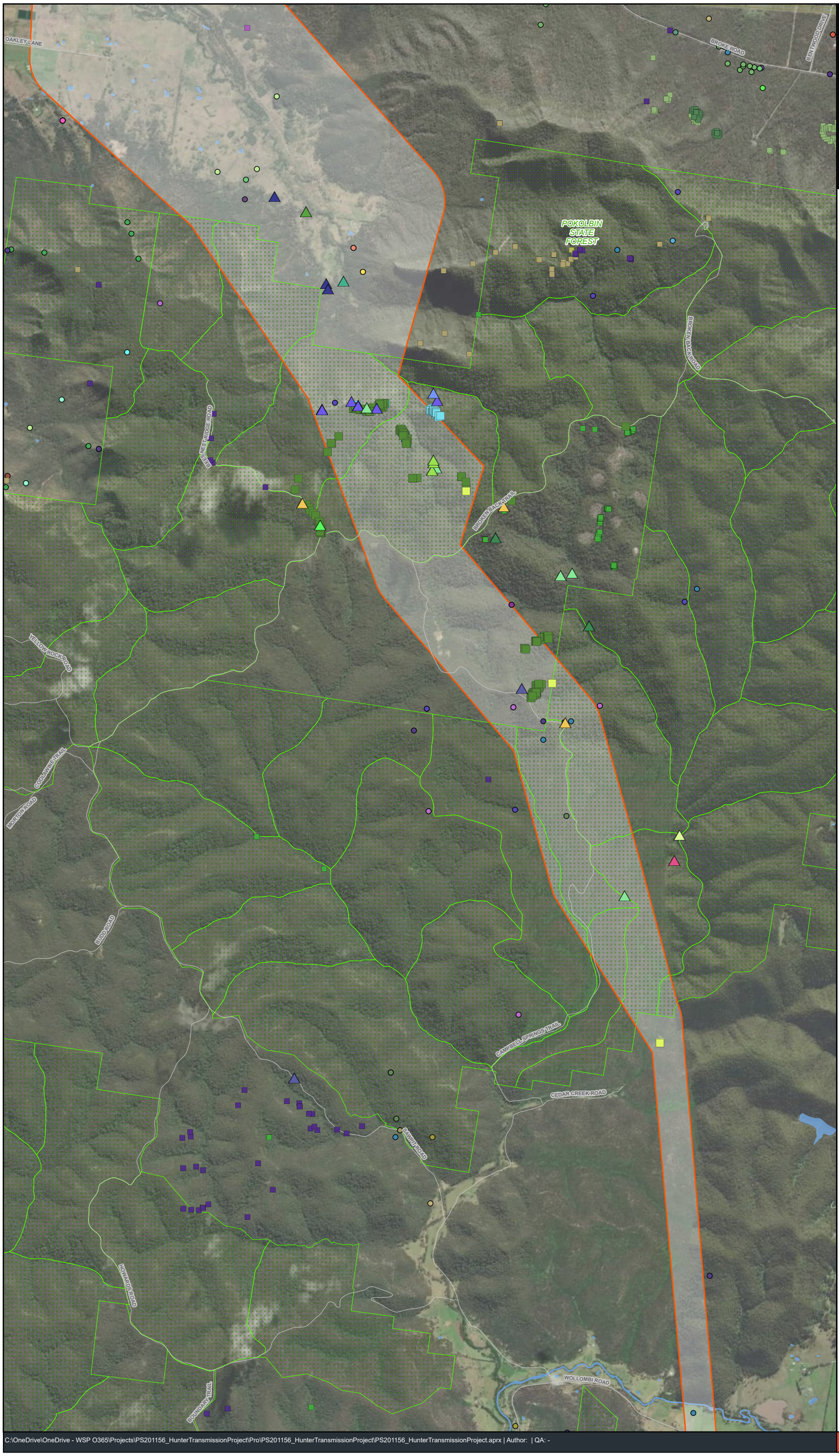


0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area

Legend

- Project Area
- Existing transmission line
- Road
- Watercourse
- Waterbody

Significant Flora Species - WSP

- *Eucalyptus fracta*
- *Eucalyptus pumila*
- *Prostanthera cineolifera*
- *Rhodamnia rubescens*

Significant Fauna Species - WSP

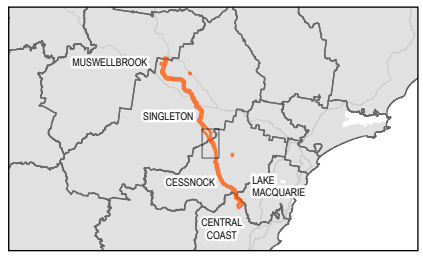
- Barn Owl
- Brush-tailed Rock Wallaby
- Gang-Gang Cockatoo
- Glossy Black-cockatoo
- Grey-crowned Babbler
- Koala
- Masked Owl
- Red-crowned Toadlet
- Rufous Fantail
- Sooty Owl
- Southern Greater Glider
- White-throated Needletail
- Yellow-bellied Glider

Significant Flora Species - Bionet

- *Eucalyptus castrensis*
- *Eucalyptus fracta*
- *Eucalyptus glaucina*
- *Eucalyptus pumila*
- *Leionema lamprophyllum subsp. fractum*
- *Prostanthera cineolifera*
- *Rhodamnia rubescens*

Significant Fauna Species - Bionet

- Brown Treecreeper (eastern subspecies)
- Brush-tailed Rock-wallaby
- Dusky Woodswallow
- Gang-gang Cockatoo
- Glossy Black-Cockatoo
- Greater Broad-nosed Bat
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin (south-eastern form)
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Lorikeet
- Masked Owl
- New Holland Mouse
- Powerful Owl
- Regent Honeyeater
- Sooty Owl
- Southern Greater Glider
- Speckled Warbler
- Spotted-tailed Quoll
- Squirrel Glider
- Swift Parrot
- Varied Sittella
- White-throated Needletail
- Yellow-bellied Glider
- Yellow-bellied Sheathtail-bat
- State forest



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area

MILLFIELD
PAXTON ZONE SUBSTATION
CORRABARE STATE FOREST
WATAGAN STATE FOREST
MOUNT VIEW ROAD
WOLLOMBI ROAD
SHINGLE GULLY ROAD
THIRD AVENUE
ELEVENTH AVENUE
DAVIS STREET
MILLFIELD ROAD
ROSEHILL ROAD
ELVIN CIRCUIT
WILLIAM STREET
JACOBS ROAD
SWEETMANS CREEK ROAD
HAWKINS ROAD
LUMBEY'S ROAD
JURDS ROAD
HATES ROAD
CRAWFORDS ROAD
HPI ROAD
NORTH ROAD
ROBERTS ROAD
BECKETTS ROAD
TROG ROAD
LISTERS LANE
THURSBYS ROAD
QUINCE TREE LANE
LOWES ROAD
GONGWA ROAD
RUCK ROAD
GRUTTS ROAD
OLYMPIC TRAIL
ROUND MOUNTAIN FIRETRAIL
WESTERN FIRETRAIL
BILLY GOURNE ROAD
GOONEES ROAD
MIDDLE RIDGE ROAD
ROCKY CREEK ROAD
EGLINFORD LANE
WATAGAN TRACK
DEANS ROAD
MAHOGANY ROAD
CEDAR RIDGE ROAD
LYNCHS FIRETRAIL
FIG ROAD
BURGESS ROAD
TURPENTINE POINT ROAD
GABANS ROAD
LANGANS ROAD
KRAFTS ROAD
MILSONS ARM ROAD
WATAGAN CREEK ROAD
DOGWOOD ROAD
HEARNS ROAD
CRUMP LANE

Legend

- Project Area
- Existing transmission line
- Road
- Watercourse
- Waterbody

Significant Flora Species - WSP

- *Rhodamnia rubescens*

Significant Fauna Species - WSP

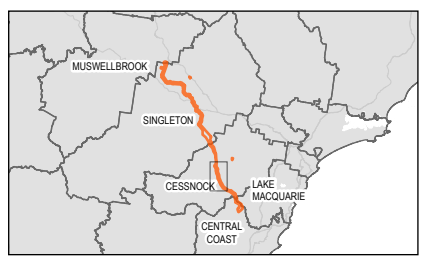
- Brush-tailed Rock Wallaby
- Gang-Gang Cockatoo
- Glossy Black-cockatoo
- Grey-crowned Babbler
- Koala
- Little Lorikeet
- Parma Wallaby
- Powerful Owl
- Red-crowned Toadlet
- Sooty Owl
- Southern Greater Glider
- Spotted-tail Quoll
- Stuttering Frog
- Yellow-bellied Glider

Significant Flora Species - Bionet

- *Melaleuca deanei*
- *Melaleuca groveana*
- *Rhodamnia rubescens*
- *Rhodomyrtus psidioides*
- *Rutidosis heterogama*
- *Senna acclinis*

Significant Fauna Species - Bionet

- Black-chinned Honeyeater (eastern subspecies)
- Brown Treecreeper (eastern subspecies)
- Brush-tailed Rock-wallaby
- Dusky Woodswallow
- Eastern Cave Bat
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Gang-gang Cockatoo
- Giant Barred Frog
- Glossy Black-Cockatoo
- Golden-tipped Bat
- Greater Broad-nosed Bat
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Lorikeet
- Long-nosed Potoroo
- Olive Whistler
- Parma Wallaby
- Powerful Owl
- Regent Honeyeater
- Rose-crowned Fruit-Dove
- Sooty Owl
- Southern Greater Glider
- Southern Myotis
- Spotted-tailed Quoll
- Squirrel Glider
- Swift Parrot
- Varied Sittella
- White-bellied Sea-Eagle
- White-throated Needletail
- Yellow-bellied Glider
- Sooty Owl Breeding Site
- State forest



0 1,000 2,000
Meters

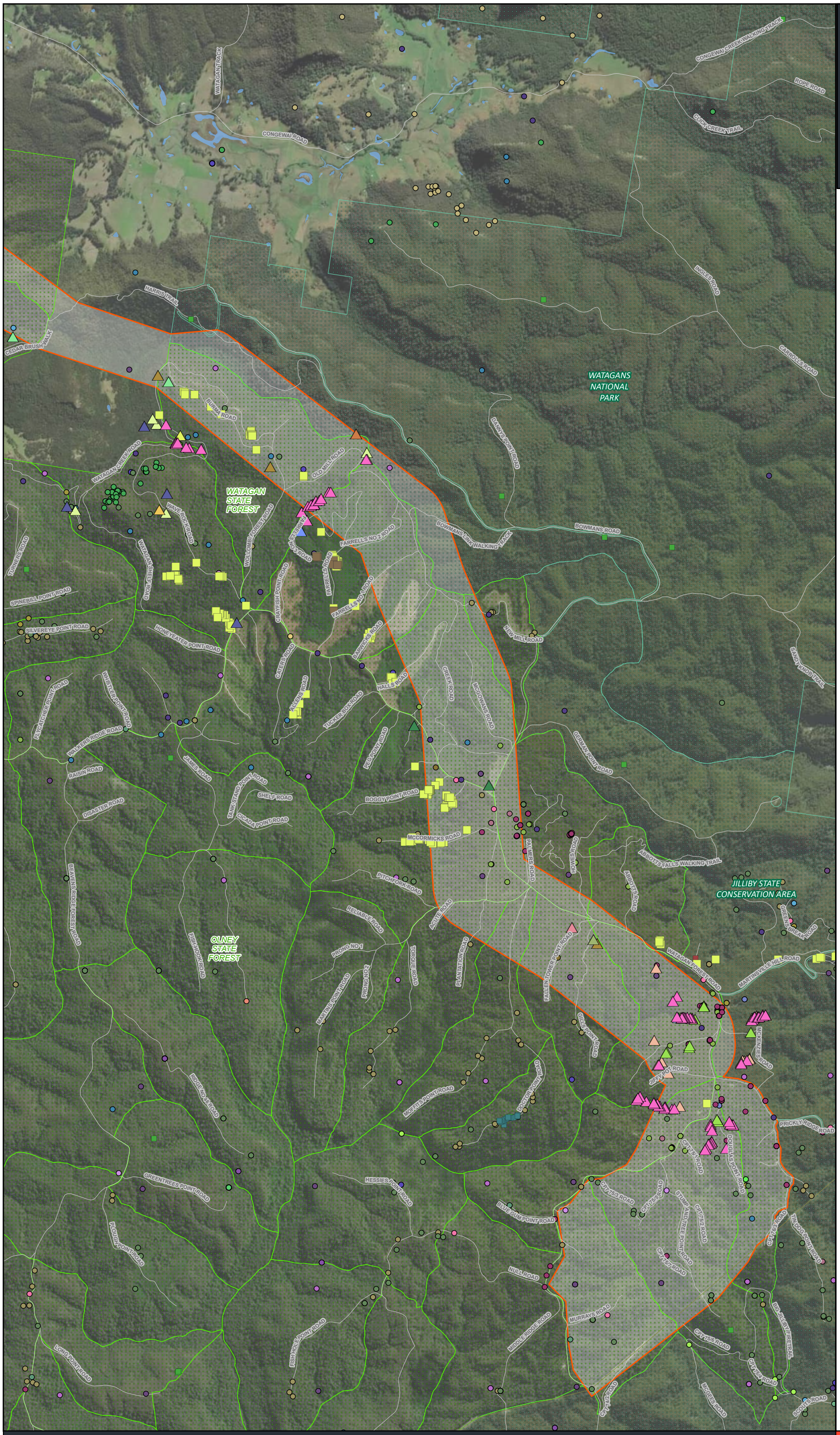
Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area



Legend

- Project Area
- Existing transmission line
- Road
- Watercourse
- Waterbody

Significant Flora Species - WSP

- *Rhodamnia rubescens*
- *Rhodomyrtus psidioides*

Significant Fauna Species - WSP

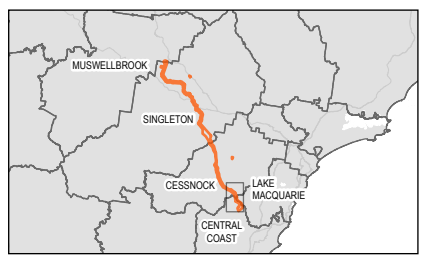
- Black faced monarch
- Gang-Gang Cockatoo
- Giant Barred Frog
- Glossy Black-cockatoo
- Heleioporus australiacus
- Little John's Tree Frog
- Long-nose Potoroo
- Masked Owl
- Pygmy Possum
- Red-crowned Toadlet
- Sooty Owl
- Southern Greater Glider
- Spotted-tail Quoll
- Stephen's Banded Snake
- Stuttering Frog
- Yellow-bellied Glider

