



METROPOLITAN COAL CONSTRUCTION MANAGEMENT PLAN

SURFACE WORKS ASSESSMENT FORM

GROUNDWATER MONITORING BOREHOLES

JANUARY 2024

Background

The subject Surface Works Assessment Form (SWAF) is submitted to Department of Planning & Environment (DPE) and WaterNSW for the proposed vegetation clearance for access tracks and installation of groundwater monitoring boreholes and soil moisture probes.

Groundwater monitoring boreholes and soil moisture probes will be installed in each swamp. One monitoring borehole will be drilled to a depth of approximately 10 m (within the underlying rock) while the other would be drilled to remain within the swamp sediment. Based on sediment depths measured during the swamp reconnaissance inspections, the shallower (i.e. swamp sediment) monitoring bore will be approximately 600 mm to 1 m deep. Where suitable, a soil moisture probe will also be installed to depths between 0.3 – 0.9 m.

A summary of the groundwater monitoring boreholes and access tracks proposed in this SWAF is provided in Table 1.

Table 1

Site	Piezometer Depth	Vegetation Clearance (ha)
74a	1m/10m	0.040
74b	1m/10m	0.062
75a	1m/10m	0.016
106a	1m/10m	0.068
106b	1m/10m	0.049
106c	1m/10m	0.079
113a	1m/10m	0.033
115a	1m/10m	0.023
119b	1m/10m	0.061
128a	1m/10m	0.032
129a	1m/10m	0.039
14a	1m/10m	0.124

The planned timing of the boreholes and access tracks is subject to approval of this SWAF. This SWAF provides details of construction and environmental management measures for the proposed as outlined in the Metropolitan Coal Construction Management Plan (ConMP) as approved by DP&E on 25 August 2015.

Site Location

The site is within the Woronora Special Area in the local government area (LGA) of Wollongong City Council. The Woronora Special Area covers a region of approximately 75 square kilometres (km²) and includes the catchment of Woronora Dam. WaterNSW manages the Woronora Special Area and public access is restricted.

The proposed activities are situated within the Metropolitan Coal mining lease (Consolidated Coal Lease (CCL) 703). The township of Helensburgh is located approximately 5 km to the east.

Construction Management Plan Surface Works Assessment Form

**Note, this form must be completed in full
prior to the commencement of surface disturbance works**

Date: January 2024

Name and position: Kane Organ (Environment and Community Coordinator)

Register number (i.e. Number 1, 2, etc.):

RMP register number: 18

Site names: Swamps 74a, 74b, 75a, 106a, 106b, 106c, 113a, 115a, 119b, 128a, 129a, 14a

Site types: Environmental monitoring sites – groundwater monitoring boreholes, access tracks and moisture probes

Site co-ordinates (easting/northing): Coordinates in table below

Site	Piezometer depth / Site type	Easting	Northing
74a	1m/10m	310097.31	6218256.06
74b	1m/10m	310173.45	6218459.53
75a	1m/10m	310247.02	6218150.35
106a	1m/10m	309497.68	6216440.94
106b	1m/10m	309369	6216931
106c	1m/10m	309535.98	6217372.61
113a	1m/10m	309645.69	6216827.84
115a	1m/10m	309744.98	6216934.14
119b	1m/10m	309720.49	6217369.69
128a	1m/10m	310145.25	6218714.15
129a	1m/10m	310069.61	6218622.76
14a	1m/10m	309007.88	6216311.16

Expected duration of works:

Approximately one to two days per swamp for drilling, borehole installation, and moisture probe construction. Access tracks would be cleared prior to the drilling.

The entire construction campaign is expected to take approximately three to five weeks, weather permitting.

Works schedule:

- Describe the activities (including timing) to be conducted during construction works.

- Risk Assessment
- Flora, Fauna and Archaeological Assessments

- *Personnel training and awareness – prior to commencement of activities*
- *Establishment and implementation of pre-construction management measures (e.g. erosion and sediment controls, vegetation clearance)*
- *Delivery of equipment by ATV/quad bike, rubber-tracked remote access drill rig and by hand - approximately one to two days per site.*
- *Site clean-up (e.g. removal of equipment, materials and waste) - approximately half a day per site.*
- *Monitoring during and following completion of construction.*

Groundwater Monitoring Boreholes (Piezometers)

Twelve (12) borehole sites include piezometers to be installed to a depth of one (1) meter and to a depth of approximately ten (10) meters (within the underlying rock). See Attachment 1.

Site preparation will involve:

- *Use of existing tracks and fire trails*
- *Access to the monitoring bore construction sites will be from existing access roads. Narrow (1-1.2 m wide) tracks to each construction site will be slashed for pedestrian access and equipment and materials delivery/removal.*
- *Use of “trittering” attachment to mulch vegetation in-situ*
- *Prepare each borehole site (including a level drill pad and border set down and work area approximately 5 x 5 m)*
- *Erosion and sediment controls*

Drilling of boreholes will involve:

- *Drilling will occur during forecast dry weather wherever practicable.*
- *Delivery of drill rigs to site (including ancillary equipment).*
- *Water delivery (water to lubricate and flush cuttings which will be deposited into a closed reticulated system i.e. an above-ground containerised drill water sump). Containerised drill water and cuttings will be removed from site.*
- *The deep (10m) and shallow (1m) boreholes will be drilled utilising open hole hammer techniques. Groundwater monitoring bores will have a diameter of up to 100 mm. The 10 m deep bores will be drilled using a small remote access drill rig or man portable drill rig, while the shallow swamp sediment bores will be drilled with a hand auger. An air compressor will be located on adjacent access trails with a pressure rated airline secured along the access track. Due to the shallow nature and moisture content of the bores dust generated during drilling is expected to be very minor, cuttings will be collected and disposed of offsite.*
- *The 10 m deep monitoring boreholes will be drilled in Hawkesbury Sandstone which will negate the need for chemicals to reduce swelling clays. Swelling clays are typically found in the Stanwell Park Claystone and the Wombarra Shale. Metropolitan Coal has drilled approximately 300 holes of similar depth in the Hawkesbury Sandstone and only water has been used to remove cuttings.*
- *PVC borehole screen (50 mm) with blank PVC casing will be installed and packed with a sand gravel mix sealed with bentonite and cement grout to surface. Each monitoring borehole to be protected by installation of a steel monument.*
- *Water level sensor and data logger will be installed within each borehole.*
- *Revegetation (Brush Matting, planting and/or direct seeding)*
- *Site clean-up (e.g. removal of equipment, materials and waste) and rehabilitation will be in accordance with Metropolitan Coal’s Rehabilitation Management Plan.*
- *Monitoring program associated with swamp groundwater will be incorporated into future Biodiversity Management Plans*

Fuel management will involve:

- Large quantities of fuel will not be stored on site. Fuel will be transported in closed containers (e.g. jerry cans). 60 L plastic containers will be used to hold fuel cans after use. Re-fuelling will be conducted using an appropriately sized funnel. Refuelling of equipment will be completed before the equipment is transported to the drill site so as to reduce the requirement of transporting fuel. Care will be taken not to spill fuel. Oil/fuel absorbent materials or other containment materials will be made available at the site to prevent contact with the surrounding environment.

- Equipment (e.g. drill rigs, pumps) will be regularly inspected for leaks of oil/fuel/coolant. Impervious bunding will be provided with greater than 110% of the capacity of the item being banded. Spill containment/treatment resources (i.e. spill kits) will be provided and personnel will be trained in their use. The spill kits will include: absorbent material 40 L bag of Organic Oil/Fuel absorbent; absorbent pads: 20 of 480 X 430 mm pads; garbage bags; shovel; and a bag of rags.

Any spill that occurs will be immediately cleaned up and reported to:

- the site supervisor;
- the Metropolitan Coal Environment & Community Superintendent (Stephen Love 0417 584 121); and
- Water NSW (via the incident Management Number 1800 061 069).
- The site supervisor and the Metropolitan Coal Environment & Community Superintendent will investigate any spills.

Moisture Probes

- Soil moisture probes installed to depths between 0.3 – 0.9 m.

Site Rehabilitation

- Construction sites will be rehabilitated in accordance with Metropolitan Coal's Rehabilitation Management Plan.
- The area disturbed by the footprint of the drill rig, rod carriers, settling tanks and access tracks will be remediated.

Human Wastewater

- A portable toilet will be located on a proximal access road near the construction sites. The toilet will be serviced fortnightly with a vacuum truck.

Review of baseline information - site features (refer Section 5 of the ConMP)

Are any of the following features located within the proposed disturbance area or immediate surrounds?

Are there occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils EEC in the general area? **No**

Are there occurrences of the O'Hares Creek Shale Forest EEC in the general area? **No**

Are upland swamps located in the general area? **Yes**

Are there records of known threatened flora species in the general area? **Yes**

A Twelve threatened flora were considered to have a High or Moderate likelihood of occurrence in the study area prior to field survey: *Acacia baueri* subsp. *baueri*, *A. bynoeana*, *Astrotricha crassifolia*, *Callistemon linearifolius*, *Cryptostylis hunteriana*, *Epacris purpurascens* var. *purpurascens*, *Eucalyptus camfieldii*, *Genoplesium baueri*, *Leucopogon exolasius*, *Melaleuca deanei*, *Persoonia hirsuta* and *Pultenaea aristata*. Many *Pultenaea aristata*

individuals were recorded during the survey with the species being locally abundant. No individuals were recorded within the proposed borehole sites.

Are there records of known threatened fauna species in the general area? **No**

Are existing (or proposed) monitoring sites located nearby? **No**

What vegetation type is present?

Native vegetation communities that will be impacted by the proposal include:

- *PCT 3598: Woronora Plateau Scribbly Gum Woodland*

- *PCT 3814: Woronora Plateau Heath-Mallee*

- *PCT 3924: Sydney Coastal Upland Swamp Heath*

Are known Aboriginal heritage sites present? **Yes**

Is this an area in which disturbance is to be avoided and/or limited? (refer Sections 6.1.1 and 6.1.2 of the ConMP) **No**

If the proposed disturbance area is located in an area to be avoided or limited, relocate site where appropriate in accordance with the requirements of the ConMP

Threatened flora survey (refer Section 6.1.3 of the ConMP)

Date of survey for threatened flora.

September 12, 13 and 14 2023

Name of suitable qualified ecologist conducting survey

Justin Merdith, Niche Environment & Heritage

Have any threatened flora been identified within the proposed disturbance area or immediate surrounds. **Yes**

Pultenaea aristata individuals were recorded during the survey of the proposed borehole sites and the species is known to be locally abundant. All *Pultenaea aristata* within the proposed development area have been marked with pink flagging tape. *P. aristata* individuals at all sites will be made known to project personnel so they can be avoided and protected during works. Within dense areas of threatened plants the vegetation clearing will be reduced and completed by hand-held devices, this will ensure the proposed works avoid any individuals of *P. aristata*.

Scientific names of threatened flora species recorded.

Pultenaea aristata

Will works be relocated to avoid or minimise impacts on the threatened flora species? **Yes**

The groundwater bore construction sites and access tracks have been located to avoid the known records of Pultenaea aristata.

If it is not feasible to relocate the works, have the impacts of the proposed works on the population of the threatened flora species been assessed by a suitably qualified and experienced ecologist? **Yes**

If No, do not proceed

Has the assessment concluded that the proposed surface activities are likely to have a significant impact on a population of the threatened flora species? **No**

If Yes, the proposed works are to be modified to avoid such an outcome

[Attach any relevant ecological reports to this assessment form]

Flora, Fauna and Archaeological Assessment Metropolitan Coal – Swamp Piezometer Installation (Project No: 5410) attached as Attachment 1

Vegetation clearance and site access (refer Section 6.1.6 of ConMP)

Is vegetation clearing required for the construction works? If yes, describe extent (e.g. m²) and method of clearing (e.g. slashing/lopping branches/removal)? **Yes**

The proposal seeks to minimise disturbance by using previously developed tracks where possible. It would result in approximately 0.21 hectares of vegetation disturbance.

Describe the access requirements for the construction site (e.g. vehicle/pedestrian/helicopter) and where the access will be from (e.g. which fire road).

An access track approximately 1-1.2m wide will be required from the nearest existing access road to each groundwater monitoring bore construction site. This access track will be used for pedestrian access and equipment and materials delivery/removal using an ATV/quad bike and a rubber-tracked remote access drill rig.