Significant Flora Species - Bionet

- *Rhodamnia rubescens*
- *Senna acclinis*
- *Tetratheca juncea*

Significant Fauna Species - Bionet

- Brush-tailed Rock-wallaby
- Dusky Woodswallow
- Eastern False Pipistrelle
- Eastern Pygmy-possum
- Gang-gang Cockatoo
- Giant Barred Frog
- Giant Burrowing Frog
- Glossy Black-Cockatoo
- Golden-tipped Bat
- Greater Broad-nosed Bat
- Green-thighed Frog
- Grey-headed Flying-fox
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Lorikeet
- Littlejohn's Tree Frog
- Long-nosed Potoroo
- Masked Owl
- Parma Wallaby
- Powerful Owl
- Red-crowned Toadlet
- Red-legged Pademelon
- Regent Honeyeater
- Scarlet Robin
- Sooty Owl
- Southern Greater Glider
- Spotted-tailed Quoll
- Squirrel Glider
- Stephens' Banded Snake
- Stuttering Frog
- Varied Sittella
- Yellow-bellied Glider
- State forest
- NPWS Estate



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area

Legend

- Project Area
- Existing transmission line
- Road
- Watercourse
- Waterbody

Significant Flora Species - WSP

- *Rutidosis heterogama*

Significant Fauna Species - WSP

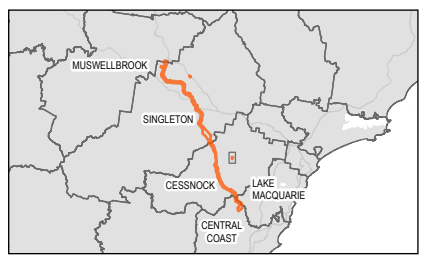
- Glossy Black-cockatoo
- Red tailed black cockatoos

Significant Flora Species - Bionet

- *Grevillea parviflora subsp. parviflora*
- *Prostanthera cineolifera*
- *Rutidosis heterogama*

Significant Fauna Species - Bionet

- Barking Owl
- Black-chinned Honeyeater (eastern subspecies)
- Dusky Woodswallow
- Eastern Coastal Free-tailed Bat
- Gang-gang Cockatoo
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Eagle
- Little Lorikeet
- Powerful Owl
- Regent Honeyeater
- Speckled Warbler
- Spotted-tailed Quoll
- Squirrel Glider
- Swift Parrot
- Varied Sittella
- White-throated Needletail
- NPWS Estate



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-4

Threatened Species Mapped in the Project Area

Legend

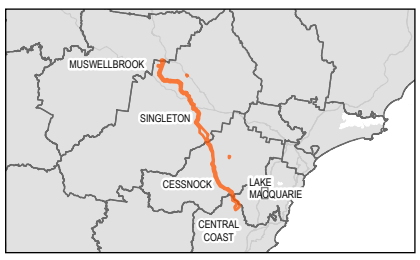
- Project Area
- Existing transmission line
- Mining constraints
- Road
- Watercourse
- Waterbody

Significant Flora Species - Bionet

- *Acacia bynoeana*
- *Angophora inopina*
- *Callistemon linearifolius*
- *Grevillea parviflora subsp. parviflora*
- *Rhodomyrtus psidioides*
- *Tetratheca juncea*

Significant Fauna Species - Bionet

- Eastern Coastal Free-tailed Bat
- Gang-gang Cockatoo
- Green and Golden Bell Frog
- Grey-headed Flying-fox
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Lorikeet
- Masked Owl
- Powerful Owl
- Sooty Owl
- Southern Myotis
- Spotted-tailed Quoll
- Squirrel Glider
- Stephens' Banded Snake
- Swift Parrot
- Varied Sittella
- White-bellied Sea-Eagle
- White-throated Needletail



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

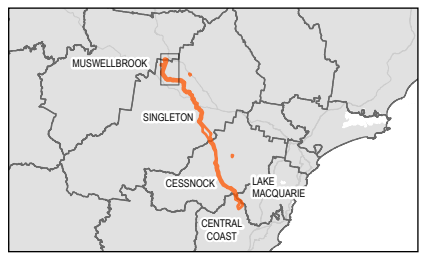
1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-5
Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- Mining biodiversity offset areas (EMM)



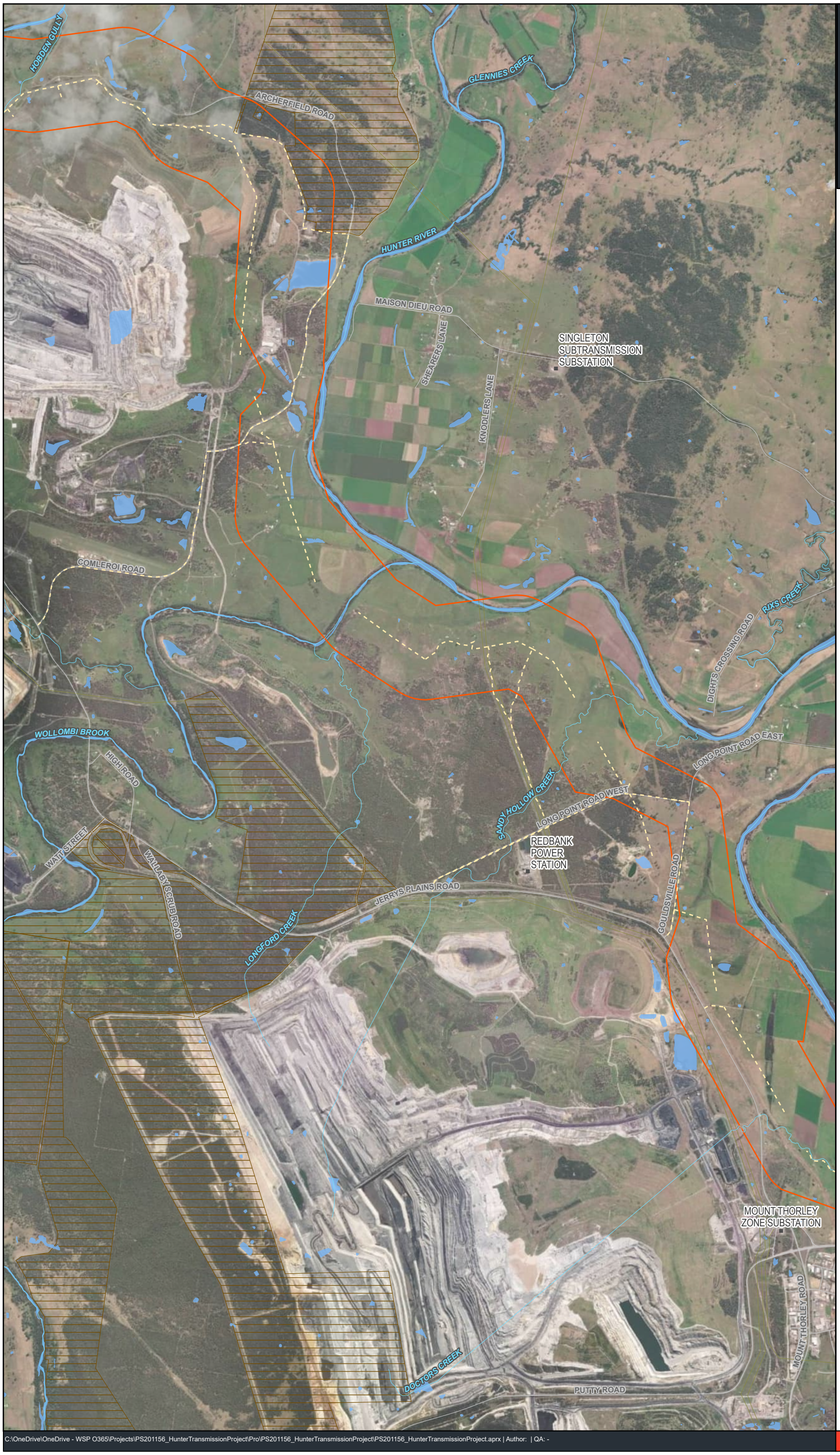
0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:43,000 Date: 27/03/2024

GDA 2020

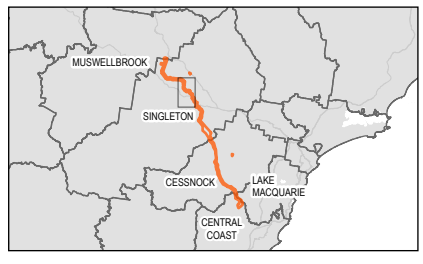
Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



Hunter Transmission Project
Figure 3-5
Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- Mining biodiversity offset areas (EMM)



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56

Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

GDA 2020

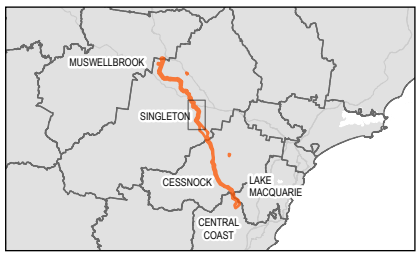
Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-5

Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody
- Mining biodiversity offset areas (EMM)



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

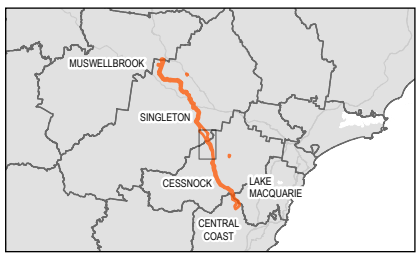
Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-5
Regent Honey Eater & Swift Parrot Important Habitat Map

OAKLEY LANE
BROKE ROAD
POKOLBIN STATE FOREST
PEACH TREE CREEK
BROKEN BACK ROAD
MONKEY PLACE CREEK
POTHOLES GULLY
YELLOW ROCK CREEK
BEES NEST RIDGE ROAD
YELLOW ROCK ROAD
BROKEN BACK TRAIL
DEEP CREEK
COOLAWINE TRAIL
BUDD ROAD
CAMPBELLS SPRINGS TRAIL
FLYING FOX CREEK
SAWPIT GULLY
BALDY CREEK
LITTLE BALDY CREEK
CEDAR CREEK
SAWPIT ROAD
CEDAR CREEK ROAD
MULVANES CREEK
HOWARDS ROAD
CONGEWAI CREEK
WOLLOMBI ROAD

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- State forest
- NPWS Estate
- Waterbody



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

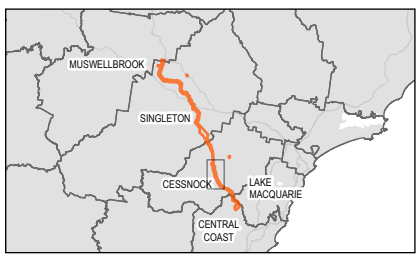
Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-5

Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- State forest
- NPWS Estate
- Waterbody



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

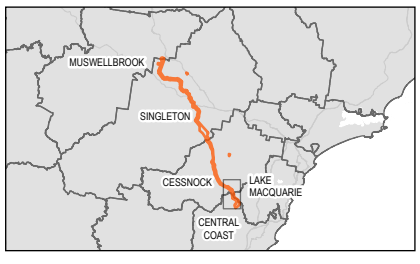
1:40,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-5
Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- State forest
- NPWS Estate
- Waterbody



0 1,000 2,000
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:40,000 Date: 27/03/2024

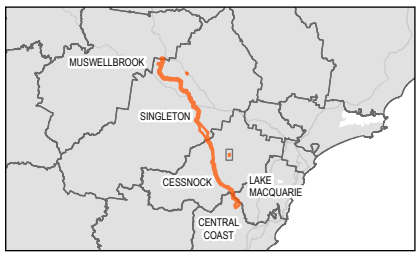
Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

Hunter Transmission Project
Figure 3-5

Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Access roads
- Road
- Water course
- Waterbody

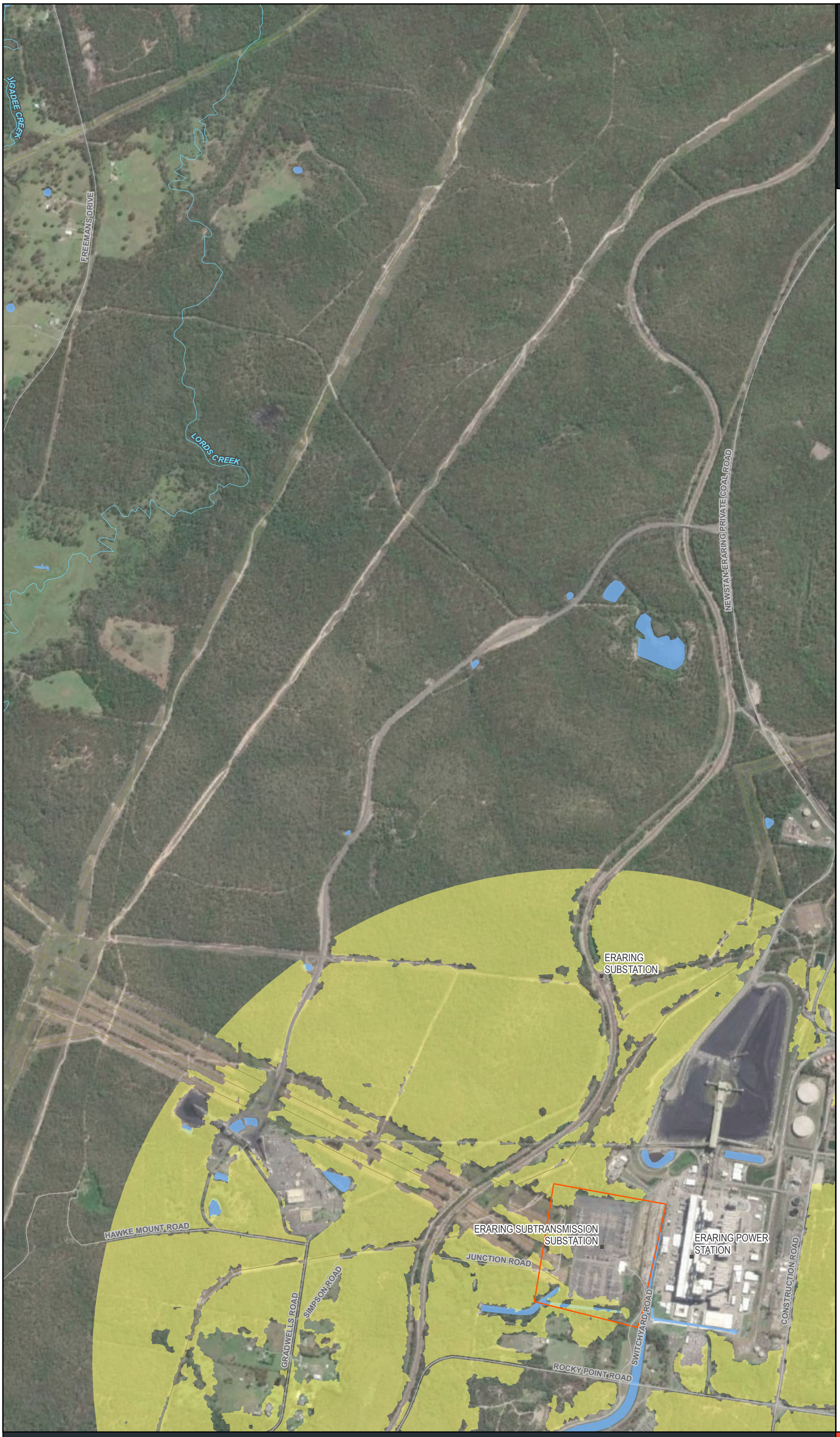


0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar



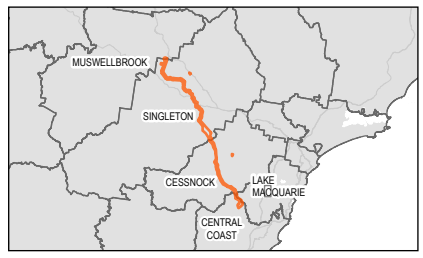
wsp

Hunter Transmission Project
Figure 3-5

Regent Honey Eater & Swift Parrot Important Habitat Map

Legend

- Project Area
- Regent Honey Eater Important Areas
- Swift Parrot Important Areas
- Existing transmission line
- Road
- Water course
- Waterbody



0 380 760
Meters

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:15,000 Date: 27/03/2024

GDA 2020

Data sources: EMM, Geoscience Australia, NSW State Government, WSP, Yancoal
World Imagery: Maxar

4 Consideration of avoidance in the project area

Biodiversity values identified as known, predicted or likely to occur within the project area have been assigned to a three-tier biodiversity constraint hierarchy. This hierarchy has been developed to assist with addressing the principle of avoid and minimise as required under section 8 of the BAM and inform project development and alignment options during EIS preparation. Biodiversity constraints ranking have been based on the following criteria:

4.1 Tier 1 biodiversity constraint – Areas to avoid

Tier 1 biodiversity constraints are areas of very high environmental sensitivity, with environmental approvals considered unlikely or unachievable. Tier 1 constraints are:

- Ramsar Wetlands
- World Heritage Areas
- National Parks, ecological conservation areas (including flora reserves, state conservation areas, Biobanks; wilderness protection areas).

4.2 Tier 2 biodiversity constraint – Areas to be avoided if reasonable, or minimise impact

Tier 2 biodiversity constraints are areas of high environmental sensitivity with environmental approvals considered complex and uncertain. This will require additional triggers for biodiversity offsets and further demonstration of avoiding and minimising impacts on such biodiversity values. If unavoidable, these may require significant, expensive, and perhaps unattainable offsets obligations. Tier 2 biodiversity constraints are:

- threatened ecological communities listed under the EPBC Act
- threatened ecological communities listed under the BC Act as SAII entities
- other important wetlands and water sources for migratory birds protected by international agreements.

4.3 Tier 3 biodiversity constraint – Areas to minimise impact

Tier 3 biodiversity constraints are areas of high environmental sensitivity, with environmental approvals considered complex and uncertain. Avoiding and minimising impact recommended as biodiversity offsets will apply to unavoidable impacts that in some cases would require significant, expensive, and perhaps unattainable offsets obligations. Tier 3 biodiversity constraints are:

- threatened species (flora/fauna) listed under the BC Act and EPBC Act
- large, contiguous/intact areas of moderate or better-quality woodland vegetation (only patch sizes of > 5 hectares) (only within 3 km of existing corridor)
- threatened ecological communities listed under the BC Act (non-SAII)
- key fish habitat which includes most permanent and semi-permanent freshwater habitats including Strahler 4/5 order streams
- GDEs and riparian corridors (Strahler 4/6 order streams) that require a 40m riparian buffer on these features as outlined under Table 14 of the BAM.

4.4 Preliminary outcomes of avoidance

Based on preliminary field surveys and desktop assessment the project has demonstrated the following preliminary avoidance considerations:

- avoiding Watagans National Park, Werakata National Park, Warrawolong Flora Reserve and Jilliby State Conservation Area
- avoiding and minimising impacts to threatened ecological communities, in particular minimising clearing of woodland remnants and scarce valley floor vegetation such as the critically endangered, Warkworth Sands Woodland
- avoiding and minimising the removal of critical habitat for key threatened species, such as the critically endangered Regent Honeyeater and Swift Parrot
- avoiding and minimising impacts to SAII threatened species such as the Sooty Owl and threatened microbats breeding habitat, Brush-tailed Rock Wallaby and Scrub Turpentine
- reducing the extent of vegetation clearing as far as possible in the State forests, noting partial clearance is proposed in some locations between towers sited on ridgelines in Pokolbin, Corrabare, and Watagan State forests in HTP Central and Olney State Forest in HTP South, similar to the clearing for the existing 500kV Eraring-Kemps Creek transmission line in Olney State Forest

5 Further assessment recommendations

5.1 Application of BAM

Detailed further assessment of the terrestrial biodiversity impacts of the project will be undertaken in accordance with the BC Act and BAM and documented in a BDAR. The BDAR will document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.

The key further assessment requirements for the project in the development of the BDAR include the following sections;

5.1.1 *Vegetation mapping*

Mapping of native vegetation extent within the project area is required under section 4.1 of the BAM with detailed requirements outlined in section 3.2 of the BAM 2020 Operational Manual.

Existing desktop information will be supplemented by detailed further field surveys incorporating vegetation integrity plots in accordance with section 4.3.3 of the BAM to identify PCTs and TECs, map vegetation boundaries, regional vegetation mapping resources, aerial photograph interpretation and knowledge of the project area.

Native vegetation within the project area was aligned to the most likely PCT as outlined in the BioNet Vegetation Classification database (Department of Planning and Environment 2023b).

Field verification will be completed to confirm the vegetation structure, dominant and characteristic species of each stratum, landscape position, native diversity, condition, presence of threatened ecological communities and other diagnostic features. These studies will compare and analyse key diagnostic species to confirm each vegetation type. Where a vegetation type does not strictly meet all characteristics of a single PCT the PCT which best fit the vegetation on site will be allocated.

5.1.2 *Consideration of prescribed and indirect impacts*

Indirect and prescribed impacts, as defined in the BAM, are impacts that occur when the project affects native vegetation and threatened species habitat beyond the development footprint or within retained areas. This includes impacts from activities related to the construction or operational phase of the project. The key prescribed and indirect impacts associated with transmission lines, include;

- connectivity
- line strike and
- impacts to caves

5.1.3 *Partial impacts*

Further assessment of the project's operational maintenance areas, hazard trees, spanned valley floors will require consideration of evidence based outcomes from existing transmission lines, interpretation of impacts to species key habitat components and construction methodologies.

5.1.4 *Consideration of serious and irreversible impacts (SAII)*

The identification of potential serious and irreversible impact (SAII) entities will be required to assist decision-makers to determine a serious and irreversible impact. Impact assessment of potential SAII impacts will be required in accordance with Chapter 9 of the BAM.

.

5.1.5 *Threatened species surveys*

Targeted threatened flora and fauna surveys will be required for species credit species listed under the BAM within seasonal requirements in the project area. Targeted surveys will also be undertaken with due consideration of Commonwealth survey requirements. These surveys will address section 6 of the BAM and Commonwealth survey requirements and will consider each species individual seasonality requirements, including through the BAM Credit Calculator or directly from the Threatened Biodiversity Data Collection.

The targeted flora surveys will continue to be undertaken in accordance with the NSW Guide to Surveying Threatened Plants (EES 2020b) and any Commonwealth requirements, incorporating random meander searches and/or parallel traverses undertaken for candidate species within their known or potential habitat.

Targeted fauna surveys will continue to be undertaken in accordance with the State and Commonwealth fauna survey guidelines for candidate species within their known or potential habitat.

5.1.6 *Detailed Biodiversity Management plans for biosecurity*

The BDAR will present detailed biodiversity management plans for the relevant species. This will include managing biosecurity risk through the following two plans:

5.1.6.1 Phytophthora management plan

'Dieback caused by the root-rot fungus *Phytophthora cinnamomi'* is listed as a key threatening processes under the BC Act. Since its listing, further research has determined that *Phytophthora cinnamomi* is a water mould and not a fungus. *Phytophthora cinnamomi* has been identified as a threat to a number of threatened species and ecological communities within the project area. Preliminary surveys have identified *Phytophthora* as being present throughout the project area, with a majority of recorded *Rhodamnia rubescens* being affected by *Phytophthora*.

5.1.6.2 Chytrid management plan

'Infection of frogs by amphibian chytrid causing the disease chytridiomycosis' is listed as a key threatening processes under the BC Act. Chytridiomycosis is potentially fatal to all native species of amphibian. Preliminary surveys have identified four threatened species of amphibians that could be at risk within the project area.

5.1.7 *Application for native vegetation regulatory Category 1 mapped land exemption*

In accordance with section 6.8 (3) of the BC Act, the BAM excludes the assessment of impacts on Category 1-exempt land (within the meaning of Part 5A of the NSW *Local Land Services Act 2013*), other than any impacts prescribed by the regulations under section 6.3.

Assessment of the potential Category 1 land within the project area will be undertaken using native vegetation regulatory mapping and analysis of available datasets such as:

- Historical and current land use component – NSW Landuse 2013 (https://data.nsw.gov.au/data/dataset/nsw-landuse-2013).
- Detectable woody vegetation clearing component – NSW Woody Vegetation Extent 2011 (https://datasets.seed.nsw.gov.au/dataset/nsw-woody-vegetation-extent-2011c0569).

Results of this assessment will be further refined using high resolution aerial photographic interpretation, latest satellite imagery and/or field verification. Following this refinement, the proposed Category 1-exempt land will be submitted to DPE for confirmation.

References

Atlas of Living Australia (2023) accessed in August 2023 from Atlas of Living Australia – Open access to Australia's biodiversity data (ala.org.au)

Australian Bureau of Meteorology (2023). Atlas of Groundwater Dependent Ecosystems (GDE) accessed August 2023.

Cropper, S.C. (1993) Management of Endangered Plants. CSIRO Australia, Melbourne.

DAWE – see Department of the Agriculture, Water and the Environment , as of July 1st 2023 changed to Department of Climate Change, Energy, the Environment and Water (DCCEEW)

Department of Agriculture Water and the Energy. (2023a). Australian Faunal Directory. Retrieved from Australian Faunal Directory (biodiversity.org.au)

Department of Agriculture Water and the Environment. (2023a). *Anthochaera phrygia* — Regent Honeyeater in Species Profile and Threats Database. Retrieved from https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82338

Department of agriculture Water and the Environment. (2023b). Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia in Species Profile and Threats Database. Retrieved from http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=86

Department of Climate Change, Energy, the Environment and Water (2023) Protected Matters Search Tool. Accessed August 2023 at Protected Matters Search Tool - DCCEEW

Department of Environment Climate Change and Water NSW. (2010). *National Recovery Plan, White Box Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, a critically endangered ecological community* Retrieved from http://www.environment.gov.au/system/files/resources/386f395f-b2c6-4e10-8fc3-e937ad277bfe/files/white-and-yellow-box.pdf

Department of Planning and Environment (2023a) Bionet Vegetation Classification. Accessed in August 2023 at BioNet Vegetation Classification (nsw.gov.au)

Department of Planning and Environment (2023b) NSW Bionet Atlas. Accessed in August 2022 at BioNet Atlas (nsw.gov.au)

Department of Planning and Environment (2022c). NSW BioNet Threatened Biodiversity Data Collection. Retrieved from http://www.bionet.nsw.gov.au/

Department of Planning and Environment (2022)

Department of Planning Industry and Environment. (2021). Serious and irreversible impacts of development on biodiversity. Retrieved from https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development

Department of Primary Industries (2013) Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update). Fisheries NSW, Wollongbar.

Department of Primary Industries (2022a) Fisheries Spatial Data Portal accessed August 2022 at Fisheries Spatial Data Portal (nsw.gov.au)

Department of Primary Industries (2022a) Threatened species lists. Retrieved from Threatened species lists (nsw.gov.au)

Department of Primary Industries (2022b) Register of critical habitat. Accessed August 2022 at Register of critical habitat (nsw.gov.au)

Department of the Environment and Energy (2016). An Interim Biogeographic Regionalisation of Australia (IBRA) – Version 7. Canberra, Department of the Environment and Energy

Department of the Environment Water Heritage and the Arts. (2010a). *Approved Conservation Advice for the Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-east Australia.* . Retrieved from Canberra, ACT: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/86-conservation-advice.pdf

Department of the Environment, Water, Heritage and the Arts (2010) Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the Environmental Protection and Biodiversity Conservation Act 1999. Retrieved from Survey guidelines for Australia's threatened birds (dcceew.gov.au)

Department of the Environment. (2013). *Matters of National Environmental Significance – Significant impact guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*. Retrieved from http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf

Department of the Environment. (2016). *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia)*. Retrieved from Canberra ACT: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-regent-honeyeater-anthochaera-phrygia-2016

DEWHA – see Department of the Environment, Water, Heritage and the Arts

DoE – see Department of the Environment

DPE – see Department of Planning and Environment

DPIE (2019a) Biodiversity Assessment Method (BAM) Operational Manual Stage 2. State of NSW and Department of Planning, Industry and Environment. Dated September 2019.

DPIE (2019a). State Vegetation Type Map: Upper Hunter v1.0. VIS_ID 4894. Retrieved from State Vegetation Type Map: Upper Hunter v1.0. VIS_ID 4894 | Anzlic_Dataset | SEED (nsw.gov.au)

DPIE (2019b). State Vegetation Type Map: Central West/Lachlan Region v1.4 VIS_ID 4468. Retrieved State Vegetation Type Map: Central West / Lachlan Region Version 1.4. VIS_ID 4468 | Anzlic_Dataset | SEED (nsw.gov.au)

DPIE (2022) Biodiversity Values Map: Biodiversity offset scheme threshold

DPIE (2022) NSW Sharing and Enabling Environmental Data (SEED) portal https://www.seed.nsw.gov.au

Eamus, D., Froend, R., (2006). Groundwater-dependent ecosystems: the where, what and why of GDEs. Aust. J. Bot. 54, 91–96.