Is vegetation clearing required for site access? If yes, describe the extent and method of clearing?

Yes

The access track described above will be slashed above ground level with vegetation root mass left in situ. The access tracks will be created from the nearest existing access point (e.g. fire roads or public roads). Access tracks will be located to avoid disturbance to larger trees, with existing trails and cleared areas used for access where possible.

Vegetation management measures to be implemented (refer Section 6.1.4 of the ConMP)

Disturbance would be appropriately limited by the following mitigation measures:

- Care will be taken to minimise disturbance to native vegetation.*
- Equipment will be transported to the construction site by hand and ATV/quad bike and rubber-tracked remote access drill rig to minimise impacts to vegetation from vehicles.*
- Existing fire trails, tracks and exposed bedrock will be used for access and placement of equipment.*
- Vegetation disturbance along access tracks will be kept to the minimum necessary.*
- Cleared vegetation will be placed within the footprint of clearing and not on adjacent vegetation.*

Site Layout Plan (refer Section 6.1.5 of ConMP)

Has a Site Layout Plan been prepared and attached to the Works Assessment Form?

Yes

Have the following been indicated on the Site Layout Plan?

- Site location
- Works design
- Management measures (e.g. erosion and sediment controls, spill kits)
- Access track/s (indicate type of access, e.g. pedestrian/vehicle. Also indicate location of nearest fire trail where access will be from)
- Areas of vegetation clearance
- Location of equipment (e.g. pump, generator, fuel storage, portable toilets)
- Equipment storage areas
- Safety equipment (e.g. fire extinguisher and first aid kit)

Attach photographs, where appropriate



Photo showing indicative ground conditions within upland swamps and an example of an existing access track.



Photo showing exposed rock within swamps. No direct disturbance of exposed rock outcrop would be conducted. Exposed rock areas would be used for access and transport of materials where required.



Photo showing a swamp with less dense vegetation. Limited slashing would be required for access tracks in areas like this.



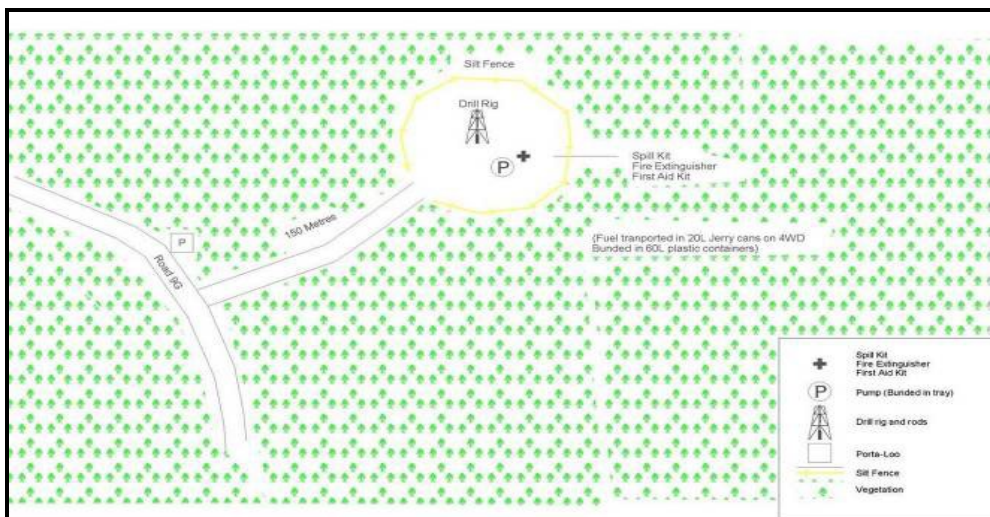
Photo showing an existing access track within a swamp



Photo showing site access through woodland with flagged pink tape P. aristate to be avoided



Photo of a typical groundwater bore installation within a swamp. Note vegetation re-establishing within the cleared area following construction.



Indicative site layout plan of proposed groundwater monitoring sites. Access tracks are shown. A portable toilet will be located in an easily accessible location near the construction sites.

Aboriginal heritage pre-clearance survey (refer Section 6.2 of the ConMP)

Date of pre-clearance survey for Aboriginal heritage sites.

A visual inspection was conducted on 11 September 2023. An extensive search of the Aboriginal Heritage Information Management System (AIMS) was conducted on 10 October 2023.

Name of suitably qualified archaeologist conducting survey.

Olivier Rochecouste (Heritage Consultant) and Chelsea Freeman (Heritage Consultant), Niche Environment & Heritage.

Are any Aboriginal heritage sites identified within the proposed disturbance area or immediate surrounds? **Yes**

Description of recorded Aboriginal heritage sites.

Several previous Aboriginal Cultural Heritage Assessments have been carried out within proximity to the Activity Area (Kayandel 2006, 2007 & 2008). These studies show that the landscape and environment of the Woronora Dam Special Area consists of slopes, sandstone rock platforms and outcrops, swamps, and low-lying sclerophyll with a severely reduced number of large old growth trees. There are also many ephemeral and intermittent drainage lines which flow into and contribute to the Woronora Dam's water supply. The noted landscape features and environment, informed by the extensive AHIMS site search, suggests that sandstone shelters containing art, artefacts and/or potential archaeological deposits, and sandstone rock platforms containing axe grinding grooves are the most prevalent site types expected within the Activity Area.

Will works be relocated to avoid impacts on the Aboriginal heritage site? **Yes**

If it is not feasible to relocate the works to avoid impacts to the Aboriginal heritage site, management and/or mitigation measures to be implemented in accordance with the Metropolitan Mine Heritage Management Plan. Describe measures below.

Where avoidance is not practicable, has a comprehensive baseline record been obtained and salvage considered in consultation with Aboriginal stakeholders prior to disturbance.

Niche Environment and Heritage's Aboriginal Heritage Due Diligence Assessment is attached as part of Attachment 1.

Known Aboriginal heritage sites located close to surface disturbance works

Details of demarcation (e.g. fencing, sign-posting or temporary flagging) implemented to avoid accidental damage to known Aboriginal heritage sites located close to surface disturbance works.

The following recommendations are made:

- *Standard work procedures for protection and reporting of Aboriginal objects of Metropolitan Coal and sites be implemented*
- *Project personnel to be made aware of the archaeological sites near swamp access track 89 and Stream P surface water monitoring track to avoid any disturbance outside the alignment of the 0.5 m track clearing*
- *Should Aboriginal objects or sites be identified during any works, works should cease in the vicinity of the find and a qualified archaeologist should be consulted on appropriate management actions*

Erosion or sediment control measures required?

- | | |
|---|------------|
| - Is any erosion or sediment control required? | Yes |
| - If yes, has an Erosion and Sediment Control Plan been prepared and attached to the Surface Works Assessment Form? | Yes |

Fuel and spill management measures required?

- | | |
|--|------------|
| - Are compressors and pumps bunded and with sufficient capacity? | Yes |
| - Where fuels are used, are spill kits available at the construction site? | Yes |
| - Have personnel been trained in spill clean-up procedures? | Yes |

List Hazardous Materials and Storage Requirements

- What hazardous materials are required to be used and how will they be stored on site?

If fuel (diesel or petrol) is required at the swamp drill site it will be stored on-site during construction works in bunded containers.

- | | |
|---|------------|
| - Are Materials Safety Data Sheets (MSDS) for hazardous materials located at the construction site? | Yes |
|---|------------|

Bushfire Preparedness and Management

- | | |
|---|------------|
| - Have MCPL staff and contractors been provided with fire awareness and fire safety training? | Yes |
| - Has a Hot Work Permit been obtained from the Water NSW if required? | N/A |

As the Bushfire season has commenced, a Hot Work Permit will be used for any work that involves high temperatures and fire risk. This includes the use of chainsaws and other equipment associated with vegetation management. Metropolitan Coal will use the following measures when conducting any hot work:

- Presence of a 9L fire extinguisher.*
- No works will be carried out on a Total Fire Ban day.*
- A dedicated fire observer will be present at all times during hot works.*

Groundwater Monitoring Borehole Installation

Erosion and Sediment Control Plan

This Erosion and Sediment Control Plan (ESCP) has been developed for the construction of groundwater monitoring bores within upland swamps. The purpose of this ESCP is to minimise the risks of the groundwater bore construction activities causing erosion or sedimentation. The construction activities will involve the use of a mobile drill rig to drill a shallow groundwater bore at approximately 10 m depth and hand augering of a swamp sediment bore to a depth of approximately 600 mm to 1 m. The construction of the bores is anticipated to take approximately one to two days per swamp. Construction will be conducted during dry weather wherever practicable.

Groundwater borehole construction sites have been selected to minimise the potential for erosion, such as locating the drilling site on flatter ground, away from drainage paths.

Boreholes will only be constructed when there is no flowing water within the drilling site to minimise the potential for sediment transport away from the construction site.

Sediment control measures will be implemented around the drill sites in accordance with the *Management Urban Stormwater: Soils and Construction Volumes 1 and 2A* as required.

All sediment, cuttings and drilling fluids will be collected and transferred off-site for disposal.

Given the construction works are only anticipated to take one day per swamp, all construction equipment and materials will be transported into and out of the swamp each day.

Weekly inspections of erosion and sediment control structures for structural integrity and effectiveness will be conducted by the Metropolitan Coal Environmental Coordinator or their delegate.

At the conclusion of the construction works all construction equipment and materials will be removed from site including all waste materials and sediment recovered from the construction area.

Attachment 1

*Ecological and Archaeological Assessment Metropolitan Coal – 317-318 Upland Swamp
Piezometer Installation*

317-318 Upland Swamp SWAF – Aboriginal Objects Due Diligence Assessment

Ecological and Archaeological Assessment

Metropolitan Coal – 317-318 Upland Swamp Piezometer Installation

Helensburgh, NSW

Prepared for Metropolitan Coal Pty Ltd

Prepared by Niche Environment and Heritage | 14 November 2023



Document control

Project number	Client	Project director	Project manager	LGA
8288	Metropolitan Coal	Chris McEvoy	Justin Merdith	Wollongong City Council

Version	Author	Review	Status	Date
D1	Justin Merdith	Kai Whitaker	Draft	27/10/23
D2	Justin Merdith	Kane Organ	Draft	30/10/23
R1	Justin Merdith	Kane Organ	Final	14/11/23

© Niche Environment and Heritage Pty Ltd (ACN 137 111 721) 2018

Copyright protects this publication. All rights reserved. Except for purposes permitted by the Australian Copyright Act 1968, reproduction, adaptation, electronic storage, transmission and communication to the public by any means is prohibited without our prior written permission. Any third party material, including images, contained in this publication remains the property of the specified copyright owner unless otherwise indicated, and is used subject to their licensing conditions.

Disclaimer

While Niche Environment and Heritage Pty Ltd uses care and diligence in the preparation of this report, it is not responsible or liable for any mistakes, misprints, omissions or typographical errors. None of Niche Environment and Heritage Pty Ltd, nor its editors or authors are responsible for the results of any actions taken on the basis of information in this publication. Niche Environment and Heritage Pty Ltd and its editors and authors expressly disclaim all and any liability and responsibility to any person or organisation in respect of, or as a consequence of, anything done or omitted to be done by any person or organisation in reliance, whether wholly or partially, upon the whole or part of any of the contents of this publication, including any photographs, statements or descriptions. No representation is made as to the suitability of this publication for any particular purpose. The views expressed in this publication are not necessarily endorsed by this publication, its editors or authors, or the owners or management of Niche Environment and Heritage Pty Ltd.

Enquiries should be addressed to:

Sydney Head Office
Niche Environment and Heritage
02 9630 5658
info@niche-eh.com
PO Box 2443 North Parramatta
NSW 1750 Australia

Executive summary

Niche Environment and Heritage (Niche) has undertaken an assessment of the ecological and archaeological constraints and potential impacts associated with the development of 12 proposed swamp piezometer groundwater monitoring sites by Metropolitan Coal. The piezometer sites are required to undertake groundwater monitoring within upland swamps in relation to potential mine induced subsidence impacts in order to meet Agency requirements.

The 12 piezometer sites include Sites 128a, 129a, 74a, 74b, 75a, 119b, 106a, 106b and 106c, 115a, 113a and 14a (Refer Figures 2 and 3). At each site there will be a shallow piezometer (up to 1 m deep), a deep piezometer (up to 10 m deep) and soil moisture probe (up to 1 m deep) installed.

The relevant management measures as outlined in the Metropolitan Coal Construction Management Plan (Peabody Energy 2018) shall be implemented in order to avoid and minimise impacts to the environment. Primary clearing will be required of up to a 1 m wide track and up a 5 m x 5 m area at each proposed borehole site. The proposal would result in up to 0.64 ha of native vegetation to be cleared.

Provided mitigation measures detailed within the management plan and this report are implemented, the proposal is not likely to cause a significant impact to any Threatened Ecological Communities (TEC) or threatened biodiversity listed on the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act).

The proposed sites have been inspected by Chelsea Freeman (Heritage Consultant- Niche) and Justin Merdith (Environmental Approvals Consultant – Niche). An Aboriginal Objects Due Diligence Assessment has concluded there is unlikely to be adverse effects to Aboriginal cultural heritage sites as a result of the proposed borehole sites and access tracks (refer Annex 3).

This report supports the Surface Works Assessment Form required to be completed for the proposed activities under the Metropolitan Coal Construction Management Plan. Metropolitan Coal will provide the details of the proposed surface construction works in the form of a completed Surface Works Assessment Form to the DPE and WaterNSW for comment.

Table of Contents

Executive summary	i
Table of Contents	ii
1. Introduction	1
1.1 Context	1
1.2 Proposed works	1
1.2.1 Overview	1
1.2.2 Access and Equipment Delivery	1
1.2.3 Drilling	1
1.2.4 Water Management and Cuttings Containment	1
1.2.5 Bore Casing Specifications	2
1.2.6 Monitoring Equipment	2
1.2.7 Fuel Management	2
1.2.8 Human Waste Water	2
1.2.9 Expected duration of works:	3
1.2.10 Site closure and rehabilitation	3
2. Proposed borehole site locations	4
3. Environmental assessment	9
3.1 Site assessment	9
3.2 Impact assessment	9
3.3 Aboriginal Objects Due Diligence Assessment	15
3.4 Recommendations	15
4. Conclusion	17
References	18
Annex 1 Figures	19
Annex 2 Plates	30
Annex 3 Aboriginal Objects Due Diligence Assessment	33
Annex 4 Threatened flora and fauna likelihood of occurrence	34
Annex 5 Assessment of Significance (5-part test) (BC Act)	55
Annex 6 Assessment of Significance (EPBC Act)	64

List of Figures (Annex 1)

Figure 1: Locality Map	20
Figure 2: Site Plan	21
Figure 3: Land Tenure	22
Figure 4: Vegetation	23
Figure 5: AHIMS	24
Figure 6: Threatened flora within 5 km	25
Figure 7: Threatened fauna within 5 km	26
Figure 8: Site Plan Swamp 74, 75, 128 & 129	27
Figure 9: Site Plan Swamp 106, 113, 115 & 119	28
Figure 10: Site Plan Swamp 14 & 106	29

List of Tables

Table 1: Location of proposed borehole sites	4
Table 2: Proposed vegetation clearing for 1 m wide access tracks (ha)	10
Table 3: Proposed vegetation clearing for 25 m ² borehole sites (ha)	10
Table 4: Affected threatened fauna (NSW and Commonwealth)	13

List of Plates

Plate 1: Site S14a	30
Plate 2: Site S74a	30
Plate 3: Site 74b	30
Plate 4: Site S75a	30
Plate 5: Site S106a	31
Plate 6: Site S106b	31
Plate 7: Site S106c	31
Plate 8: Site S113a	31
Plate 9: Site S115a	31
Plate 10: Site S119b	31
Plate 11: Site S128a	32

Plate 12: Site S129a	32
----------------------------	----

1. Introduction

1.1 Context

Niche Environment and Heritage (Niche) has undertaken an assessment of the ecological and archaeological constraints and potential impacts associated with the development of twelve (12) proposed swamp piezometer groundwater monitoring sites by Metropolitan Coal. The piezometer sites are required to undertake groundwater monitoring within upland swamps in relation to potential mine induced subsidence impacts in order to meet Agency requirements.

1.2 Proposed works

1.2.1 Overview

The proposed monitoring sites are located in the Woronora special area (drinking water catchment) managed by WaterNSW (Figure 1). Location details, site specific environmental constraints, safeguards, and access considerations are outlined in Section 2; Table 1. Site plans are provided in Annex 1 and site photos are provided in Annex 2.

The 12 piezometer sites (Sites 128a, 129a, 74a, 74b, 75a, 119b, 106a, 106b and 106c, 115a, 113a and 14a - Refer Table 1, Figures 2 and 3) include both shallow and deep swamp sediment bore sites with piezometers to a depth of one metre and 10 m respectively; additionally at each site there will be soil moisture probes installed to depths between 0.3 – 0.9 m.

The proposed activity includes the installation, maintenance, use and decommissioning of the borehole sites and access tracks.

1.2.2 Access and Equipment Delivery

Access to all sites will be from existing Fire Trails (9D and 9E) (Figure 2). Narrow tracks (approximately 1 m wide) are required for the 12 monitoring sites.

Tracks to each site will be slashed for pedestrian access (up to 1 m wide), unless otherwise stated (See Section 3.2 for mitigation measures). Each site will be augured using a combination of a remote access mini drill rig and a petrol powered post hole auger. The remote access mini drill rig will be tracked to each swamp location along the nominated access tracks.

1.2.3 Drilling

Both shallow and deep swamp sediment bores will have a diameter of up to 100 mm. The shallow swamp sediment bores will be drilled with a hand auger, while the deep bores will be drilled using a small remote access drill rig. The disturbance of each of the bore site will be approximately 5 m x 5 m (25 m²). Drilling will take up to 2 days per drill site.

1.2.4 Water Management and Cuttings Containment

Drilling will occur during forecast dry weather wherever practicable. Water will be used to clear the drill cuttings.

The 10 m deep monitoring bores will be chipped from surface minimising the drill pad clearance requirements and to reducing the manual handling associated with coring. Drilling muds will not be required for drilling, instead fresh water will be used to lift cuttings from the bore and these will be disposed of at the mine.

Drill water will be supplied as necessary to each location by pumping it from an Intermediate Bulk Container located at the nearest vehicle access track to the drill site using a hose line.

A 150 L drum may be used at the site to store contingency water if necessary.

1.2.5 Bore Casing Specifications

10 metre monitoring bores: PVC bore screen installed to approximately 5 m below ground level (mbgl) with blank PVC casing from 5 mbgl to the surface. A sand gravel pack to 4 mbgl, a bentonite seal to 3 mbgl and a cement grout to the surface.

Swamp sediment monitoring bores: PVC well screen installed to the full depth of the hole with a sand gravel pack to the surface.

The PVC screen and casing for each monitoring bore would be up to 50 mm in diameter.

Blank PVC casing would extend to a height of 1 m above the ground for each monitoring bore with a steel monument to protect the casing from damage.

1.2.6 Monitoring Equipment

A water level sensor and data logger will be installed within each bore. Monitoring of the bore will continue until mine closure.

1.2.7 Fuel Management

Large quantities of fuel will not be stored on site. Fuel will be transported in closed containers (e.g. jerry cans). 60 L plastic containers will be used to hold fuel cans after use. Re-fuelling will be conducted using an appropriately sized funnel. Refuelling of equipment will be completed before the equipment is transported to the drill site so as to reduce the requirement of transporting fuel. Care will be taken not to spill fuel. Oil/fuel absorbent materials or other containment materials will be made available at the site to prevent contact with the surrounding environment.

Equipment (e.g. drill rigs, pumps) will be regularly inspected for leaks of oil/fuel/coolant. Impervious bunding will be provided with greater than 110% of the capacity of the item being banded. Spill containment/treatment resources (i.e. spill kits) will be provided and personnel will be trained in their use. The spill kits will include: absorbent material 40 L bag of Organic Oil/Fuel absorbent; absorbent pads: 20 of 480 X 430 mm pads; garbage bags; shovel; and a bag of rags.

Any spill that occurs will be immediately cleaned up and reported to:

- The site supervisor.
- The Metropolitan Coal Environment & Community Superintendent (Stephen Love 0417 584 121); and
- Water NSW (via the incident Management Number 1800 061 069).

The site supervisor and the Metropolitan Coal Environment & Community Superintendent will investigate any spills.

1.2.8 Human Waste Water

Portaloo will be installed on fire trail proximal to works for duration of the drilling and access works.

1.2.9 Expected duration of works:

Approximately one to two days per swamp for drilling and groundwater bore installation. Access tracks would be cleared prior to the drilling.

The entire construction campaign is expected to take approximately three to five weeks, weather permitting.

Monitoring is expected to be conducted for several years.

1.2.10 Site closure and rehabilitation

Construction sites will be rehabilitated in accordance with Section 7 of the Metropolitan Coal's Rehabilitation Management Plan. Site closure and rehabilitation would involve the following:

- For deep bores only:
 - Sealing the borehole to the surface with a cement/bentonite mix as per the standard requirements of Division of Resources and Geoscience (DRG).
 - Capping and reporting the sealed borehole to the standards required by the DRG.
- Replacement of larger items (notably rocks and logs) back over the site (if required) in order to arrest water flow over the disturbed ground and provide a structure for emergent seedlings and other regenerating plants to shelter.

The access tracks will be maintained over time to allow safe access for personnel to revisit the borehole sites and water monitoring locations.

Given the limited nature of the disturbance footprint (narrow linear disturbance adjacent to Fire Trails) and the existence of high quality native vegetation adjacent to each borehole site/track, it is not expected active revegetation measures (e.g. planting of tubestock) will be necessary.

2. Proposed borehole site locations

Details of the proposed borehole site locations, access, site specific constraints and safeguards are detailed in Table 1 with an impact assessment in the following sections. Refer to attached Figures and Borehole Site Plans in Annex 1 and photo Plates in Annex 2.

Table 1: Location of proposed borehole sites

Site	GDA94 Easting	GDA94 Northing	Access and Site Preparation Requirements	Depth to Rock (m)	Plate (Annex 2)	Site-specific constraints and Environmental Safeguards
74a	310097.31	6218256.06	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.040 ha. This consists of 0.020 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.017 ha of PCT 3924: Sydney Coastal Upland Swamp Heath . AHIMS site, Woronora Reservoir; Northern Trail 30 (AHIMS ID# 52-2-0637) has been previously recorded within 10 m of this site.	0.6	Plate 2	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site. Standard work procedures for protection and reporting of Aboriginal objects of Metropolitan Colliery and sites must be implemented prior to, during, and after the proposed work. Refer to Section 10.5 from the <i>Metropolitan Coal Longwalls 308-310 Heritage Management Plan</i> (HMP) Cultural Awareness Program training for on-site staff. Project personnel must be made aware of the location of the cultural site and its proximity to S74a to avoid any indirect impacts. Once the location of this site is known, appropriate demarcation of the site will be implemented according to Section 10.3.2 of the HMP. If the site is unexpectedly impacted during works, refer to Section 14 of the HMP. Should any unanticipated finds or ancestral remains be found, then the protocols for Sections 10.3 and 10.4 from the HMP should be adhered to. Aboriginal objects or sites be identified during any works, works should cease in the vicinity of the find and a qualified

Site	GDA94 Easting	GDA94 Northing	Access and Site Preparation Requirements	Depth to Rock (m)	Plate (Annex 2)	Site-specific constraints and Environmental Safeguards
						archaeologist should be consulted on appropriate management actions.
74b	310173.45	6218459.53	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.062 ha. This consists of 0.059 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.003 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.5	Plate 3	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.
75a	310247.02	6218150.35	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.016 ha. This consists of 0.008 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.005 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.65	Plate 4	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.
106a	309497.68	6216440.94	Access to the site is off Fire Trail 9E and will require primary clearing of the access track and bore site, up to approximately 0.068 ha. This consists of 0.062 ha of PCT 3814: Woronora Plateau Heath-Mallee and 0.004 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 5	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.

Site	GDA94 Easting	GDA94 Northing	Access and Site Preparation Requirements	Depth to Rock (m)	Plate (Annex 2)	Site-specific constraints and Environmental Safeguards
106b	309469	6216931	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.049 ha. This consists of 0.031 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.015 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	TBC	Plate 6	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.
106c	309535.98	6217372.61	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.079 ha. This consists of 0.064 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.013 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 7	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site. Avoid <i>Pultenaea aristata</i> as marked in Figure 9. Clearing to be supervised by botanist. Clearing will be reduced and completed by hand for areas of dense threatened flora (see Figure 6)
113a	309645.69	6216827.84	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.033 ha. This consists of 0.029 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.001 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 8	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.