EES – see Environment Energy and Science

Environment Energy and Science (2020a). Biodiversity Assessment Method 2020 Operational Manual – Stage 1. Published by Department of Planning, Industry and Environment.

Environment Energy and Science (2020b). Surveying threatened plants and their habitats. NSW survey guide for the Biodiversity Assessment Methodology. April 2020, Paramatta.

Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries, Cronulla, 16 pp

Hatton, T., Evans, R., (1998). Dependence of ecosystems on groundwater and its significance to Australia. Land and Water Resources Research and Development Council (LWRRDC) Occasional Paper No 12/98. Canberra.

Niche (2021) Preliminary Ecological Assessment Central-West Orana REZ. Report prepared for AECOM, 9 June 2021.

NSW TSSC – see NSW Threatened Species Scientific Committee

Pennay, M, Law, B, Reinhold, L. (2004) Bat calls of New South Wales: region-based guide to the echolocation of microchiropteran bats. Hurstville NSW: Depart. Of Environment and Conservation.

Pennay, M., Law, B., & Reinhold, L. (2004). *Bat calls of NSW. Region based guide to the echolocation calls of microchiropteran bats*. Retrieved from Sydney:

Royal Botanic Gardens. (2022). Plantnet – The Plant Information Network System of Botanic Gardens Trust Version 2.0. Retrieved from https://plantnet.rbgsyd.nsw.gov.au/

Smith, M, L. (2003) Aquatic Ecology in Environmental Impact Assessment – EIA Guideline Series. Prepared on behalf of Department of Planning.

Threatened Species Scientific Committee. (2006). *Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* Retrieved from http://www.environment.gov.au/biodiversity/threatened/communities/box-gum.html

Threatened Species Scientific Committee. (2010). *Commonwealth Listing Advice on Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. Department of the Environment, Water, Heritage and the Arts.* Retrieved from Canberra, ACT: DPI – see Department of Primary Industries

TSSC – see Threatened Species Scientific Committee

Appendix A

Threatened flora in the locality of the project, likelihood of occurrence

Table A.1 Threatened flora in the locality of the project, likelihood of occurrence

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Acacia bynoeana	Bynoe's Wattle	E	No	Occurs in heath or dry sclerophyll forest on sandy soils with a preference for open, sometimes slightly disturbed sites e.g., trail margins, edges of roadside spoil mounds and in recently burnt patches. This species is associated with Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	BioNet, PMST, ALA	All year	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3315, 3433, 3443, 3593, 3595, 3610, 3617, 3622, 3631, 3634, 4039
Acacia pendula	Acacia pendula population in the Hunter catchment	EP	Yes	Within the Hunter catchment the species typically occurs on heavy soils, sometimes on the margins of small floodplains, but also in more undulating locations.	Bionet	All year	Moderate. There are a number of records of this species occurring between Muswellbrook and Singleton.
Allocasuarina glareicola	-	E	Yes	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla* and *Melaleuca decora.*	PMST	All year	None. *Allocasuarina glareicola* is primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.
Androcalva procumbens *(Synonym: Commersonia procumbens)*	-	V	No	Grows in sandy sites, often along roadsides. Recorded in *Eucalyptus dealbata* and *Eucalyptus sideroxylon* communities, *Melaleuca uncinata* scrub, under mallee eucalypts with a *Calytrix tetragona* understorey, and in a recently burnt Ironbark and Callitris area. Also in *Eucalyptus fibrosa subsp. nubila*, *Eucalyptus dealbata, Eucalyptus albens* and *Callitris glaucophylla* woodlands north of Dubbo.	PMST	August – May	Low. The project area is outside the known distribution of this species. *Androcalva procumbens* mainly confined to the Dubbo-Mendooran-Gilgandra region, but also known in the Pilliga, Mount Kaputar National Park, north east of Gulgong and near Denmen.
Angophora inopina	Charmhaven Apple	V	No	This species occurs most frequently in four main vegetation communities: (i) *Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest; (ii) *Hakea teretifolia-Banksia oblongifolia* wet heath; (iii) *Eucalyptus resinifera-Melaleuca sieberi-Angophora inopina* sedge woodland; (iv) *Eucalyptus capitellata-Corymbia gummifera-Angophora inopina* woodland/forest.	Bionet, PMST, ALA	All year	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3244, 3315, 3433, 3581
Asperula asthenes	Trailing Woodruff	V	No	Damp sites, often along river banks	PMST, Bionet, ALA	October - December	Low. Potential habitat occurs in the project area in the form of PCT 3087.
Caladenia tessellata	Thick-lipped Spider-orchid	E	Yes	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	PMST	September, October	Low. The project area is outside the known distribution of this species. *Caladenia tessellata* is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW.
Callistemon linearifolius	Netted Bottle Brush	V	No	Found in dry sclerophyll forest on the coast and adjacent ranges, with 5-6 remaining populations.	Bionet, ALA	October - January	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3230, 3315, 3433, 3442, 3443, 3444, 3581, 3593, 3595, 3610, 3617, 3621, 3622, 3631, 3634

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Corybas dowlingii	Red Helmet Orchid	E	No	Found in sheltered areas at elevations of 10-200 m, including gullies and southerly slopes, within tall open forest on well-drained gravelly soil at elevations of 10-200 m.	Bionet	June, July	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3150, 3241, 3244, 3433, 3446, 3581
Cryptostylis hunteriana	Leafless Tongue Orchid	V	No	This species does not appear to have well-defined habitat preferences and is known from a range of communities, including swamp-heath and woodland.However, larger populations occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*). Open areas in the understorey of this community are preferred. On the Central Coast of NSW, populations have been recorded in woodland dominated by Scribbly Gum (*Eucalyptus haemastoma*), Brown Stringybark (*Eucalyptus capitellata*), Red Bloodwood (*Corymbia gummifera*). The Leafless Tongue Orchid is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	PMST	November - January	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3581, 3593
Cymbidium canaliculatum	Cymbidium canaliculatum population in the Hunter Catchment	EP	No	Typically grows in the hollows, fissures, trunks and forks of trees in dry sclerophyll forest or woodland, where its host trees typically occur on Permian Sediments of the Hunter Valley floor. It usually occurs singly or as a single clump, which can form large colonies on trees, between two and six metres from the ground.	Bionet, ALA	All year	Present. This species has been recorded within the project area as part of preliminary field surveys.
Cynanchum elegans	White-flowered Wax Plant	E	No	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation as well as littoral rainforest; Coastal Tea-tree Leptospermum laevigatum– Coastal Banksia coastal scrub; Forest Red Gum aligned open forest and woodland; Spotted Gum aligned open forest and woodland; and Bracelet Honeymyrtle scrub to open scrub.	Bionet, PMST, ALA	All year	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3029, 3086, 3087, 3110, 3151, 3152, 3237, 3239, 3244, 3489, 3617, 3621
Dendrobium melaleucaphilum	Spider orchid	E	No	The Spider Orchid grows frequently on *Melaleuca styphelioides*, less commonly on rainforest trees or on rocks in coastal districts.	ALA	August, September	Low. No associated PCTs within the project area
Dichanthium setosum	Bluegrass	V	No	Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	PMST, ALA	November - May	Moderate. Two records of this species from 2017 occur near the project area at Mount Thorley and Ravensworth.
Dillwynia tenuifolia		V	No	This species may be locally abundant within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest within Sydney's western suburbs. It may also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. At Yengo, individuals occur in disturbed escarpment woodland on Narrabeen sandstone. *Eucalyptus fibrosa* is usually the dominant canopy species. *Eucalyptus globoideax, E. longifolia, E. parramattensis, E. sclerophylla* and *E. sideroxylon* may also be present or codominant, with *Melaleuca decora* frequently forming a secondary canopy layer. The shrub layer is dominated *by D. tenuifolia, Leucopogon muticus, Leptospermum parvifolium* and *Pultenaea microphylla*.	Bionet, ALA	August - October	Low. The project area is outside the known distribution of this species. The core distribution for this species is the Cumberland Plain although disjunct localities outside the Cumberland Plain include the Bulga Mountains at Yengo. Potential habitat occurs in the project area in the form of PCTs: 3593, 3604, 3605, 3617, 3622

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Diuris bracteata		E	Yes	For over 100 years Diuris bracteata was known only from the original collection made near Gladesville in northern Sydney. The complete absence of records for most of the 20th Century resulted in this species being listed as 'presumed extinct' on Part 4 of Schedule 1 of the Threatened Species Conservation Act 1995. This listing status was updated in 2005 to Endangered under the Act after several specimens were found in the Sydney Basin (Duffy's Forest, Mount White and Kulnura). In recent years, however, these specimens are considered to have been incorrectly identified and are considered to be Diuris platichila (Peter Weston May 2013). The species is considered to be extinct.	Bionet	August, September	None. The species is considered to be extinct.
Diuris pedunculata	Small snake-orchid	E	No	The Small Snake Orchid grows on grassy slopes or flats. Often on peaty soils in moist areas. Also on shale and trap soils, on fine granite, and among boulders.	Bionet	September, October	Low. The project area is outside the known distribution of this species. *Diuris pedunculata* is confined to north east NSW. It was originally found scattered from Tenterfield south to the Hawkesbury River, but is now mainly found on the New England Tablelands, around Armidale, Uralla, Guyra and Ebor.
Diuris praecox	Rough Doubletail	V	No	Found on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey.	Bionet	August	Low. The project area is outside any known records of this species. Potential habitat occurs in the project area in the form of PCTs: 3150, 3244, 3581
Diuris tricolor	Pine Donkey Orchid	V	No	The Pine Donkey Orchid is usually recorded from disturbed habitats within sclerophyll forest. Associated species include *Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta,* within Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species. It is found in sandy soils, either on flats or small rises as well as red earth soil in a Bimble Box community in western NSW.	Bionet	September, October	High. The western portion of the project area is located in the Muswellbrook LGA. Records of the species occur near the project area footprint. Potential habitat occurs in the project area in the form of PCTs: 3314, 3315, 3431, 3485
Diuris tricolor	Pine Donkey Orchid population in the Hunter Catchment.	EP	No	Found in sclerophyll woodland and derived grassland on flats or small rises, on a range of substrates including sandy or loamy soils. The habitat of *Diuris tricolor* in the Muswellbrook LGA has been fragmented by past land clearing.	Bionet	September, October	High. The western portion of the project area is located in the Muswellbrook LGA. Records of the species occur near the project area footprint. Potential habitat occurs in the project area in the form of PCTs: 3314, 3315, 3431, 3485

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Epacris purpurascens var. purpurascens		V	No	Found in a range of habitat types with a strong shale soil influence.	Bionet	September, October	Low. The project area is outside the known distribution of this species. *Epacris purpurascens var. purpurascens* has a restricted distribution from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South.
Eucalyptus camaldulensis	*Eucalyptus camaldulensis* population in the Hunter Catchment.	EP	No	May occur with *Eucalyptus tereticornis, Eucalyptus melliodora, Casuarina cunninghamiana subsp. cunninghamiana* and *Angophora floribunda.* Prior to European settlement, it is likely that the species formed extensive stands of woodland and open woodland on the major floodplains of the Hunter and Goulburn rivers, especially in areas where water impoundment occurs after flood. Since settlement, most of the floodplains have been cleared of woody vegetation. Flood mitigation works now prevent most minor floods from inundating floodplains. These flow changes, coupled with the clearing of native vegetation, have greatly reduced the extent of habitat favourable to the River Red Gum in the Hunter catchment.	Bionet, ALA	All year	Present. This species has been recorded within the project area as part of preliminary field surveys. This species is known to occur in the Hunter catchment and will be subject to targeted surveys.
Eucalyptus camfieldii	Camfield's Stringybark	V	No	This species occurs on poor coastal country, in shallow sandy soils overlying Hawkesbury sandstone including within coastal heath on exposed sandy ridges. Found in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of *E. oblonga, E. capitellata* and *E. haemastoma*.	Bionet, PMST	All year	Low. The project area is outside any known records of this species. Potential habitat occurs in the project area in the form of PCTs: 3244, 3593
Eucalyptus castrensis	Singleton Mallee	E	Yes	Singleton Mallee is very restricted in range, but locally dominant, occurring as a dense mallee stand over about three hectares, on a low broad ridgetop on loam over sandstone. The understorey consists of grasses and scattered shrubs, with bare ground and litter, with adjacent trees including *Eucalyptus fibrosa* and *Corymbia maculata.*	Bionet, ALA	All year	Moderate. The project area occurs west of the current known distribution of this species. Targeted surveys will be conducted for this species. Potential habitat occurs in the project area in the form of PCTs: 3438, 3446, 3604
Eucalyptus fracta	Broken Back Ironbark	V	Yes	Brocken Back Ironbark is the dominant tree in a narrow band along the upper edge of a sandstone escarpment, in dry eucalypt woodland on shallow soils. Associated species in slightly deeper soils include *Eucalyptus sparsifolia, E. punctata, Corymbia maculata* and *Angophora euryphylla.*	Bionet, ALA	All year	Present. The species has been recorded within the project area at Pokolbin State Forest. Potential habitat occurs in the project area in the form of PCTs: 3489, 3604, 3605

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Eucalyptus glaucina	Slaty Red Gum	V	No	Occurs in grassy woodland and dry eucalypt forest on deep, moderately fertile and well-watered soils.	Bionet, PMST, ALA	All year	Present. Known areas of occupancy of this species occur within the project area. Potential habitat occurs in the project area in the form of PCTs: 3152, 3239, 3241, 3314, 3315, 3431, 3433, 3446, 3605, 3631, 3634, 3636, 4073
Eucalyptus largeana	Craven Grey Box	E	No	Often found in wet forest on subcoastal ranges	Bionet, ALA	All year	Low. The project area is outside any known records of this species. The species is generally confined to the to Gloucester-Craven district although a historic record from near Cessnock (1906) occurs to the north of the project area.
Eucalyptus parramattensis subsp. decadens	Earp's Gum	V	No	Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant.	PMST, Bionet	All year	Low. The project area is outside any known records of this species. *Eucalyptus parramattensis subsp. decadens* occurs in two separate meta populations being Cessnock-Kurri Kurri and Tomago Sandbeds. The project area is located outside the distribution of both meta opoulations.
Eucalyptus pumila	Pokolbin Mallee	V	Yes	The single known population occupies north-west-facing slopes derived from sandstone within dry sclerophyll woodland, with a canopy comprising *Eucalyptus fibrosa, Callitris endlicheri* and, to a lesser extent, *Corymbia maculata.*	Bionet, PMST, ALA	All year	High. The project area occurs west of the current known distribution of this species. Targeted surveys will be conducted for this species. Potential habitat occurs in the project area in the form of PCTs: 3152, 3239, 3314, 3315, 3433, 3444, 3446, 3485, 3605, 3610
Euphrasia arguta	-	CE	Yes	Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'.	PMST	November - March	Low. The project area is outside any known records of this species. *Euphrasia arguta* is currently restricted in distribution to Nundle, Barrington Tops and Hastings River areas.
Genoplesium baueri	Yellow Gnat-orchid	E	Yes	Grows in dry sclerophyll forest and moss gardens over sandstone.	PMST	February, March	Low. The project area is outside any known records of this species. The species generally occurs within coastal areas from Ulladulla on the south coast to Port Stephens on the mid-north coast.