Site	GDA94 Easting	GDA94 Northing	Access and Site Preparation Requirements	Depth to Rock (m)	Plate (Annex 2)	Site-specific constraints and Environmental Safeguards
115a	309744.98	6216934.14	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.023 ha. This consists of 0.020 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.001 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 9	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.
119b	309720.49	6217369.69	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.061 ha. This consists of 0.047 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.012 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 10	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site. Avoid <i>Pultenaea aristata</i> as marked in Figure 9. Clearing to be supervised by botanist. Clearing will be reduced and completed by hand for areas of dense threatened flora (see Figure 6).
128a	310145.25	6218714.15	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.032 ha. This consists of 0.025 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.005 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 11	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.

Site	GDA94 Easting	GDA94 Northing	Access and Site Preparation Requirements	Depth to Rock (m)	Plate (Annex 2)	Site-specific constraints and Environmental Safeguards
129a	310069.61	6218622.76	Access to the site is off Fire Trail 9D and will require primary clearing of the access track and bore site, up to approximately 0.043 ha. This consists of 0.039 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.001 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate 12	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.
14a	309007.88	6216311.16	Access to the site is off Fire Trail 9E and will require primary clearing of the access track and bore site, up to approximately 0.127 ha. This consists of 0.124 ha of PCT 3598: Woronora Plateau Scribbly Gum Woodland and 0.001 ha of PCT 3924: Sydney Coastal Upland Swamp Heath.	0.9	Plate1	Vegetation disturbance will be minimised to the smallest footprint required. Avoid habitat features such as rocky outcrops, hollow bearing trees and large fallen logs which occur throughout the broader general area. Sediment controls to be implemented as appropriate on downslope sides of the site.

3. Environmental assessment

3.1 Site assessment

Site assessments were conducted for 20 hours across three field days (12, 13 and 14 September 2023) by Chelsea Freeman (Heritage Consultant) and Justin Merdith (Environmental Approvals Consultant).

The site assessment involved traversing the proposed areas of disturbance for all 12 borehole sites and their associated access tracks. The field survey included assessing any environmental constraints, marking any constraints to be avoided on GPS.

3.2 Impact assessment

Vegetation disturbance

The study area has been mapped by NSW State Vegetation Type Map (SVTM) (*State Government of NSW and Department of Planning and Environment, 2022*). The vegetation mapping is provided in Figure 3 of Annex 1. The swamps (Figure 8) have been mapped as a result of the Longwalls 301-303 Upland Swamp Vegetation Mapping and Proposed Monitoring Program (Eco Logical 2016).

The Proposal would result in up to approximately 0.64 ha of native vegetation primary clearing (Table 2 and Table 3). Primary clearing is clearing of vegetation that has never been cleared before. This level of vegetation disturbance may include trittering, with only the mid-storey, groundcover and semi-mature canopy trees affected (i.e. mature trees and hollow-bearing trees forming the canopy layer would not be removed). The “trittering” attachment effectively mulches the vegetation in situ leaving the root balls intact and does not disturb the soil seedbank. This means that the natural soil profile is not disturbed and the resilience (i.e. the natural capacity for regeneration) of the native vegetation remains high. As a consequence, the disturbed vegetation would rapidly regenerate.

The vegetation disturbance associated with the proposed borehole sites is provided in Table 3, and photos of each borehole site are provided in Annex 2 of this report. Native vegetation communities that will be impacted by the proposal include:

- PCT 3598: Woronora Plateau Scribbly Gum Woodland
- PCT 3814: Woronora Plateau Heath-Mallee
- PCT 3924: Sydney Coastal Upland Swamp Heath

Of the three vegetation communities one of these communities align to the TEC Coastal Upland Swamps (PCT 3924). The proposed borehole sites are not likely to significantly impact any Threatened Ecological Communities (TECs) due to the small extent of impact, and management of residual impacts from the proposal.

After decommissioning, the borehole sites will be monitored, and actions taken as required to ensure no active erosion is occurring and that vegetation is re-establishing.

Table 2: Proposed vegetation clearing for 1 m wide access tracks (ha)

Sites	Presence of <i>P. aristata</i>	PCT 3598	PCT 3814	PCT 3924	Total (ha)
				Coastal Upland Swamps (TEC)	
Track 1	No	0.152	-	0.031	0.183
Track 8	Yes	0.110	-	0.025	0.135
Track 17	No	0.080	-	0.017	0.097
Track 10	No	-	0.062	0.004	0.066
Track 11	No	0.123	-	0.001	0.124
Total impacts	See threatened flora below for more detail	0.465	0.062	0.078	0.605

Table 3: Proposed vegetation clearing for 25 m² borehole sites (ha)

Sites	Presence of <i>Pultenaea aristata</i>	PCT 3598	PCT 3814	PCT 3924	Total (ha)
				Coastal Upland Swamps (TEC)	
74a	No	-	-	0.0025	0.0025
74b	No	-	-	0.0025	0.0025
75a	No	-	-	0.0025	0.0025
106a	No	-	-	0.0025	0.0025
106b	No	-	-	0.0025	0.0025
106c	No	-	-	0.0025	0.0025

Sites	Presence of <i>Pultenaea aristata</i>	PCT 3598	PCT 3814	PCT 3924	Total (ha)
				Coastal Upland Swamps (TEC)	
113a	No	-	-	0.0025	0.0025
115a	No	-	-	0.0025	0.0025
119b	No	-	-	0.0025	0.0025
128a	No	-	-	0.0025	0.0025
129a	No	-	-	0.0025	0.0025
14a	No	-	-	0.0025	0.0025
Total	No individuals present within borehole sites			0.0300	0.0300

Threatened ecological communities

A list of threatened ecological communities (TECs) occurring or potentially occurring within the locality was determined from database searches (the NSW Bionet Database Search tool and EPBC Act Protected Matters Search Tool).

Based on the database searches, one TEC exists near the study area; Coastal Upland Swamp (PCT 3924). Coastal Upland Swamp is listed as endangered on both the BC and EPBC Acts.

The results of the field survey found that Coastal Upland Swamps TEC occurs within the area to be disturbed at all of the swamp monitoring sites and sections of each of the tracks, with a total impact of up to 0.11 ha proposed (Table 3 and Table 2).

Vegetation disturbance will be minimised to the smallest footprint required. An assessment of significance under the BC Act (5-part test) (Annex 5) and Commonwealth Assessment of Significance has been completed (Annex 6). Both assessments found the proposed clearing disturbance will not significantly impact the threatened ecological community. Approximately 498 ha of Coastal Upland Swamp exists within 5 km of the study area and approximately 0.11 ha of Coastal Upland Swamp would be modified by trittering for access tracks or clearing for borehole sites. This is less than 1% of the total community within the 5 km radius and temporary in nature. The small extent of impact, and management of residual impacts from the proposal, mean that the community would not likely be significantly impacted.

Threatened flora

A total of 36 threatened flora, as listed on the BC and/or EPBC Acts, were considered in this assessment (Annex 4). These records were derived from the Atlas of NSW Wildlife (DPE, 2023a) and the EPBC Act Protected Matters Search tool (DAWE, 2023).

Twelve threatened flora were considered to have a High or Moderate likelihood of occurrence in the study area prior to field survey: *Acacia baueri* subsp. *baueri*, *A. bynoeana*, *Astrotricha crassifolia*, *Callistemon linearifolius*, *Cryptostylis hunteriana*, *Epacris purpurascens* var. *purpurascens*, *Eucalyptus camfieldii*, *Genoplesium baueri*, *Leucopogon exolasius*, *Melaleuca deanei*, *Persoonia hirsuta* and *Pultenaea aristata*.

Many *Pultenaea aristata* individuals were recorded during the survey along Track 8 between sites 119b and 106c (Figure 9) and the species is known to be locally abundant. No individuals were recorded within the proposed borehole sites. Within dense areas of threatened plants the vegetation clearing will be reduced and completed by hand-held devices, this will ensure the proposed works avoid any individuals of *Pultenaea aristata*. The proposed access tracks are narrow and can avoid any individuals, minimising the impact to *Pultenaea aristata*, such that no direct impacts are expected. An Assessments of Significance (under the BC Act and EPBC Act) has been conducted for this species (See Annex 5 and Annex 6) and safeguards will be in place to protect them, i.e., pre-clearing survey.

Most of the other threatened species are relatively conspicuous and were not detected during the current survey or previous surveys in the study area.

The proposed borehole site locations and access tracks are therefore unlikely to impact any threatened flora species. No further assessment of threatened flora species is required.

Fauna habitat

Vegetation communities within the study area provide a wide range of food and shelter for vertebrate fauna. Trees from the family Myrtaceae (mostly *Eucalyptus* spp.) generally dominate the canopy and supply direct (foliage, nectar, exudates) and indirect food (arthropods) for a range of vertebrates, particularly birds and arboreal mammals.

Tree hollows (formed in stags and mature trees) provide nesting and roosting habitat for hollow-dwelling fauna and are important habitat components of native forests. No hollow-bearing trees will be removed by the proposal.

Some sandstone outcrops were present along sections of access tracks and sometimes included exfoliation surfaces and crevices. These habitat features may provide refuge for a range of reptile species, including the threatened Broad-headed Snake and Rosenberg's Goanna. These species rely on these habitats for over-wintering, thermoregulation, and shelter, and as a refuge for juveniles and prey species. The Proposal will avoid rock outcrops where practicable and will not alter or remove the exfoliating surfaces and crevices.

Threatened fauna

No threatened fauna species were recorded during the current survey.

A total of 62 threatened fauna have previously been recorded (Atlas of NSW Wildlife) or are predicted to have habitat (EPBC Act) within 10 km of the study area (Annex 4). The analysis (Annex 4) resulted in 20 threatened fauna being rated as having a moderate or high likelihood within the study area (Table 4).

Developments can impact upon fauna in a number of ways. The significance of an impact would be greatest if any of the following situations occur:

- Death or injury of individuals.
- Loss or disturbance of limiting foraging resources.
- Loss or disturbance of limiting breeding resources.

Limiting resources are those that are of importance for the survival of a species.

All candidate threatened species in Table 4 may have potential foraging or move-through habitat within the study area, however important features such as hollow bearing trees, stags, termite mounds, dense shrubs and mature trees have been avoided. Bushland immediately adjacent to the study area is extensive and provides a variety of important habitat features. The current proposal will not remove any hollow-bearing trees, stags or mature trees.

Given the above factors, it is unlikely that the proposal will result in any measurable loss of habitat or direct impact to any threatened fauna species. However, an Assessments of Significance (under the BC Act) has been conducted for the Red-crowned Toadlet (See Annex 5 for Assessment of significance)

Table 4: Affected threatened fauna (NSW and Commonwealth)

Species	BC Act	EPBC Act	Likelihood of Occurrence	Potential to be affected by the proposal
Giant Burrowing Frog <i>Heleioporus australiacus</i>	V	V	Moderate	Low; limiting breeding habitat within the study area would be impacted.

Species	BC Act	EPBC Act	Likelihood of Occurrence	Potential to be affected by the proposal
Red-crowned Toadlet <i>Pseudophryne australis</i>	V	-	Moderate	Low; impacts are likely to be negligible, (See Annex 5 for Assessment of significance)
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts are likely to be negligible.
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	V	-	High	None; no limiting foraging or breeding habitat within the study area would be impacted. Hollow bearing trees will be avoided and thus impacts are likely to be negligible.
Glossy Black-Cockatoo <i>Calyptrorhynchus lathami</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area would be impacted. Hollow bearing trees will be avoided and thus impacts are likely to be negligible.
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area would be impacted. Hollow bearing trees will be avoided and thus impacts are likely to be negligible.
Eastern Bristlebird <i>Dasyornis brachypterus</i>	E	E	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts are likely to be negligible.
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts are likely to be negligible.
Swift Parrot <i>Lathamus discolor</i>	E	E	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts are likely to be negligible.
Powerful Owl <i>Ninox strenua</i>	V	-	High	None; no limiting foraging or breeding habitat within the study area. Hollow bearing trees will be avoided and thus impacts are likely to be negligible.
Eastern Pygmy-possum <i>Cercartetus nanus</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area would be impacted. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V	V	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.