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Genoplesium insigne	Variable Midge Orchid	CE	Yes	This species appears to be associated with Scribbly Gum – Red Bloodwood – *Angophora inopina* (not always present) heathy woodland on lowlands of the Central Coast and variations containing *Angophora costata.* Several known sites exhibit a removed/managed shrub layer and canopy. Grows in patches of *Themeda triandra* (Kangaroo Grass), which can be ephemeral. Other associated species include, but are not limited to, *Mirbelia speciosa, Ptilothrix deusta, Leptospermum trinervium* and *L. juniperinum* in wet (seasonal) heath settings, *Banksia spinulosa* and *Xanthorrhoea latifolia*, and *X. media*. Other seasonal and cryptic species commonly associated with known populations include: *Cryptostylis subulate, C. erecta, Thelymitra ixiodes, T. pauciflora, Microtis spp., Burchadia umbellate, Tricoryne elatior,* and *Thysanotus juncifolius.*	Bionet, PMST, ALA	September - November	Low. The project area is outside any known records of this species. *Genoplesium insigne* occurs in southern Lake Macquarie and northern Central Coast LGAs. It's distribution is recorded as far as Cooranbong in the north, Warnervale in the south and Chain Valley in the east. Potential habitat occurs in the project area in the form of PCTs: 3433, 3581
Grammitis stenophylla	Narrow-leaf Finger Fern	E	No	Found in moist places, usually near streams, on rocks in rainforest and dry and moist eucalypt forest.	Bionet	All year	Moderate. The project area is outside any known records of this species. Potential habitat occurs in the project area in the form of PCTs: 3029, 3037, 3150, 3239, 3242, 3617, 3621
Grevillea parviflora subsp. Parviflora	Small-flower Grevillea	V	No	Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Hunter occurrences are usually 30-70m ASL, often occuring in open, slightly disturbed sites such as along tracks. This species grows in sandy or light clay soils in a range of vegetation types, from heath and shrubby woodland to open forest. In Sydney it has been recorded from Shale Sandstone Transition Forest and in the Hunter in Kurri Sand Swamp Woodland. Associated species in the Kurri Sand Swamp Woodland include *Eucalyptus parramattensis subsp. Decadens, Angophora bakeri* and *E. fibrosa* with *Acacia elongate, Dillwynia parvifolia, Melaleuca thymifolia, Grevillea montana, Eragrostis brownie* and *Aristida vagans.* Despite the range of associated communities several understorey species which are common to several of the known sites include *Allocasuarina littoralis, Daviesia ulicifolia, Kunzea ambigua, Banksia spinulosa, Leptospermum trinervium, Melaleuca nodosa, linifolia, Themeda australis, Entolasia stricta* and *Eragrostis brownie.*	Bionet, PMST, ALA	August – November	High. There are records throughout the study area. The species has not been recorded during field surveys conducted to date. Potential habitat occurs in the project area in the form of PCTs: 3244, 3433, 3442, 3443, 3444, 3446, 3581, 3610, 3631, 3634
Haloragis exalata subsp. exalata	Wingless Raspwort	V	No	Square Raspwort appears to require protected and shaded damp situations in riparian habitats.	PMST	All year	Low. The project area is outside the known distribution of this species. The species is not known to occur north of Marramarra National Park in northern Sydney.
Homoranthus darwinioides	Fairy Bells	V	No	Grows in in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Landforms the species has been recorded growing on include flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand. Associated species include *Callitris endlicheri, Eucalyptus crebra, E. fibrosa, C. trachyphloia, E. beyeri subsp. illaquens, E. dwyeri, E. rossii, Leptospermum divaricatum, Melaleuca uncinata, Calytrix tetragona, Allocasuarina spp.* and *Micromyrtus spp.*	PMST	March - December	Low. The project area is outside the known distribution of this species. *Homoranthus darwinioides* is know to occur in central tablelands and western slopes of NSW, occurring from Putty to the Dubbo district. It is found west of Muswellbrook between Merriwa and Bylong, and north of Muswellbrook to Goonoo SCA.

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Kunzea rupestris	-	V	No	Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland.	PMST	All year	Low. The project area is outside the known distribution of this species. *Kunzea rupestris* has a highly restricted distribution, with most locations in the Maroota - Sackville - Glenorie area and one outlier in Ku-ring-gai Chase National Park
Lasiopetalum joyceae	-	V	No	Grows in heath on sandstone.	PMST	September -November	Low. The project area is outside the known distribution of this species. *Lasiopetalum joyceae* has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest.
Lepidium aschersonii	Spiny Peppercress	V	No	Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmanii)* and Grey Box (*Eucalyptus microcarpa*). In the south has been recorded growing in Bull Mallee (*Eucalyptus behriana*). Often the understorey is dominated by introduced plants. The species grows as a a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter.	PMST	November - April	None. The project area is outside the known distribution of this species and no potential habitat is considered likely to occur.
Maundia triglochinoides		V	No	This species is found in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay with low nutrients and is commonly associated with wetland species.	Bionet	November – March	Low. Potential habitat occurs in the project area in the form of PCTs: 3150, 3975
Melaleuca biconvexa	Biconvex Paperbark	V	No	Occurs in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Bionet, PMST, ALA	All year	Low. The project area is outside any known records of this species. Potential habitat occurs in the project area in the form of PCTs: 3025, 3029, 3150, 3241, 3242, 3244
Melaleuca deanei	Deane's Melaleuca	V	Yes	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone.	PMST	All year	Moderate. *Melaleuca deanei* ccurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Whlist the project area is located outside these two distribution areas, a recent record (2021) from Corrabare State Forest warrants this species as having a moderate likelihood of occurrence and will be subject to further targted surveys.

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Melaleuca groveana	Grove's Paperbark	V	No	Grove's Paperbark grows on exposed sites, in low coastal hills, escarpment ranges and tablelands on outcopping granite, rhyolite and sandtone on rocky outcrops and cliffs within heath, dry shrubby open forest and woodlands.	Bionet	All year	High. *Melaleuca groveana* is known from Corrabare and Pokolbin State Forests. The species has not been recorded during field surveys conducted to date. Potential habitat occurs in the project area in the form of PCTs: 3239, 3244, 3593, 3604, 3605, 3610, 3622
Micromyrtus blakelyi	-	V	No	Typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms.	PMST	All year	None. The project area is outside the known distribution of this species. This species is restricted to areas near the Hawkesbury River, north of Sydney. Distribution extends from north of Maroota in the north, to Cowan in the south. All known populations occur within the Baulkham Hills and Hornsby local government areas.
Neoastelia spectabilis	-	V	Yes	Grows in rock crevices near waterfalls and in seepage lines on rocky slopes in Antarctic Beech rainforest, between 900 - 1150 m altitude.	PMST	All year	None. This species is not known to occur in NSW.
Olearia cordata	-	V	No	Populations are typically small and scattered. Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges.	PMST	All year	Low. The project area occurs outside the current known distribution of this species. The species has a scattered distribution generally restricted to the south-western Hunter Plateau, eastern Colo Plateau, and the far north-west of the Hornsby Plateau near Wisemans Ferry east of Maroota.
Ozothamnus tesselatus	-	V	No	Grows in eucalypt woodland.	Bionet, PMST	September, October	High. The species is known to occur near Bayswater Power Station which is within the western extent of the project area. The existing records are outside the project area footprint and no specimens of this species have been recorded from preliminary field surveys to date. Potential habitat occurs in the project area in the form of PCTs: 3315, 3431
Persicaria elatior	Tall Knotweed	V	No	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	PMST	December - May	Low. There are no current records of this species within the project area.
Persoonia hirsuta	Hairy Geebung	V	Yes	The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone. It is usually present as isolated individuals or very small populations.	PMST	All year	Low. Not recorded in the locality and rare in the region, some potential habitat occurs within the project area although the occurrence of this species is considered unlikely.

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Persoonia pauciflora	North Rothbury Persoonia	CE	Yes	Occurs in dry open forest or woodland on silty sandstone soils with a moderate to sparse shrub layer and grassy groundcover. Associated dominate canopy species include *Corymbia maculata, Eucalyptus fibrosa* and *E. crebra*.	Bionet	All year. May not maintain above-ground presence without fire or other disturbance.	Low. This species has a highly restricted distribution at North Rothbury in the Cessnock local government area which occurs well outside the current project area. Potential habitat occurs in the project study in the form of PCTs: 3314, 3315, 3328, 3431, 3442, 3443, 3444, 3446, 3631, 4015
Picris evae	Hawkweed	V	No	All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks. Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora, E. crebra, E. populnea, E. albens, Angophora subvelutina, Allocasuarina torulosa* , and/or *Casuarina cunninghamiana* with a Dichanthium grassy understory.	PMST	November - February	None. The project area is located outside the known distribution for this species. The species is only known in NSW north from the Inverell area, in the north-western slopes and plains regions.
Pimelea curviflora var. curviflora	-	V	No	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawara coastal plain.	PMST	October to March	Low. The project area is outside the known distribution of this species. *Pimelea curviflora var. curviflora* is generally confined to the coastal area of the Sydney and Illawarra regions.
Pomaderris brunnea	Rufous Pomaderris	E	No	Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	PMST	August - October	Low. The project area is outside the known distribution of this species. *Pomaderris brunnea* is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria.
Pomaderris queenslandica	Scant Pomaderris	E	No	Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks.	Bionet	All year	Moderate. *Pomaderris queenslandica* is generally known from several locations on the NSW north coast and a few locations on the New England Tablelands and North West Slopes, including near Torrington and Coolata. A single record of the species from 2006 occurs south of Broke and whilst not within the project area it is located in the broader locality. Potential habitat occurs in the project area in the form of PCTs: 3111, 3242, 3244, 3431, 3433

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Pomaderris reperta	Denman Pomaderris	CE	Yes	Denman Pomaderris occupies woodland on sandy loam of sandstone or conglomerate, in association with *Eucalyptus crebra* , *E. blakelyi*, *Notelaea macrocarpa* and *Allocasuarina littoralis.*	Bionet	September - November	Low. The project area is outside the known distribution of this species. *Pomaderris reperta* is only known from a small number of sites along a single ridgeline near Denman in the upper Hunter Valley Potential habitat occurs in the project area in the form of PCTs: 3489
Prasophyllum petilum	Tarengo Leek Orchid	E	No	Found within open natural temperate grassland at known sites, as well as in grassy woodland in association with *Poa labillardieri*, *Eucalyptus aggregate* and *Leptospermum spp*. near Queanbeyan and within the grassy groundlayer dominated by Kanagroo Grass under Box-Gum Woodland at Ilford. This species is only retained at little-grazed travelling stock reserves and in cemeteries at some locales. The population near Muswellbrook is considered small.	Bionet	September - December	Moderate. The project area is outside the known distribution of this species. Whilst the project area is outside the current known distribution for this species, it is known from the Muswellbrook area to the west and as such the species is considered to have a moderate likelihood of occurrence. Potential habitat occurs in the project area in the form of PCTs: 3315, 3431, 3485
Prostanthera askania	Tranquility Mintbush	E	No	Occurs adjacent to, but not immediately in, drainage lines on flat to moderately steep slopes formed on Narrabeen sandstone and alluvial soils derived from it. Found in moist sclerophyll forest and warm temperate rainforest communities, and the ecotone between them. These communities are generally tall forests with a mesic understorey; *Eucalyptus saligna* and *Syncarpia glomulifera* are usually present, though canopy species present can be highly variable.	Bionet	September – November	Low. The project area is outside the known distribution of this species. *Prostanthera askania* has a very restricted geographic range (of less than 12 km) in the upper reaches of creeks that flow into Tuggerah Lake or Brisbane Water within the Central Coast local government areas.
Prostanthera cineolifera	Singleton Mint Bush	V	No	Grows in open woodlands on exposed sandstone ridges in association with shallow or skeletal sands.	Bionet, PMST	September, October	Present. This species has been recorded from Pokolbin State Forest during preliminary field surveys. Potential habitat occurs in the project area in the form of PCTs: 3239, 3315, 3433, 3438, 3443, 3444, 3446, 3489, 3604, 3605, 3610, 4023
Prostanthera cryptandroides subsp. cryptandroides	Wollemi Mint-bush	V	No	At Glen Davis, occurs in open forest dominated by *Eucalyptus fibrosa*. Other eucalypt species may be present as sub-dominants. In the Denman-Gungal and Widden-Baerami Valley areas, occurs on rocky ridgelines on Narrabeen Group Sandstones in association with a range of communities.	PMST	September - November	Low. The project area is outside the known distribution of this species. *Prostanthera cryptandroides subsp. cryptandroides* is distributed between Lithgow and Sandy Hollow on the NSW central west slopes, central tablelands and western parts of the central coast botanical regions.

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Prostanthera junonis	Somersby Mintbush	E	No	The species is restricted to the Somersby Plateau, on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest/low woodland/open scrub. It occurs in both disturbed and undisturbed sites.	Bionet	October - December	Low. Not recorded in the locality and rare in the region (generally restricted to the Somersby Plateau), some potential habitat occurs within the project area although the occurrence of this species is considered unlikely. Potential habitat occurs in the project area in the form of PCTs: 3242, 3593, 3595, 3617
Pterostylis chaetophora	-	V	No	This species has a preference for seasonally moist, dry sclerophyll forest with a grass and shrub understorey including grassy open forests or derived native grasslands of *Eucalyptus amplifolia* and *E. moluccana* on gentle flats, or that are dominated by *Corymbia maculata* with any of the ironbarks *E. fibrosa, E. sideroploia* or *E.crebra.*	Bionet	September - November	Moderate. The species is not known to occur within the project area and in the Hunter it is located north from Kurri Kurri to Myall River State Forest. Potential habitat occurs in the project area in the form of PCTs: 3241, 3244, 3314, 3315, 3328, 3431, 3433, 3438, 3442, 3443, 3444, 3446, 3485
Pterostylis gibbose	Illawarra Greenhood	E	No	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Hunter region, the species grows in open woodland dominated by *Eucalyptus crebra* and *Callitris endlicheri.*	Bionet, PMST	September, October	Low. In the Hunter the species is only known from the Kurri Kurri and Maitland area. Potential habitat occurs in the project area in the form of PCT 3438 although the occurrence of this species within the project area is considered unlikely.
Rhizanthella slateri	Eastern Australian Underground Orchid	V	Yes	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest.	Bionet, PMST, ALA	September – November	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3025, 3029, 3037, 3041, 3086, 3087, 3110, 3111, 3150, 3176, 3230, 3237, 3241, 3242, 3244, 3258, 3263, 3581, 3593, 3595, 3599, 3617, 3620, 3621, 3622
Rhodamnia rubescens	Scrub Turpentine	CE	Yes	Scrub Turpentine occupies littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Bionet, PMST, ALA	All year	Present. This species has been recorded from Watagan, Corrabare and Pokolbin State Forests during preliminary field surveys. Potential habitat occurs in the project area in the form of PCTs: 3025, 3029, 3037, 3041, 3075, 3083, 3086, 3087, 3100, 3110, 3111, 3150, 3151, 3152, 3176, 3230, 3237, 3238, 3239, 3241, 3242, 3244, 3258, 3263, 3446, 3593, 3595, 3617, 3620, 3622, 4058, 4073

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Rhodomyrtus psidioides	Native Guava	CE	Yes	This species occurs in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Bionet, PMST, ALA	All year	Present. This species was recorded from Watagan State Forest during preliminary field surveys. Potential habitat occurs in the project area in the form of PCTs: 3025, 3029, 3037, 3075, 3083, 3086, 3087, 3100, 3150, 3151, 3152, 3242, 3593, 3621, 4072, 4073
Rutidosis heterogama	Heath Wrinklewort	V	No	Grows in heath on sandy soils and moist areas in open forest, with records along disturbed roadsides.	Bionet, PMST, ALA	All year	Present. This species was recorded at Austar Coal Mine (Option 10). Potential habitat occurs in the project area in the form of PCTs: 3244, 3315, 3433, 3443, 3444, 3446, 3581, 3605, 3610, 3631, 3634, 4023, 4039
Senna acclinis	Rainforest Cassia	E	No	Occurs on the margins of subtropical, littoral and dry rainforests.	Bionet	All year	Moderate. The species has been previously recorded in Watagan, Olney and Corrabare State Forests. Potential habitat occurs in the project area in the form of PCTs: 3029, 3086, 3100, 3111, 3150, 3242, 3595, 4023
Syzygium paniculatum	Magenta Lilly Pilly	E	No	On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Bionet, PMST, ALA	April – June	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3025, 3029, 3087, 3100, 3150, 3241, 3242, 3244, 3433
Tetratheca juncea	Black-eyed Susan	V	No	Found in low open forest/woodland with a mixed shrub understorey and grassy groundcover, as well as in heathland and moist forest. Often found on well-drained sites.	Bionet, PMST, ALA	September, October	Moderate. Potential habitat occurs in the project area in the form of PCTs: 3241, 3242, 3244, 3433, 3581, 3617
Thelymitra adorata	Wyong Sun Orchid	CE	Yes	Occurs from 10-40 m a.s.l. in grassy woodland or occasionally derived grassland in well-drained clay loam or shale derived soils. Common vegetation type is a Spotted Gum - Ironbark Forest with a diverse grassy understorey and occasional scattered shrubs. Often found at disturbed sites, including on the edges of roads that contain a mixture of native and introduced species in the understorey. Alluvial Redgum Footslopes Forest adjoins Dooralong Spotted Gum - Ironbark Forest at one known population and may constitute habitat for the species. Alluvial Floodplain Shrub Swamp Forest also adjoins Dooralong Spotted Gum - Ironbark Forest at another extant population.	Bionet, PMST	September, October	Low. The project area is generally located north of the known distribution for this species with the closest being from southern portion of Lake Macquarie City Council area. Potential habitat occurs in the project area in the form of PCTs: 3241, 3244, 3433
Thesium australe	Austral Toadflax	V	No	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*).	PMST	November - February	Low. The species is rare but widespread in distribution. Whilst the species is not known to occur within the project area it is known to occur to the west in the Muswellbrook region.

Scientific name	Common name	BC Act[1]	SAII	Habitat[4]	Source[2]	Months of survey	Likelihood of occurrence
Tylophora linearis	-	V	No	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa*, *Eucalyptus sideroxylon*, *Eucalyptus albens*, *Callitris endlicheri*, *Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides*, *Acacia lineata*, *Melaleuca uncinata*, *Myoporum species* and *Casuarina species.*	PMST	October - May	Low. Not recorded in the locality and rare in the region with the closest records being near Goulburn River National Park, Murrurundi and Nundle. Some potential habitat occurs within the project area although the occurrence of this species is considered unlikely.
Wollemia nobilis	Wollemi Pine	CE	Yes	Occurs in warm temperate rainforest and rain forest margins in remote sandstone canyons.	PMST	All year	None. Restricted to remote canyons in the Wollemi National Park, north-west of Sydney.

(1) V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered, EX = Presumed Extinct under the BC Act

(2) Source: PMST = The Department of the Environment and Energy's EPBC Protected Matters Search Tool, BioNet = Bionet Atlas of NSW Wildlife

Appendix B

Threatened fauna in the locality of the project, likelihood of occurrence

Table B.1 Threatened fauna within the locality of the project, likelihood of occurrence

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Amphibians						
Crinia sloanei	Sloane's Froglet	E	No	Recorded at scattered sites in the floodplains of the Murray-Darling Basin, this species prefers grassland, woodland and disturbed habitat that is periodically inundated.	ALA	Low. The project area is outside of the known distribution for this species.
Crinia tinnula	Wallum Froglet	V	No	Wallum Froglets are found in a wide range of habitats, typically sedgelands and wet heathlands, usually associated with acidic swamps on coastal sand plains. They can also be found along drainage lines and disturbed areas, and occasionally in swamp sclerophyll forests. Breeding occurs in swamps with permanent water as well as shallow ephemeral pools and drainage ditches. Wallum Froglets shelter under wet or damp leaf litter, vegetation, other debris or in burrows of other species near the water's edge.	Bionet, ALA	Low. Species rarely occurs away from the coast and preferred habitat not present, no records within project area.
Heleioporus australiacus	Giant Burrowing Frog	V	No	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spending more than 95% of its time in non-breeding habitat below the soil surface in areas up to 300 m from breeding sites. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	Bionet, PMST, ALA	Moderate. Potential habitat is present within the project area however this is a cryptic species. Records within broader project area (> 5 years).
Litoria aurea	Green and Golden Bell Frog	E	No	This species inhabits marshes, dams and stream-sides, particularly those containing bullrushes or spikerushes that are unshaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available. Can occur in highly disturbed areas.	Bionet, PMST, ALA	Moderate. Potential habitat is present within the project area with records within broader project area (> 5 years).
Litoria booroolongensis	Booroolong Frog	E	No	Found along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. This species occurs on or near cobble banks and other rock structures within stream margins where they shelter under rocks or amongst vegetation near the ground on the stream edge.	PMST	None. No records of this species within project area, no suitable habitat.
Litoria brevipalmata	Green-thighed Frog	V	No	This species occurs in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range, but extends into drier forests in northern NSW and southern Queensland.	Bionet, ALA	Moderate. Potential habitat is present within the project area with records from the broader project area (> 5 years).
Litoria littlejohni	Littlejohn's Tree Frog	E	No	Littlejohn's Tree Frog breeds in the upper reaches of permanent streams and in perched swamps, calling from low overhanging vegetation. Non-breeding habitat includes heath-based forests and woodlands.	Bionet, PMST, ALA	Present. This species has been recorded within the project area.
Mixophyes balbus	Stuttering Frog	E	Yes	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Adults live in deep leaf litter and thick understorey vegetation on the forest floor out of breeding season. Breeding occurs in small flowing streams with rock shelves or shallow riffles connected to deep permanent pools.	Bionet, PMST, ALA	Present. This species has been recorded within the project area.
Mixophyes iteratus	Giant Barred Frog	E	No	Occurring along freshwater streams with permanent or semi-permanent water, generally at lower elevation.within moist riparian habitats such as rainforest or wet sclerophyll forest. However, Giant Barred Frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams.	Bionet, PMST, ALA	Present. This species has been recorded within the project area.
Pseudophryne australis	Red-crowned Toadlet	V	No	Found on Hawkesbury and Narrabeen sandstone within open forest. This species utilises dense vegetation for shelter and breeding congregations. Breeding in periodically wet drainage lines and ephemeral creeks below sandstone ridges.	Bionet, ALA	Present. This species has been recorded within the project area.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Uperoleia mahonyi	Mahony's Toadlet	E	No	Mahony's Toadlet inhabits ephemeral and semi-permanent swamps and swales on coastal fringes. Habitat is exclusively associated with leached white sand including heath or wallum habitat including acid paperbark swamps.	PMST	None. No suitable habitat is found within the project area.
Birds						
Anseranas semipalmata	Magpie Goose	V	No	Occupying shallow wetlands, formed by river floodplains or run-off with breeding occurring in monsoonal areas. Known to use dry ephemeral swamps and wet grassland also.	ALA, Bionet	Low. This species is rarely recorded within the broader locality and those individuals are considered vagrants within the area.
Anthochaera phrygia	Regent Honeyeater	CE	Yes	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	ALA, Bionet, PMST	High. Suitable habitat is present in the project area, and the project area includes mapping of Regent Honeyeater important areas habitat (BAM 2020).
Aphelocephala leucopsis	Southern Whiteface	V	No	Occupying a wide range of dry open woodland and shrubland on ranges, foothills, lowlands and plains. Dominated by an acacia or eucalypt canopy of low tree density, the understorey is usually grassy or shrubby, with hollows and crevices of live or dead trees required for roosting and nesting.	ALA, PMST	Low. This species is not recorded within the project area, with no suitable dry habitat present.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	No	Found in dry, open eucalypt forest and woodlands with a sparse understorey and ground-cover of grass or sedge with fallen woody debris. Also recorded in farmland, shrubland, heathland and rainforest on occasion.	ALA, Bionet	High. Suitable foraging habitat occurs within the project area with records from the broader project area (> 5 years).
Botaurus poiciloptilus	Australasian Bittern	E	No	This species favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	ALA, Bionet, PMST	Low. The project area does not contain suitable habitat for this species, with limited records from the broader locality.
Burhinus grallarius	Bush-stone Curlew	E	No	Occupies open forest and woodland with a sparse ground-layer and fallen woody debris. Known to use open grassland and heathland also.	ALA, Bionet	Low. While the project area contains potentially suitable habitat, there are limited records from outside the project footprint within the broader locality.
Calamanthus fuliginosus	Striated Fieldwren	E	No	Found in coastal swamp heaths and tussock fields of south-eastern NSW, primarily from the far South Coast as far north as Mittagong.	ALA	Low. The project area is outside of this species known distribution, with a single record (ALA) in the broader locality.
Calidris acuminata	Sharp-tailed Sandpiper	-	No	This migratory species may stop at coastal salt marshes, lagoons and mudflats during migration.	ALA, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. Limited records from within the broader project locality.
Calidris canutus	Red Knot	-	No	Recorded in small numbers within the Hunter River estuary during non-breeding season, this species is a rare visitor to terrestrial saline wetlands, freshwater swamps and inland wetlands. Found more commonly on intertidal mudflats, estuaries, lagoons, sandflats and sandy beaches along sheltered coasts.	ALA, Bionet, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. Limited records from within the broader project locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Calidris ferruginea	Curlew Sandpiper	E	Yes	Spends non-breeding season in Australia where it occurs around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	ALA, Bionet, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. Limited records from within the broader project locality.
Calidris ruficollis	Red-necked Stint	-	No	Found along coastal Australia during non-breeding season, this migratory species occurs in sheltered coastal areas including mudflats, lagoons, estuaries and saltmarsh. Flooded paddocks and damp grassland are also utilised at times.	ALA, PMST	Moderate. Suitable foraging habitat occurs within the project area with records from the broader project area (Ravensworth, > 5 years ago).
Calidris tenuirostris	Great Knot	V	Yes	With scattered occurrence along the NSW coastline, this species is found within sheltered coastal habitats including bays, estuaries and lagoons, all with large intertidal mudflats or sandflats. Recorded on sandy beaches and spits with nearby mudflats, and sometimes on coastal rocky platforms.	ALA, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. Limited records from within the broader project locality.
Callocephalon fimbriatum	Gang-gang Cockatoo	V	No	Occurs from southern Victoria through south- and central-eastern New South Wales and ACT. In New South Wales, it occurs from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes – it is rare at the extremities of its range. Occurs in wetter tall mountain forests and woodlands in autumn/winter, and in spring/summer moves to lower altitudes in drier more open eucalypt forests and woodlands particularly box-gum and box-ironbark assemblages. Often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting.	ALA, Bionet, PMST	Present. This species has been recorded within the project area.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	No	Occurs from central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia.	ALA, Bionet, PMST	Present. This species has been recorded within the project area
Certhionyx variegatus	Pied Honeyeater	V	No	A highly nomadic species that is usually found across arid and semi-arid Australia, it has been recorded within the Hunter Valley during periods of drought. This species inhabits wattle shrub, Mulga, mallee, spinifex scrub and eucalypt woodlands.	Bionet	Low. With a single record from the broader locality this species lacks suitable habitat within the project area.
Charadrius bicinctus	Double-banded Plover	-	No	Found on coastal beaches, dunes and mudflats, as well as river banks, areas of upland tussock grasses and shingle.	PMST	None. Species rarely occurs away from the coast and preferred habitat not present. No records from within the broader project locality.
Charadrius leschenaultia	Greater Sand Plover	V	No	Rarely appears on the east coast of Australia, this species has been recorded between the northern rivers and Illawarra. Sheltered coastal sandy, shelly or muddy beaches with large sandbanks or mudflats are utilised.	ALA, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. Few records from within the broader project locality.
Charadrius mongolus	Lesser Sand Plover	V	No	A coastal migratory species, found on sheltered beaches with large mudflats or sandflats, less frequently on reefs and rocky platforms.	ALA, Bionet, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. Few records from within the broader project locality.
Chthonicola sagittate	Speckled Warbler	V	No	With a patchy distribution, this species is rarely recorded from the coast. Occuring in eucalypt dominant habitat, with scattered native tussock grasses, and sparse shrub and canopy layers frequently in gullies or on rocky ridges. Species persistence relies on large, undisturbed remnants of this habitat type	ALA, Bionet	Present. This species has been recorded within the project area.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Circus assimilis	Spotted Harrier	V	No	Dispersed widely within NSW this species is found most commonly in native grassland including acacia and mallee remnants, inland riparian woodland and shrub steppe. Is also known to use agricultural land for foraging as well as open habitats including inland wetland edges.	ALA, Bionet	Moderate. Suitable foraging habitat occurs within the project area with records from the broader project area (>5 years).
Climacteris picumnus	Brown Treecreeper (eastern)	V	No	Found less commonly on coastal plains and ranges, this species occupies eucalypt woodlands and dry open forest dominated by stringy and rough-barked eucalypts, with an open grassy understorey. Forest edging wetlands, with an open acacia, saltbush, cumbungi and grass understorey are also utilised.	ALA, Bionet, PMST	High. Suitable foraging habitat occurs within the project area with records from the broader project area.
Daphoenositta chrysoptera	Varied Sitella	V	No	Occurs in eucalypt forest and woodlands, preference shown toward rough-barked and mature smooth-barked dominant habitat, as well as mallee and Acacia woodland.	ALA, Bionet	Moderate. Suitable foraging habitat occurs within the project area with records from the broader project area (>5 years).
Ephippiorhynchus asiaticus	Black-necked Stork	E	No	Found as far south as central NSW, the species becomes increasingly uncommon south of the Clarence Valley. Major coastal rivers and floodplain wetlands are key habitat, with minor floodplains, coastal sandplain wetlands and estuaries less frequently utilised.	ALA, Bionet	Low. Preferred habitat does not occur within the project area, with limited records from the broader locality.
Epthianura albifrons	White-fronted Chat	V	No	This species is found mostly along the southern NSW coastline, within saltmarsh vegetation as well as damp open habitat along the coastline including grassland and low shrubs edging wetlands.	ALA, Bionet	Low. Species rarely occurs away from the coast and preferred habitat not present. Few records from within the broader project locality.
Erythrotriorchis radiatus	Red Goshawk	CE	Yes	Occurs sparsely through northern and eastern Australia from Western Australian Kimberley division to north eastern Queensland and south to far north-eastern NSW with scattered records in central Australia. Inhabit open woodland and forest preferring mosaic of vegetation types. Often found in riparian habitats along or near watercourses or wetlands.	ALA, PMST	Low. The project area is outside this species normal distribution. No records within the project area, with an individual historic record in the broader locality.
Falco hypoleucos	Grey Falcon	V	No	Distributed primarily throughout the Murray-Darling Basin, with the occasional vagrant found east of the Great Dividing range within open woodland. This species is generally restricted to arid and semi-arid regional grassland, shrubland and wooded watercourses.	ALA, PMST	Low. The project area is outside this species normal distribution. No records within the project area, with an individual record in the broader locality.
Falco subniger	Black Falcon	V	No	Mostly occurring in inland regions, coastal records are likely to be referable to the Brown Falcon.	ALA, Bionet	Low. The project area is outside this species normal distribution. Coastal records within the broader locality are likely to be the Brown Falcon.
Gallinago hardwickii	Latham's Snipe	-	No	A non-breeding migrant to south-east Australia, they are found in freshwater wetland on or near the coast, often with dense vegetation cover including grasses, sedges or rushes. Occasionally occurring in saltmarshes and along creek edges.	ALA, PMST	Present. This species has been recorded within the project area.
Gallinago megala	Swinhoe's Snipe	-	No	This species is a migratory wader found in wetlands, marshland and flooded grassland.	PMST	None. There are no records of this species within the project area or broader locality.
Gallinago strenura	Pin-tailed Snipe	-	No	A migratory shorebird, this species can be found in wetalnds, marshland and flooded grassland.	PMST	None. There are no records of this species within the project area or broader locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Glossopsitta pusilla	Little Lorikeet	V	No	Core habitat for this nomadic species is within NSW, with movement determined by season and food availability. Eucalypt forest and woodland is utilised for foraging as well as *Angophora* and *Melaleuca* with riparian habitats favoured by this species. However they are also known to use open country isolated flowering trees.	ALA, Bionet	Present. The species is present within the project area.
Grantiella picta	Painted Honeyeater	V	No	Found in low densities this nomadic species breeds west of the Great Dividing Range. Preferred habitat includes Boree/ Weeping Myall, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests.	ALA, Bionet, PMST	Low. While the project area contains some suitable habitat this species is not often recorded east of the Great Dividing Range, with only a small number of sightings within the broader locality.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	No	Distributed around the Australian coastline and inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include grassland, heathland, woodland, and forest.	ALA, Bionet	Moderate. The project area is not located along a large portion of an inland river, however there are records within the broader project area (>5 years)
Hamirostra melanosternon	Black-breasted Buzzard	V	No	Distributed sparsely in areas of < 500mm rainfall, from north-western NSW and north-eastern South Australia across northern Australia along inland timbered watercourses.	ALA, Bionet	Low. The project area is outside of this species usual distribution with only a single sighting within the broader locality.
Hieraaetus morphnoides	Little Eagle	V	No	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland, and forest in tall trees.	ALA, Bionet	Moderate. Suitable habitat occurs within the project area and records are found within the broader project area (>5 years).
Hirundapus caudacutus	White-throated Needletail	-	No	A migratory species, it is recorded along most of coastal eastern Australia west to the Great Dividing Range. Occurring as an aerial species over a broad range of habitats, roosting within dense canopy foliage or tree hollows.	ALA, Bionet, PMST	Present. This species has been recorded within the project area.
Irediparra gallinacea	Comb-crested Jacana	V	No	Occurring in permanent freshwater wetlands, which may be either still or slow-flowing, with a requirement of high surface cover of floating vegetation, including water-lilies, or fringing and aquatic vegetation.	ALA, Bionet	Low. Suitable habitat is not found within the project area, with few records from the broader locality.
Ixobrychus flavicollis	Black Bittern	V	No	This species has scattered records along the NSW east coast, where is inhabits both terrestrial and estuarine wetlands. These are generally densely vegetated with permanent water. Occasionally found in flooded grassland, forest, woodland, rainforest and mangroves.	ALA, Bionet	Low. Suitable habitat is not found within the project area, with few records found within the broader locality.
Lathamus discolor	Swift Parrot	E	Yes	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen, and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and nomadic, moving about in response to changing food availability. The project area did not occur within important mapped areas.	ALA, Bionet, PMST	High. Suitable habitat is present and this species has a number of records within the project area and locality (>5 years).