Species	BC Act	EPBC Act	Likelihood of Occurrence	Potential to be affected by the proposal
Little Bentwing-bat <i>Miniopterus australis</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Squirrel Glider <i>Petaurus norfolcensis</i>	V	-	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Koala <i>Phascolarctos cinereus</i>	V	V	Moderate	None; no limiting foraging or breeding habitat within the study area would be impacted. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	V	V	Moderate	None; no limiting foraging or breeding habitat within the study area. Impacts negligible. Sparse occurrence if present. Important habitat features would not be affected.
Broad-headed Snake <i>Hoplocephalus bungaroides</i>	E	V	High	Small areas of preferred habitat (exfoliating sandstone) are located near Stream P though marginal and will be avoided. Impacts are likely to be negligible.
Rosenberg's Goanna <i>Varanus rosenbergi</i>	V	-	High	Potential habitat for a variety of uses in small ephemeral drainages of the study area Low; no limiting foraging or breeding habitat within the study area. Termite mounds will not be impacted. Impacts are likely to be negligible.

3.3 Aboriginal Objects Due Diligence Assessment

One site may be indirectly impacted by the proposal, however, the works may proceed with caution. A desktop assessment confirmed that there were no records of known Aboriginal cultural heritage sites located within the study area. One known Aboriginal cultural heritage site (Woronora Reservoir; Northern Trail 30 (AHIMS ID# 52-2-0637)) is located within 10 m of the one of the proposed sites, which may be indirectly impacted by the proposed works. During field survey this site was unable to be relocated and no new aboriginal objects were recorded (refer Annex 3).

3.4 Recommendations

The proposal aims to avoid disturbance to the following:

- Aboriginal cultural heritage sites
- Threatened flora and fauna
- Mature trees
- Hollow bearing trees and stags
- Rock outcrops
- Termite mounds
- Large hollow logs; and
- Bush-rock.

The following mitigation measures will be implemented:

- When undertaking clearing of 1 m wide access track along Track 8, an ecologist or otherwise qualified person with knowledge of *Pultenea aristata* should be present to ensure no threatened plants are impacted.

The following recommendations have been made in accordance with the Metropolitan Coal Longwalls 308-310 Heritage Management Plan:

- Standard work procedures for protection and reporting of Aboriginal objects of Metropolitan Colliery and sites must be implemented prior to, during, and after the proposed work. Refer to Section 10.5 from the HMP Cultural Awareness Program training for on-site staff.
- Project personnel must be made aware of the location of Woronora Reservoir; Northern Trail 30 (AHIMS ID# 52-2-0637) and its proximity to S74a to avoid any indirect impacts. Once the location of this site is known, appropriate demarcation of the site will be implemented according to Section 10.3.2 of the HMP.
- If the site is unexpectedly impacted during works, refer to Section 14 of the HMP.
- Should any unanticipated finds or ancestral remains be found, then the protocols for Sections 10.3 and 10.4 from the HMP should be adhered to. Aboriginal objects or sites be identified during any works, works should cease in the vicinity of the find and a qualified archaeologist should be consulted on appropriate management actions.

To further minimise impacts to flora, fauna and their habitat, the management measures outlined in the Metropolitan Coal Construction Management Plan shall be adhered to (Peabody Energy 2018).

Given the careful design of the proposed works, mitigation measures proposed within this document and within the Metropolitan Coal Construction Management the proposed exploration program is considered unlikely to have a significant impact on the environment.

4. Conclusion

The proposed borehole sites and their access tracks will result in up to approximately 0.64 ha of primary vegetation clearing.

With the proposed mitigation measures in place, the proposal is unlikely to result in a significant impact on any TEC, or threatened species listed under the BC Act and/or EPBC Act.

The Aboriginal cultural heritage sites have been assessed by an archaeologist. An Aboriginal Objects Due Diligence Assessment has concluded there will unlikely be adverse effects to Aboriginal cultural heritage sites as a result of the proposed borehole sites and access tracks (refer Annex 3).

The relevant management measures as outlined in Section 6 of the Metropolitan Coal Construction Management Plan, shall be implemented in order to minimise impacts to the environment.

This report supports the Surface Works Assessment Form required to be completed for the proposed activities under the Metropolitan Coal Construction Management Plan. Metropolitan Coal will provide the details of the proposed surface construction works (in the form of a completed Surface Works Assessment Form to the DPE and WaterNSW for comment).

References

- DAWE (2023) EPBC Act Protected Matters Search Tool (accessed September 2023), <http://www.environment.gov.au/epbc/pmst/>, Commonwealth Department of the Environment and Energy.
- DECCW (2010) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales. Part 6 National Parks and Wildlife Act 1974. Parramatta: Department of Environment and Climate Change.
- DPE (2023a) NSW Bionet, Atlas of NSW Wildlife (accessed September 2023), NSW Office of Environment and Heritage (OEH), Goulburn St, Sydney.
- DPE (2023b) Threatened Species Profiles Database (accessed September 2023). Also provides access to threatened species Final Determinations by the NSW Scientific Committee.
- DPE (2023c). BioNet Vegetation Classification. <https://www.environment.nsw.gov.au/NSWVCA20PRapp/search/pctsearch.aspx>. (Accessed September 2023).
- DPI (2021) Best Practice Weed Management Guidelines. <https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control/general-management/weeds-crc-pubs/wmg>
- Landcom (2004), Managing Urban Stormwater: Soils and construction – Volume 1, New South Wales Government, 2004.
- OEH (2016). *The Native Vegetation of the Sydney Metropolitan Area*. Volume 1: Technical Report. Version 3.0. Office of Environment and Heritage, Sydney.
- Peabody Energy (2018). Metropolitan Coal Construction Management Plan. Revision ConMP-R01-D. April 2018.

Annex 1 Figures

Figure 1: Locality Map

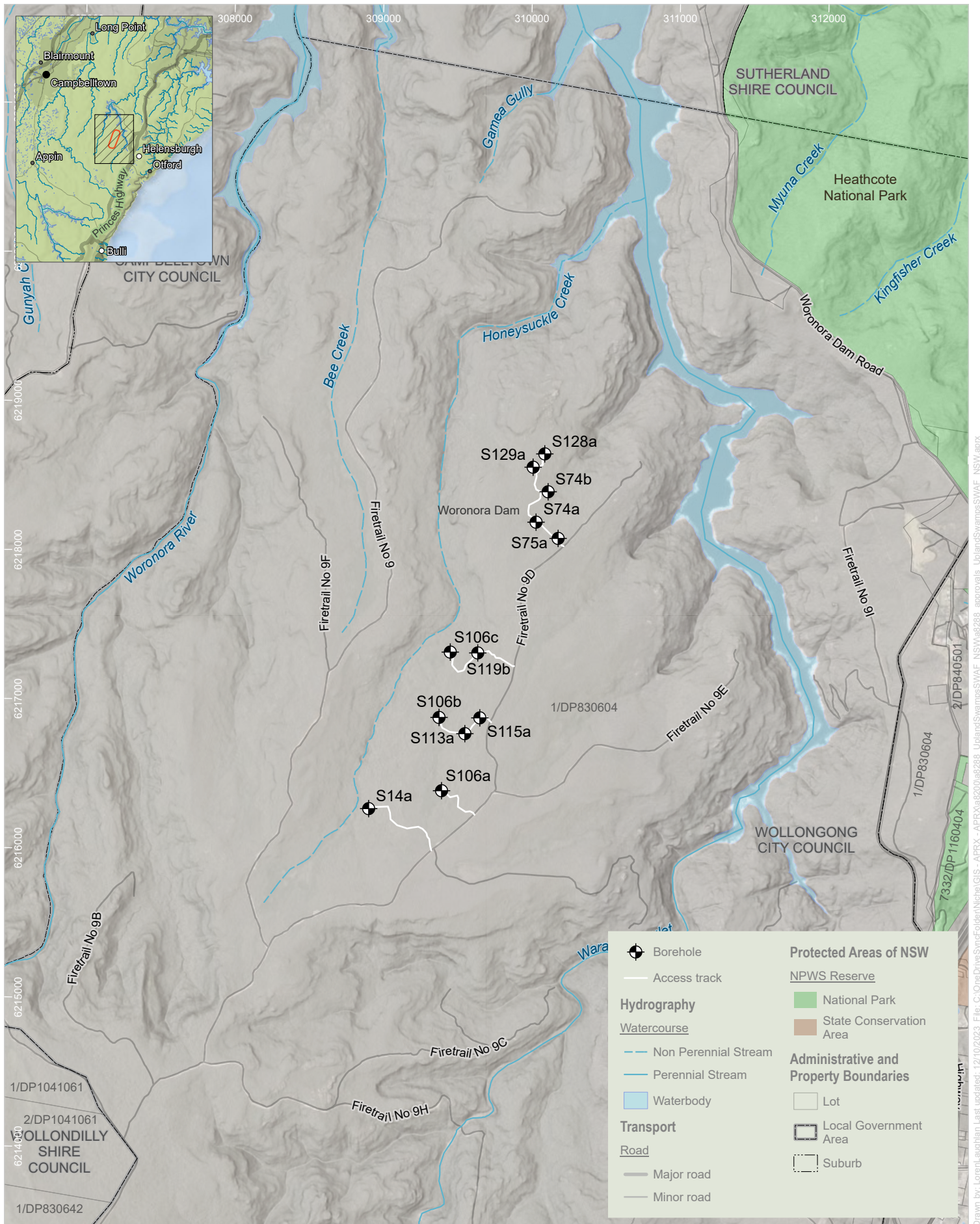
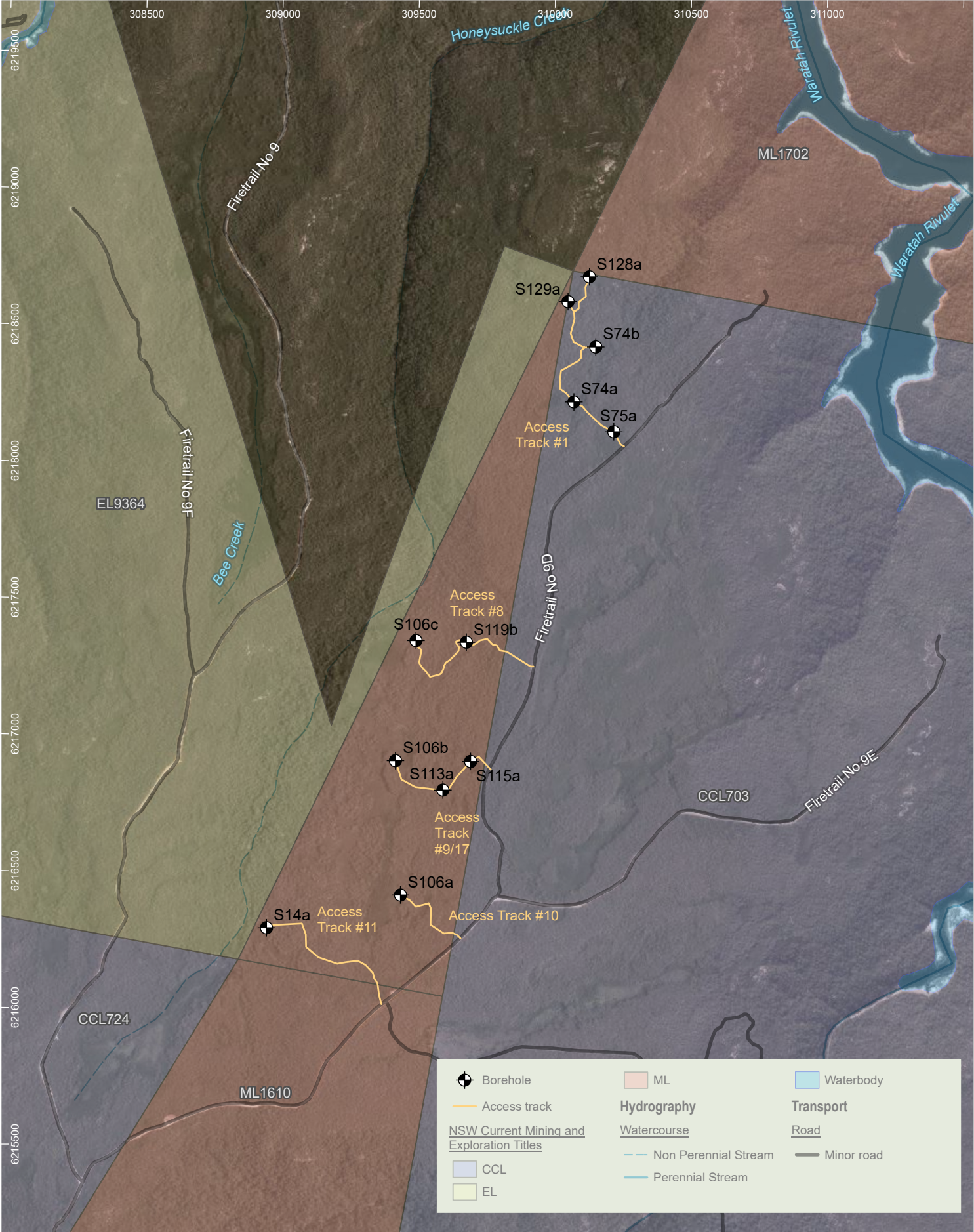
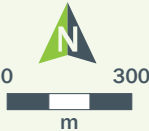