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Limicola falcinellus	Broad-billed Sandpiper	V	No	Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons.	PMST	None. This species is restricted to the coast with no records from the project locality.
Limosa lapponica	Bar-tailed Godwit	-	No	Most frequently recorded along major coastal river estuaries and sheltered embayments, it is rarely found in wetlands away from the coast. Sheltered bays, lagoons and estuaries with large mudflats or sandflats near seagrass meadows are preferred by this species, occasionally found on saltlakes and brackish wetland.	ALA, PMST	Low. Rarely recorded away from the coast, suitable habitat is not found within the project area, with few records from within the broader locality.
Limosa limosa	Black-tailed Godwit	V	No	A migratory bird most frequently recorded within NSW at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the coast, and inland. Sheltered bays, lagoons and estuaries with large mudflats or sandflats are preferred by this species, found on occasion on inland mudflats.	ALA, Bionet, PMST	Low. Rarely recorded away from the coast, suitable habitat is not found within the project area, with few records from within the broader locality.
Lophochroa leadbeateri	Major Mitchel's Cockatoo	V	No	This species occurs across the arid and semi-arid inland, sporadically further east than Bourke.	ALA	Low. The project area is outside this species usual distribution.
Lophoictinia isura	Square-tailed Kite	V	No	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems and it is a summer breeding migrant to the south-east. Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata or E. smithii.	ALA, Bionet	Low. This species has been minimally recorded within the broader project area and locality. Any individuals are likely to be passing through during migratory travel.
Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)	V	No	Widespread throughout Australia, this species is uncommon along the coast with few locations of large populations. Found in lightly wooded country, including open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	ALA, Bionet, PMST	Moderate. Potentially suitable habitat is found within the project area, with a number of records from the broader locality.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern)	V	No	This species is rarely recorded east of the Great Dividing Range and commonly found in drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark, White Box, Inland Grey Box, Yellow Box, Blakely's Red Gum and Forest Red Gum.	ALA, Bionet	Moderate. While this species is generally found inland there are a number of records within the broader locality with suitable habitat is found within the project area.
Monarcha melanopsis	Black-faced Monarch	-	No	A migratory species found along the NSW east coast, this species occurs in eucalypt woodland, rainforest, coastal scrub and damp gullies.	ALA, PMST	Present. This species has been recorded within the project area.
Motacilla flava	Yellow Wagtail	-	No	A migratory species that inhabits open country near water.	PMST	None. No records of this species are found within the broader locality.
Myiagra cyanoleuca	Satin Flycatcher	-	No	A summer breeding migrant, this species is not commonly seen. It occurs in tall forests including heavily forested gullies.	ALA, PMST	Low. Suitable habitat is found within the project area, however this species is rarely recorded from the broader locality.
Neophema chrysostoma	Blue-winged Parrot	V	No	Occurring mainly in Tasmania and Victoria, sparser populations are found in western New South Wales throughout a range of habitats.	PMST	None. The project area is outside this species usual distribution, with no records from the broader locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Neophema pulchella	Turquoise Parrot	V	No	Found from the coastal plains to the western slopes of NSW, this species occupies the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	ALA, Bionet	Moderate. Suitable habitat is found within the project area, with a number of records from the broader locality.
Ninox connivens	Barking Owl	V	No	The Barking Owl is found throughout continental Australia except for the central arid regions. Has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils.	ALA, Bionet	Moderate. Potential habitat occurs in the project area, with a limited number of records from the broader locality.
Ninox strenua	Powerful Owl	V	No	Endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains. Occurs at low densities throughout most of its eastern range, rare along the Murray River. Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well.	ALA, Bionet	Present. This species has been recorded within the project area
Numenius madagascariensis	Eastern Curlew	–	Yes	Spends non-breeding season in Australia where it occurs primarily along the coast and rarely inland. In NSW the species occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. Generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts.	ALA, Bionet, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present.
Oxyura australis	Blue-billed Duck	V	No	Most common within the southern Murray-Darling Basin, this species may be recorded in coastal areas during summer and drier years within deep swamps. This species is completely aquatic.	ALA, Bionet	Low. No suitable habitat is found within the project area.
Pachycephala olivacea	Olive Whistler	V	No	Two disjunct populations, this species occupies the beech forests around Barrington Tops and the MacPherson Ranges to the north, and south from Illawarra.	ALA, Bionet	Low. The project area is outside this species normal distribution, with limited records from the broader locality.
Pandion cristatus	Eastern Osprey	V	No	Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	ALA, Bionet	Low. This species is infrequently observed in the locality and marginal potential habitat only found within the project area.
Petroica boodang	Scarlet Robin	V	No	Occupys eucalypt forests and woodlands, with an open and grassy understorey with few scattered shrubs. This species occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps with fallen woody debris an important habitat component.	ALA, Bionet	Moderate. Suitable habitat is found within the project area and there are a number of records from the locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Petroica phoenicea	Flame Robin	V	No	This species breeds in upland areas with many birds moving to the inland slopes and plains during winter. Two separate populations are likely to exist in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands.	ALA, Bionet	Low. The project area is outside this species usual distribution with limited records from the broader locality.
Petroica rodinogaster	Pink Robin	V	No	Found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW. Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	ALA, PMST	Low. Rarely occurs so far north though occasional occurrences during winter cannot be discounted.
Pluvialis fulva	Pacific Golden Plover	-	No	A migratory species, rarely found away from coastal mudflats, estuaries, saltmarsh and beaches.	ALA, PMST	Low. This species is rarely found away from the coast with limited records from the broader locality.
Pluvialis squatarola	Grey Plover	-	No	Rarely found on the east coast of Australia, this species is restricted to coastal mudflats and sandy beaches.	ALA, PMST	Low. This species is rarely found away from the coast with limited records from the broader locality.
Polytelis swainsonii	Superb Parrot	V	No	The Superb Parrot is endemic to south-eastern Australia. It is found in the Riverina area of New South Wales and Victoria, and, in winter, in northern New South Wales. Inhabits box-gum, box-cypress-pine and boree woodlands and river red gum forest.	ALA, Bionet, PMST	Moderate. Potential habitat occurs in the project area with records from within the broader locality.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern)	V	No	Occupies open box-gum woodlands on the slopes, and box-cypress-pine and open box woodlands on alluvial plains as well as woodlands on fertile soils in coastal regions.	ALA, Bionet	Present. The species is present within the project area.
Ptilinopus magnificus	Wompoo Pigeon	V	No	The Hunter River is the southern limit for this species, which is found near rainforest, low elevation moist eucalypt forest and brush box forests.	ALA, Bionet	Moderate. Potential habitat occurs in the project area with records from within the broader locality, which is at the southern-most limit for this species distribution.
Ptilinopus regina	Rose-Crowned Fruit Dove	V	No	Newcastle is the southern limit for this species, which occurs in sub-tropical and dry rainforest sometimes in moist eucalypt and swamp forest with plentiful fruit.	ALA, Bionet	Low. Potential habitat occurs in the project area with limited historical records from within the broader locality, which is at the southern-most limit for this species distribution.
Ptilinopus superbus	Superb Fruit Dove	V	No	Occupies rainforest and similar closed forests, with an abundance of fruiting tree species including figs and palms, as well as eucalypt and acacia woodland with fruit-bearing trees.	ALA, Bionet	Low. Potentially suitable habitat occurs in the project area, with limited records from within the broader locality.
Pycnoptilus floccosus	Pilotbird	–	No	Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne. Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Its natural habitat is temperate wet sclerophyll forests and occasionally temperate rainforest, where there is dense undergrowth with abundant debris.	ALA, Bionet, PMST	Moderate. Suitable habitat is found within the project area, with records of this species from the broader locality.
Rhipidura rufifrons	Rufous Fantail	-	No	A migratory species occurring in dense wet forests, rainforest, swamp woodland and mangroves that provide deep shade.	ALA, PMST	Present. This species has been recorded within the project area.
Rostratula australis	Australian Painted Snipe	E	No	Important locations within NSW, with recent records, include the Clarence and lower Hunter Valleys. This species occupies swamp and dam fringes as well as nearby marshy areas with accompanying grass, low scrub or open timber cover.	ALA, Bionet, PMST	Low. Suitable habitat is not found within the project area, with few records from within the broader locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Stagonopleura guttata	Diamond Firetail	V	No	Not commonly found in coastal districts, this species prefers grassy eucalypt woodlands. It is also known to occur in open forest, mallee, temperate grassland and riparian habitat.	ALA, Bionet	Moderate. Suitable habitat is found within the project area and several records of this species are from the locality.
Sternula albifrons	Little Tern	E	No	Almost exclusively coastal, this species may occupy harbours, rivers and inlets several km from the sea.	ALA, Bionet, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present. A single record from within the broader locality.
Sternula nereis nereis	Australian Fairy Tern	-	No	It is unlikely that a NSW population persists, with this species occupying sheltered sandy beaches, spits and banks.	Bionet	None. Species rarely occurs away from the coast and preferred habitat not present.
Stictonetta naevosa	Freckled Duck	V	No	This species rarely occurs along coastal NSW during times of inland drought when it is forced to disperse. During these times permanent water including lakes, reservoirs and farm dams are utilised.	ALA, Bionet	Low. No suitable habitat is found within the project area. While a number of records are within the broader locality these are likely during times of inland drought.
Symposiachrus trivirgatus	Spectacled Monarch	-	No	Occurs in rainforest with a thick understorey, wet gullies as well as riparian habitat and mangrove.	ALA, PMST	Low. Limited suitable habitat is found within the project area with few records from within the broader locality.
Turnix maculosus	Red-backed Button-quail	V	No	Found in grasslands, open and savannah woodlands with grassy ground layer or pastures and crops in regions with >400 mm of annual rainfall. This species prefers sites near water with dense grassland or sedgelands near creeks, swamps springs and wetland.	ALA, Bionet	Low. This species has not been recorded within the project area or broader locality, all but a single record.
Tyto longimembris	Eastern Grass Owl	V	No	Occurs in areas of tall grass, including tussocks, swamps, grassy plains, swampy heath and sedges on floodplains.	Bionet	Low. Few records within the broader locality.
Tyto novaehollandiae	Masked Owl	V	No	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	ALA, Bionet	Present. This species has been recorded within the project area.
Tyto tenebricosa	Sooty Owl	V	Yes	Sooty Owl is found in rainforest types from dry to subtropical and warm temperate as well as moist eucalypt forest. This species requires tall tree hollows or heavy vegetation for day roosting, and very large tree hollows for nesting.	ALA, Bionet	Present. This species has been recorded within the project area.
Xenus cinereus	Terek Sandpiper	V	No	A rare migrant to the east Australian coast, the Hunter River estuary has been noted as significant to the species. This species utilises mudflats and sandflats near mangroves, known to travel up to 10 km inland around brackish pools.	ALA, PMST	Low. Species rarely occurs away from the coast and preferred habitat not present, with an individual record from within the broader locality.
Mammals						
Cercartetus nanus	Eastern Pygmy Possum	V	No	Occurs across a broad range of habitats from rainforest through sclerophyll forest and woodland to heath, with a preference for woodlands and heath, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities. Banksias, eucalypts and bottlebrush are regular feed trees.	ALA, Bionet	Present. This species has been recorded within the project area.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Chalinolobus dwyeri	Large-eared Pied Bat	V	Yes	Found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Occurs mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.	ALA, Bionet, PMST	High. Suitable habitat is present and this species has been recorded within the project area (<5 years).
Dasyurus maculatus	Spotted-tail Quoll	V	No	Occupies a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest to the coast.	ALA, Bionet, PMST	Present. The species is present within the project area.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	No	Found in moist habitats, with trees taller than 20 m with eucalypt hollows suitable for roosting.	ALA, Bionet	Moderate. Suitable habitat is found within the project area with records from the broader project area (>5 years).
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	No	Occurring east of the Great Dividing Range within dry sclerophyll forest, woodland, swamp forests and mangrove forests with suitable hollows available for roosting.	ALA, Bionet	Moderate. Suitable habitat is found within the project area with records from the broader project area (>5 years).
Miniopterus australis	Little Bent-winged bat	V	Yes	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	ALA, Bionet	High. Potential habitat occurs in the project area with several records from the project area (<5 years).
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	Yes	Occurs along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings, and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. At other times of the year, populations disperse within about 300 km range of maternity caves. Hunt in forested areas, catching moths and other flying insects above the tree tops.	ALA, Bionet	High. Potential habitat occurs in the project area with several records from the project area (<5 years).
Myotis Macropus	Southern Myotis	V	No	Found along a coastal band, this species roosts in dense foliage, caves, hollow-bearing trees, culverts and mine shafts close to water.	ALA, Bionet	Moderate. Suitable foraging habitat occurs within the project area with records from the broader project area (>5 years).
Notamacropus parma	Parma Wallaby	V	No	This species prefers moist eucalypt forest, with a dense shrubby understorey adjacent to grassy areas, rainforest margins and sometimes drier eucalypt forest.	ALA, Bionet, PMST	Present. This species has been recorded within the project area
Nyctophilus bifax	Eastern Long-eared Bat	V	No	Occupies lowland subtropical rainforest and wet swamp eucalypt forest, with a preference for coastal rainforest and patches of coastal scrub.	ALA	Low. Suitable habitat is present within the project area, with limited records from the broader locality.
Nyctophilus corbeni	Corben's Long-eared Bat	V	No	Found in a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities. A preference is shown for box/ironbark/cypress-pine vegetation along the western slopes and plains of NSW.	Bionet, PMST	Low. Suitable habitat may be present within the project area, with limited records from the broader locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Petauroides volans	Southern Greater Glider	E	No	The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The distribution may be patchy even in suitable habitat. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	ALA, Bionet, PMST	Present. This species has been recorded within the project area.
Petaurus australis	Yellow-bellied Glider	V	No	Found in tall mature eucalypt forest in areas with high rainfall, with mixed coastal forests to dry escarpment forests utilised in the north, and moist coastal gullies and creek flats to tall montane forests in the south.	ALA, Bionet, PMST	Present. This species has been recorded within the project area.
Petaurus norfolcensis	Squirrel Glider	V	No	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or *Acacia* midstorey.	ALA, Bionet	Present. This species has been recorded within the project area.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	Yes	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland, and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves, and crevices.	ALA, Bionet, PMST	Present. This species has been recorded within the project area.
Phascogale tapoatafa	Brush-tailed Phascogale	V	No	This species prefers dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter. Known to inhabit heath, swamps, rainforest and wet sclerophyll forest, foraging preferentially in rough barked trees of 25 cm DBH or greater. Brush-tailed Phascogale nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span.	ALA, Bionet	Present. This species has been recorded within the project area.
Phascolarctos cinereus	Koala	E	No	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	ALA, Bionet, PMST	Present. This species has been recorded within the project area.
Phoniscus papuensis	Golden-tipped Bat	V	No	This species occupies rainforest and adjacent wet and dry sclerophyll forest as well as tall open forest, casuarina-dominated riparian forest and coastal melaleuca forests.	ALA, Bionet	Moderate. Suitable habitat is present with a number of records within the project area (>5 years).
Potorous tridactylus	Long-nosed Potaroo	V	No	Occurs in coastal heaths and dry and wet sclerophyll forests featuring a dense understorey with occasional open areas. Habitat may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas on a sandy loam soil. is also a common feature.	ALA, Bionet, PMST	Present. This species has been recorded within the project area
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	No	In NSW this species occupies heathland and is most common in dense, wet heath and swamps.	Bionet	Low. Suitable habitat is not present within the project area with very limited records within the broader locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Pseudomys novaehollandiae	New Holland Mouse	-	No	Occupies open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes.	ALA, Bionet, PMST	Moderate. Suitable habitat may be present within the project area, with a number of records from the broader locality.
Pteropus poliocephalus	Grey-headed Flying-fox	V	No	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	ALA, Bionet, PMST	High. Suitable habitat is present with a number of records within the project area (<5 years).
Saccolaimus flaviventris	Yellow-bellied Sheathtailed-bat	V	No	Forages in most habitats across a very wide range.	ALA, Bionet	Moderate. Suitable habitat may be present within the project area, with a number of records from the broader locality.
Scoteanax rueppellii	Greater Broad-nosed Bat	V	No	Commonly found in tall wet forest, this species also occupies a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest.	ALA, Bionet	Moderate. Suitable habitat present within the project area, with a number of records from within the project area (>5 years).
Thylogale stigmatica	Red-legged Pademelon	V	No	Rarely found outside forested habitat, this species occupies forest with a dense understorey and ground cover, including wet gullies, rainforest, moist eucalypt forest and vine scrub.	ALA, Bionet	Low. Suitable habitat is found within the project area, with few records within the broader locality.
Vespadelus troughtoni	Eastern Cave Bat	V	Yes	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings. Occasionally found along cliff-lines in wet eucalypt forest and rainforest.	ALA, Bionet	High. Suitable habitat is found within the project area, with records within the project area (<5 years).
Reptiles						
Aprasia parapulchella	Pink-tailed Legless Lizard	V	No	The Pink-tailed Legless Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks.	ALA, Bionet, PMST	Low. Potential suitable habitat may be found within the project area, with limited records from the broader locality.
Delma impar	Striped Legless Lizard	V	No	Occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Found in natural temperate grassland, secondary grassland and open box-gum woodland. Habitat is typically dominated by perennial, tussock-forming grasses such as Kangaroo Grass Themeda australis, spear-grasses Austrostipa spp. and poa tussocks Poa spp., and occasionally wallaby grasses Austrodanthonia spp., though can occur in modified grasslands with a significant content of exotic grasses.	ALA, Bionet, PMST	High. Potential suitable habitat may be found within the project area, with limited records from the broader locality.
Hoplocephalus bitorquatus	Pale-headed Snake	V	No	The Pale-headed Snake is a highly cryptic species that can spend weeks at a time hidden in tree hollows and stags mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. This species favours habitats close to riparian areas in direr zones.	Bionet	Low. Potential suitable habitat may be found within the project area, with limited records from the broader locality.