Figure 2: Site Plan

Figure 3: Land Tenure



Drawn by: HarrisonBlinks Last updated: 19/10/2023 File: C:\Users\HarrisonBlinks\Niche\GIS - APRX - APRX\ae200\ae200a8288_UplandSwampsSWAF_NSW\ae200a8288_UplandSwampsSWAF_NSW.aprx



WGS 1984 Web Mercator

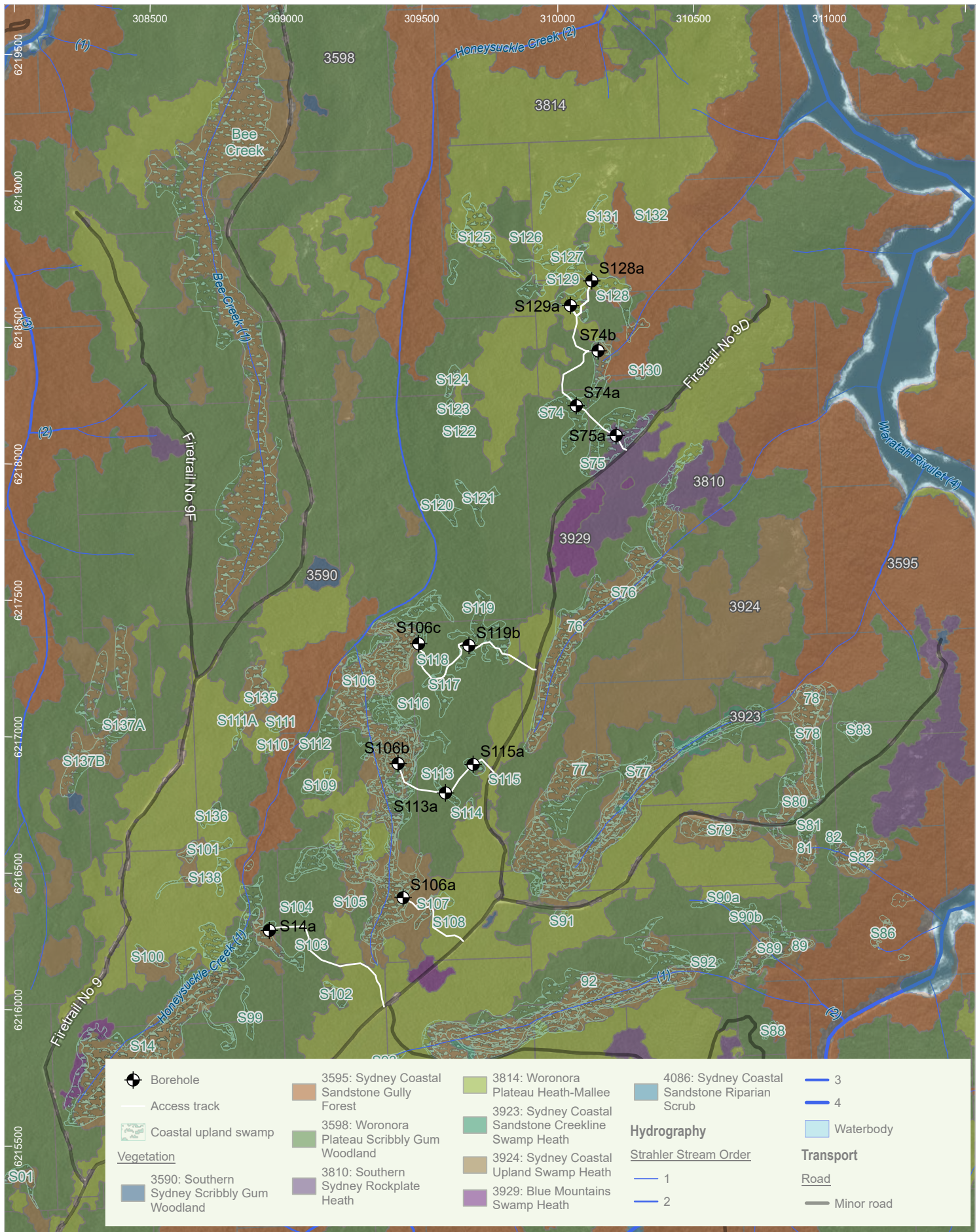
Niche PM: Justin Merdith
Niche Proj. #: 8288
Client: Peabody – Metropolitan Coal

Land Tenure
Phase 1 317-318 Upland Swamps SWAF

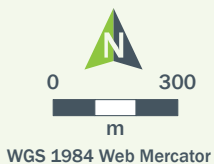
Figure 3

public/NSW_Imagery: © Department of Customer Service 2020/Terrain: Multi-Directional Hillshade: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodastylreisen,GSA,GS1 and the GIS User Community | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.

Figure 4: Vegetation



Drawn by: Loren Laughlin Last updated: 12/10/2023 File: C:\OneDrive\Sync\Folder\Niche\GIS - APRX - APRX\820\0a8288_UplandSwampsSWAF_NSW.aprx



Niche PM: Justin Merdith
Niche Proj. #: 8288
Client: Peabody – Metropolitan Coal

Vegetation Phase 1 317-318 Upland Swamps SWAF

Figure 4

Figure 5: AHIMS

Figure 6: Threatened flora within 5 km

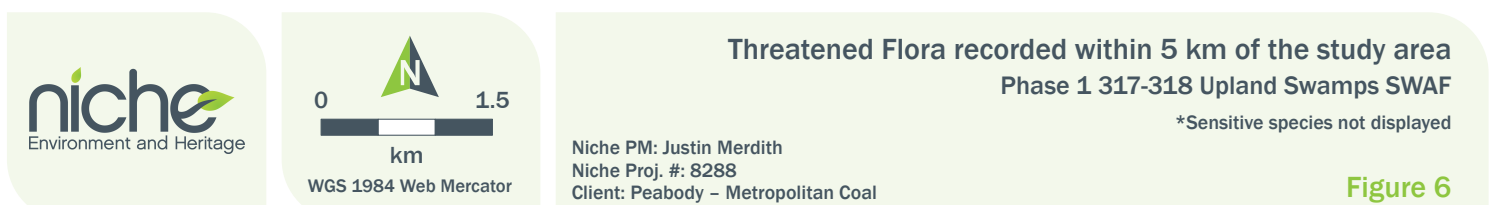
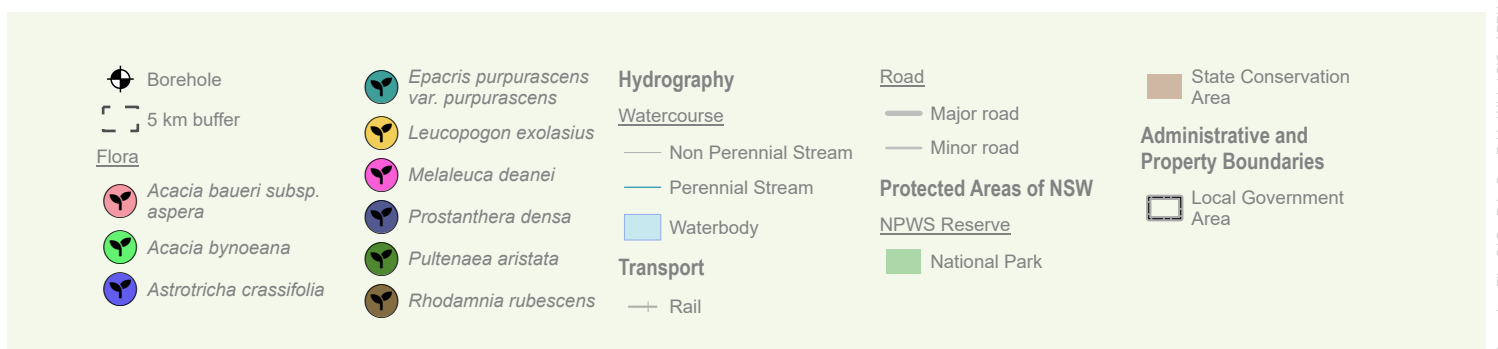
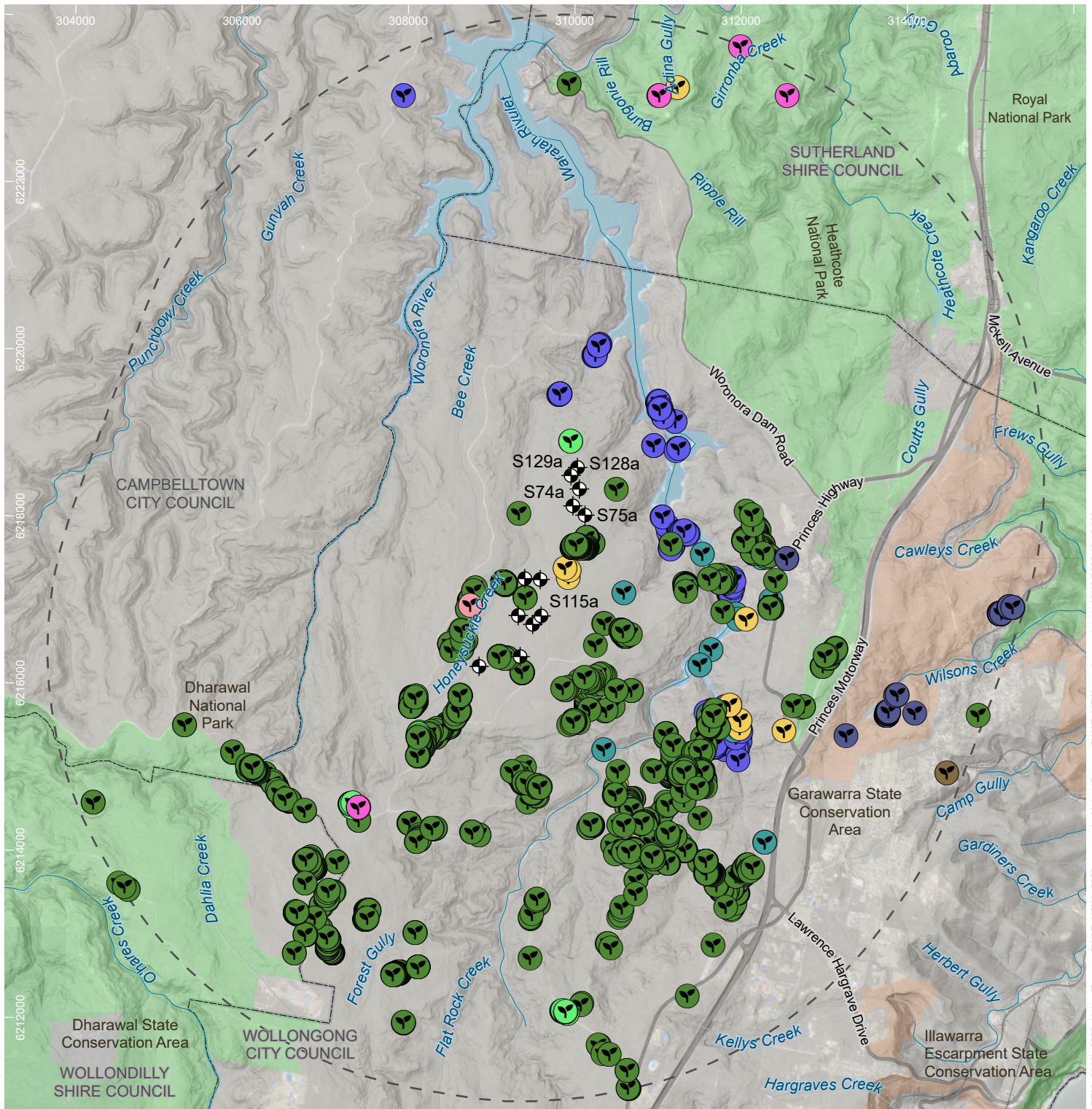


Figure 7: Threatened fauna within 5 km

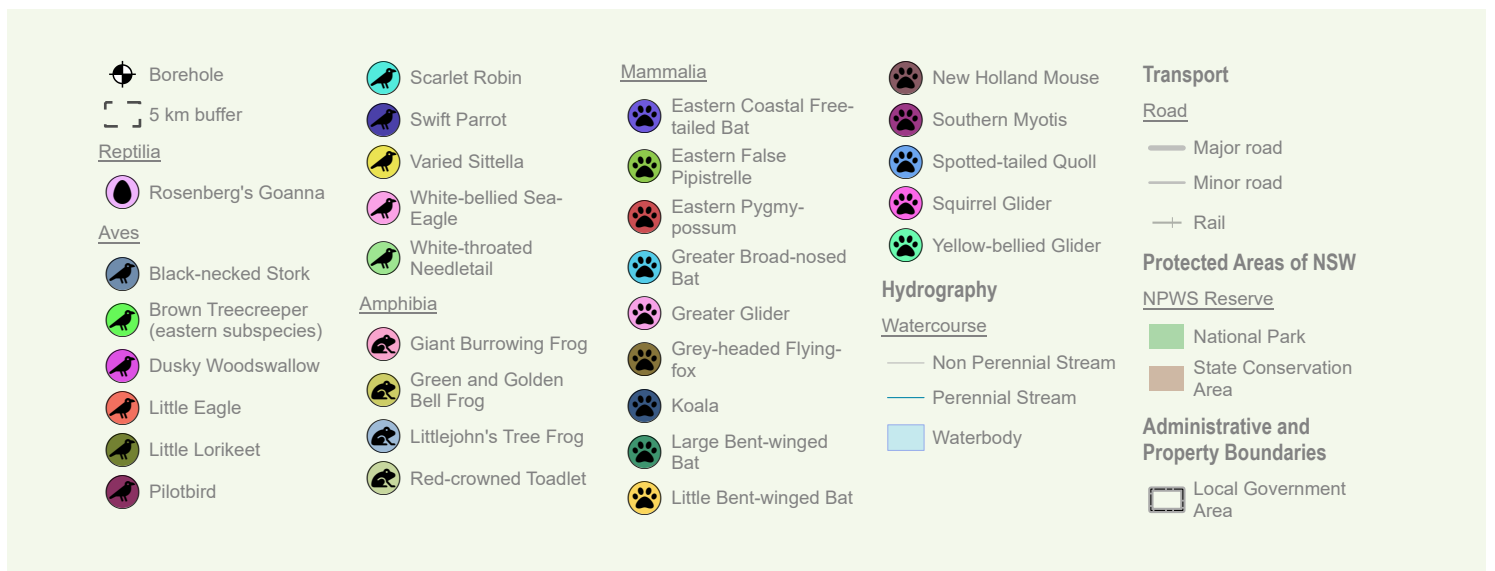
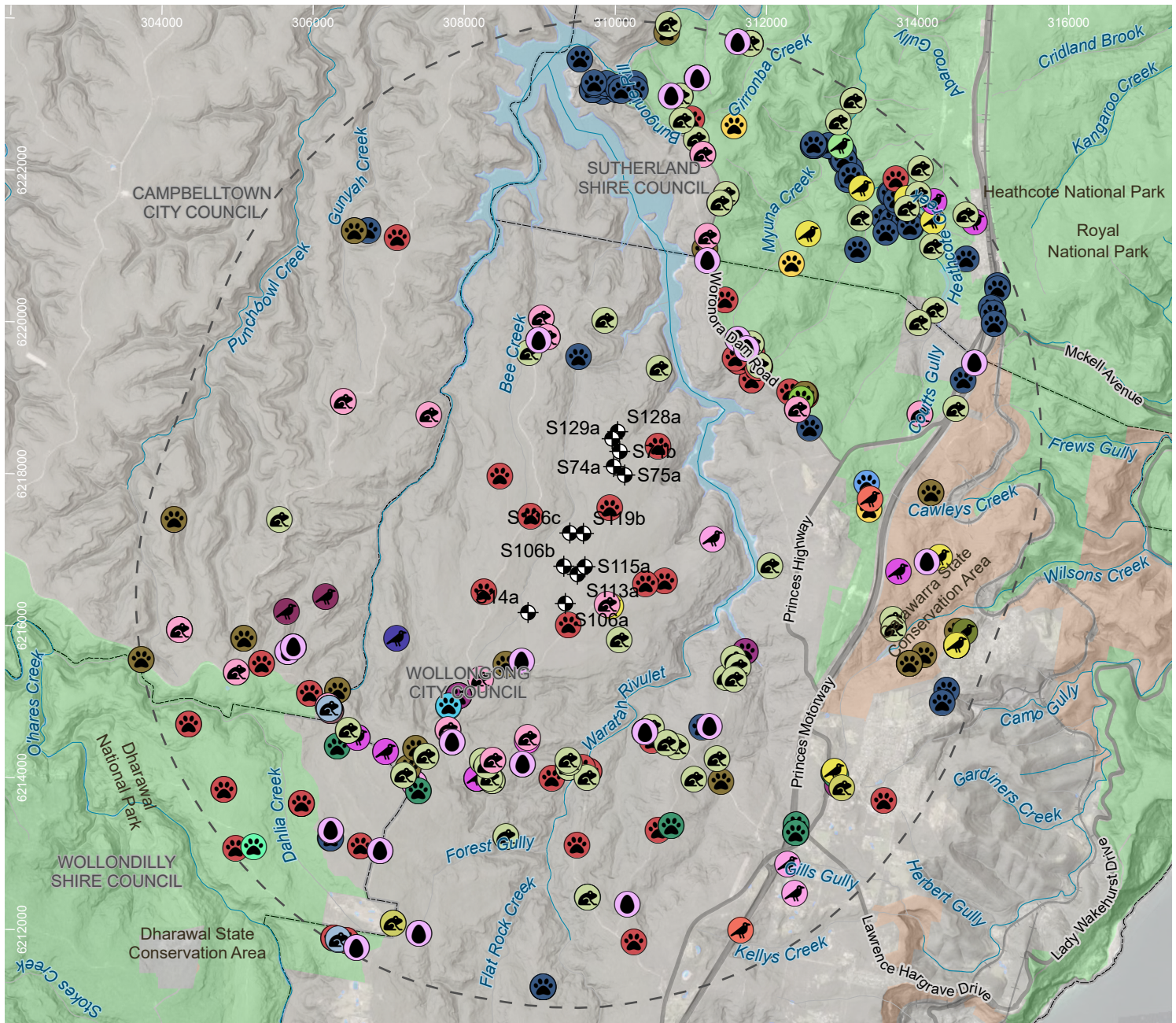
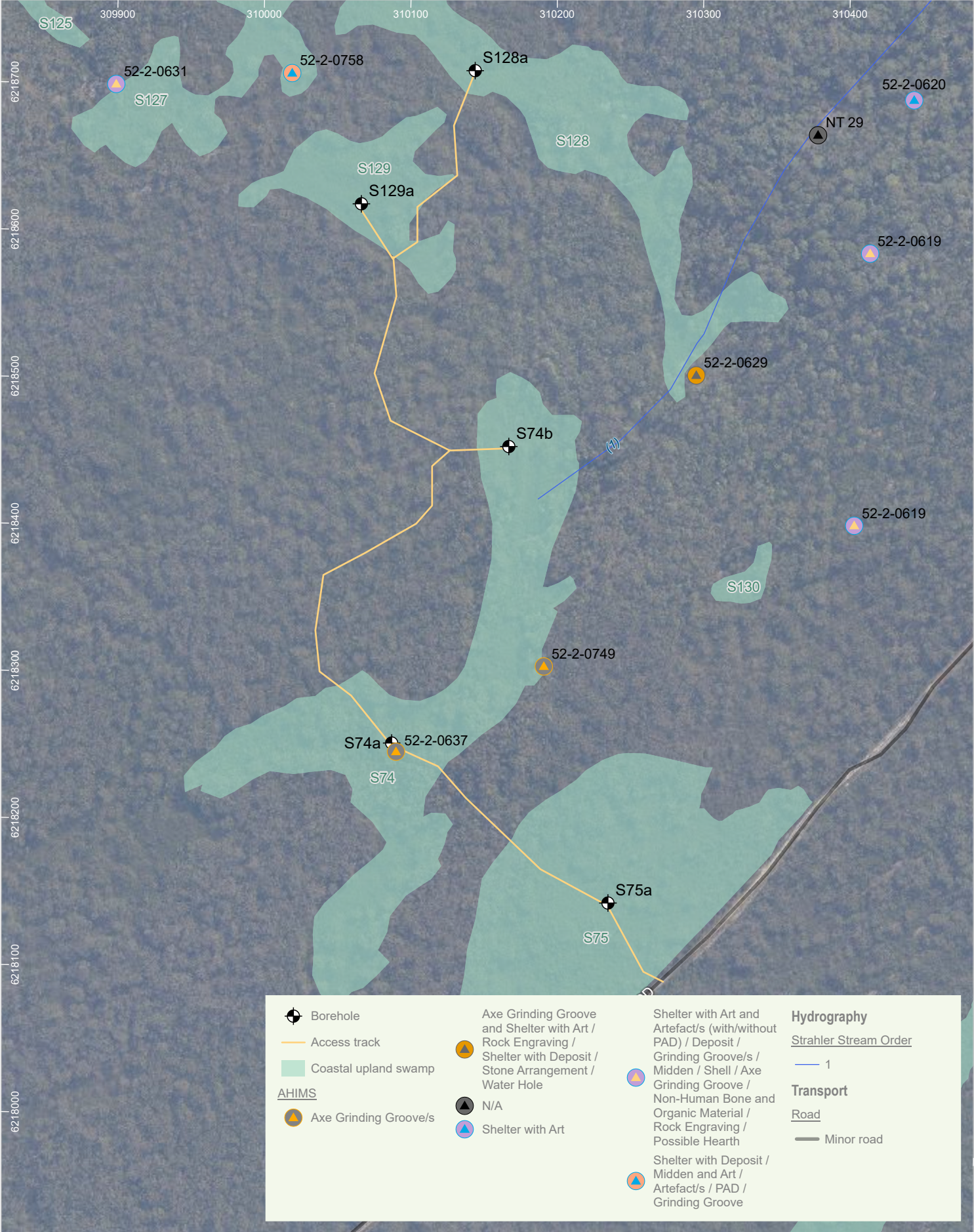


Figure 8: Site Plan Swamp 74, 75, 128 & 129



Drawn by: HarrisonBlinks Last updated: 20/10/2023 File: C:\Users\HarrisonBlinks\Niche\GIS - APRX - APRX\ae200\ae2008_UplandSwampsSWAF_NSW.aprx