Scientific name	Common name	BC Act[1]	SAII	Habitat	Source[2]	Likelihood of occurrence
Hoplocephalus bungaroides	Broad-headed Snake	E	No	This species shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring and moves to shelters in crevices or hollows in large trees within 500m of escarpments in summer.	PMST	Low. Potential suitable habitat may be found within the project area, with no records from the broader locality.
Hoplocephalus stephensii	Stephen's Banded Snake	V	No	Occurs in rainforest and eucalypt forests and rocky areas up to 950 m in altitude. This species shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day.	ALA, Bionet	Present. This species has been recorded within the project area.
Varanus rosenbergi	Rosenberg's Goanna	V	No	Occupies heath, open forest and woodland.with termites critical to the species.	Bionet	Low. Potential suitable habitat may be found within the project area, with limited records from the broader locality.

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered, EX = Presumed Extinct under the BC Act

(2) Source: PMST = The Department of the Environment and Energy's EPBC Protected Matters Search Tool, BioNet = ESS's Bionet Atlas of NSW Wildlife, ALA = Atlas of Living Australia

Table B.2 Threatened fish species listed under Fishery Management Act (1994) likelihood of occurrence

Scientific name	Common name	FM Act[1]	SAII	Habitat	Source	Likelihood of occurrence
Craterocephalus amniculus	Darling River Hardyhead population in the Hunter River Catchment	EP	No	The Darling River Hardyhead is found in the upper tributaries of the Darling River near the Queensland and New South Wales border. The Hunter River population is the only known occurrence of the species in an eastward flowing river. They are usually found in slow flowing, clear, shallow waters or in aquatic vegetation at the edge of such waters. The species has also been recorded from the edge of fast flowing habitats such as the runs at the head of pools.	Fisheries NSW Spatial Data Portal	Moderate Waterways present upstream of the project area are identified as habitat, with past records with the northern extent of the area.
Epinephelus daemelii	Black Rockcod	V	No	Generally inhabit near-shore rocky and offshore coral reefs at depths down to 50 m, but are occasionally recorded from deeper waters. In coastal waters adult black cod are found in rock caves, rock gutters and on rock reefs. Black cod are an aggressive, territorial species and individuals may occupy one particular cave for most of their adult lives. Recently settled juvenile black cod (i.e. individuals that have recently completed the pelagic larval stage) are often found in coastal rock pools while slightly older juvenile black cod are often found in estuary systems	PMST	Low The freshwater ecology of the project area is unsuitable for this salt water dependent species to occur.
Thunnus maccoyii	Southern Bluefin Tuna	E	No	The forms a single widely distributed population in the southern, temperate oceans, but with a single known spawning ground in the Indian Ocean, between Java and northern Western Australia.	PMST	Low The freshwater ecology of the project area is unsuitable for this salt water dependent species to occur.
Mogurnda adspersa	Southern Purple Spotted Gudgeon	E	No	The Southern Purple Spotted Gudgeon occurs in the Murray-Darling basin as well as parts of coastal northern NSW and Queensland. The species can be found in a variety of habitats such as rivers, creeks, streams and billabongs with slow-flowing or still waters. Cover in the form of aquatic vegetation, overhanging vegetation from riverbanks, leaf litter, rocks or snags are important for the species.	Fisheries NSW Spatial Data Portal	High. Waterways present within the project area are identified as habitat, with a record upstream from the northern extent of the area.

(1) V = Vulnerable, E = Endangered, CE = Critically Endangered, EX = Presumed Extinct, EP = Endangered Population under the Fisheries Management Act 1994
(2) Source: PMST = The Department of the Environment and Energy's EPBC Protected Matters Search Tool, BioNet = ESS's Bionet Atlas of NSW Wildlife
(3) Fisheries Management Act 1994