0 75
m

WGS 1984 Web Mercator

Site Plan - Swamps 74, 75, 128 & 129
Phase 1 317-318 Upland Swamps SWAF

Niche PM: Justin Merdith
Niche Proj. #: 8288
Client: Peabody – Metropolitan Coal

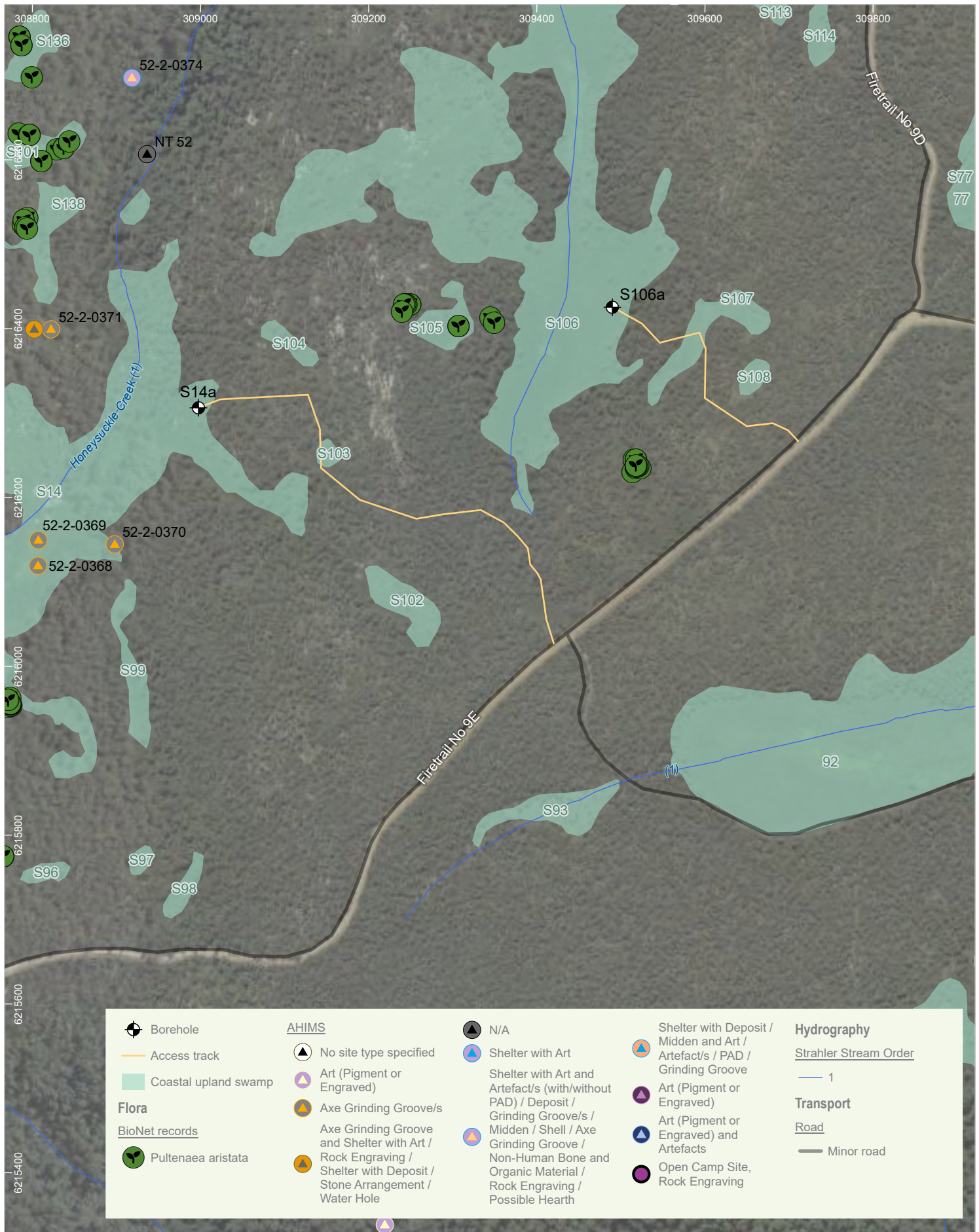
Figure 8

World Imagery: Maxar/public/NSW_Imagery: © Department of Customer Service 2020/Terrain: Multi-Directional Hillshade: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastreisen,GSA,GSI and the GIS User Community | Watercourses, Waterbodies, Road and Rail alignments, Protected areas of NSW © Spatial Services 2021. | Niche uses GDA2020 as standard for all project-related data. In order to ensure that data from numerous sources and coordinate systems is aligned, on-the-fly transformation to WGS1984 Web Mercator Auxiliary Sphere is used in the map above. For ease of reference, the grid tick marks and labels shown around the border of the map are presented in GDA2020, using the relevant MGA zone.

Figure 9: Site Plan Swamp 106, 113, 115 & 119



Figure 10: Site Plan Swamp 14 & 106



Drawn by: HarrisonBlinks Last updated: 20/10/2023 File: C:\Users\HarrisonBlinks\Niche\GIS - APRX - APRX\ae200\ae288_UplandSwampsSWAF_NSW.aprx

Annex 2 Plates

 A photograph of a tree trunk in a field of green shrubs. A red and white striped survey tape is tied around the trunk. An orange survey flag is visible in the background.	 A photograph of a dense thicket of bare, brown tree branches and shrubs.
Plate 1: Site S14a	Plate 2: Site S74a
 A photograph of a dense thicket of green and brown shrubs. A red and white striped survey tape is visible on the right side.	 A photograph of green shrubs with small, light-colored flowers or seed pods, set against a clear blue sky.
Plate 3: Site 74b	Plate 4: Site S75a



Plate 5: Site S106a



Plate 6: Site S106b



Plate 7: Site S106c



Plate 8: Site S113a



Plate 9: Site S115a



Plate 10: Site S119b



Plate 11: Site S128a



Plate 12: Site S129a

Annex 3 Aboriginal Objects Due Diligence Assessment

Annex 4 Threatened flora and fauna likelihood of occurrence

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
Amphibians							
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	-	V	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with more sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Moderate	Low – no suitable breeding habitat within proposed work areas
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	-	V	Inhabits a very wide range of water bodies including marshes, dams and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	Low	Low
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	-	V	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	Low	Low
<i>Litoria watsoni</i>	Watson's Tree Amphibian	-	-	E	<i>Litoria watsoni</i> distribution is highly fragmented in NSW. This species is known to breed in the upper reaches of permanent streams and in perched swamps, and non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Mixophyes balbus</i>	Stuttering Frog	E	-	V	Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water	Low	Low
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	High	Low – mitigation measures of nearby proposed works (Annex 5)
Birds							
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	-	E,M	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The distribution of the species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	-	-	Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris.	Moderate	Low – no limiting habitat being modified or removed
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	-	E	The Australasian Bitterns is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	Low	Low
<i>Calidris canutus</i>	Red Knot	-	-	E, M	The Red Knot is a non-breeding migratory visitor from Arctic regions of Siberia. In NSW it is recorded in small numbers replenishing fat stores along some of the major river estuaries and sheltered embayments of the coastline, in particular the Hunter River estuary, after which the birds proceed to Victoria by October.	Low	Low
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	-	-	The Curlew Sandpiper is distributed around most of the coastline of Australia. It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. 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 the inland	Low	Low
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-	-	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	High	Low – no limiting habitat being modified or removed

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	-	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	Moderate	Low – no limiting habitat being modified or removed
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	-	-	Found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Low	Low
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows.	Moderate	Low – no limiting habitat being modified or removed
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	-	E	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.	Moderate	Low – no limiting habitat being modified or removed
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-	-	Mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters, as well as extending into adjacent grasslands, paddocks and open savannah woodlands. They also forage within or around estuaries and along intertidal shorelines, such as saltmarshes, mudflats and sandflats, and mangrove vegetation.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Erythrotriorchis radiatus</i>	Red Goshawk	CE	-	E	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Low	Low
<i>Falco hypoleucos</i>	Grey Falcon	E	-	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The species is usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. It also occurs near wetlands where surface water attracts prey.	Low	Low
<i>Grantiella picta</i>	Painted Honeyeater	V	-	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. The species inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. It is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> .	Low	Low
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	-	M	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	Low	Low
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	-	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.	Moderate	Low – no limiting habitat being modified or removed
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	-	M	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Lathamus discolor</i>	Swift Parrot	E	-	E	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 also nomadic, moving about in response to changing food availability.	Moderate	Low – no limiting habitat being modified or removed
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	-	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 <i>Eucalyptus longifolia</i> , <i>Corymbia maculata</i> , <i>E. elata</i> or <i>E. smithii</i> . Individuals appear to occupy large hunting ranges of more than 100km ² . They require large living trees for breeding, particularly near water with surrounding woodland -forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	Low	Low
<i>Melanodryas cucullata</i>	South-eastern Hooded Robin	V	-	E	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies <i>cucullata</i>) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> . The species prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. It also requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	-	CE	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. Typical winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured but they will turn up anywhere within these coastal regions. The species can be found foraging in weedy areas associated with these coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses.	Low	Low
<i>Neophema chrysostoma</i>	Blue-winged Parrot	-	-	V	The main populations of Blue-winged Parrots are in Tasmania and Victoria, particularly in southern Victoria and the midlands and eastern areas of Tasmania. The species is occasionally found in New South Wales. The species inhabits a range of habitats from coastal, sub-coastal and inland areas, right through to semi-arid zones. Throughout their range they favour grasslands and grassy woodlands. They are often found near wetlands both near the coast and in semi-arid zones. Blue-winged Parrots can also be seen in altered environments such as airfields, golf-courses and paddocks.	Low	Low
<i>Neophema pulchella</i>	Turquoise Parrot	V	-	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Ninox strenua</i>	Powerful Owl	V	-	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.	Moderate	Low – no limiting habitat being modified or removed
<i>Numenius madagascariensis</i>	Eastern Curlew	-	-	M	A primarily coastal distribution. Found in all states, particularly the north, east, and south-east regions including Tasmania. Rarely recorded inland. Mainly forages on soft sheltered intertidal sand flats or mudflats, open and without vegetation or cover. Breeds in the northern hemisphere.	Low	Low
<i>Petroica boodang</i>	Scarlet Robin	V	-	-	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	Low	Low
<i>Pezoporus wallicus</i>	Eastern Ground Parrot	V	-	-	Large populations occur on the NSW south coast, particularly Barren Grounds NR, Budderoo NP, the Jervis Bay area and Nadgee NR. Small numbers are recorded at Morton and Ben Boyd NP and other areas on the south coast. The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgeland, generally below one metre in height and very dense (up to 90% projected foliage cover). These habitats provide a high abundance and diversity of food, adequate cover and suitable roosting and nesting opportunities for the Ground Parrot, which spends most of its time on or near the ground.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Pluvialis squatarola</i>	Grey Plover	P	-	C,J,K	The Grey Plover breeds around the Arctic regions and migrates to the southern hemisphere, being a regular summer migrant to Australia, mostly to the west and south coasts. It is generally sparse but not uncommon in some areas. It is occasionally found inland. The Grey Plover is almost entirely coastal, being found mainly on marine shores, inlets, estuaries and lagoons with large tidal mudflats or sandflats for feeding, sandy beaches for roosting, and also on rocky coasts.	Low	Low
<i>Pycnoptilus floccosus</i>	Pilotbird	P	-	V	Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. They are typically seen in pairs or occasionally in family parties, occupying small territories all year round. Birds forage mostly in pairs for insects, and occasionally eat seeds and fruits. Breeding takes places between August and January. Adults build a domed nest on or near the ground in which they usually lay two eggs.	Low	Low
<i>Rostratula australis</i>	Painted Snipe	E	-	E, M	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	Low	Low
<i>Stagonopleura guttata</i>	Diamond Firetail	V	-	-	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including box-gum woodlands and snow gum woodlands. Also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities.	Low	Low
<i>Sternula nereis</i>	Fairy Tern	-	-	V	Distribution includes the southern half of NSW coast. Fairy Terns utilise a variety of habitats including offshore, islands in estuaries or lakes , wetlands, beaches and spits.	Low	Low
Invertebrates							

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Austrocordulia leonardi</i>	Sydney Hawk Dragonfly	-	-	E	The Sydney hawk dragonfly has a very restricted distribution. The known distribution of the species includes three locations in a small area south of Sydney, from Audley to Picton. The species is known from the Hawkesbury-Nepean, Georges River, Port Hacking and Karuah drainages. The Sydney hawk dragonfly has specific habitat requirements, and has only ever been collected from deep and shady riverine pools with cooler water. Larvae are found under rocks where they co-exist with <i>Austrocordulia refracta</i> .	Low	Low
Reptiles							
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	-	V	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.	Moderate	Low – no limiting habitat being modified or removed
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V	-	-	This species is a Hawkesbury-Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests.	High	Low – no limiting habitat being modified or removed
Mammals							
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	-	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period.	Moderate	Low – no limiting habitat being modified or removed
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	-	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	Moderate	Low – no limiting habitat being modified or removed

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	-	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania it is still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Moderate	Low – no limiting habitat being modified or removed
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	Moderate	Low – no limiting habitat being modified or removed
<i>Isoodon obesulus</i>	Southern Brown Bandicoot (eastern)	E	-	-	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Low	Low
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P	-	-	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. The species typically inhabit dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures.	Low	Low
<i>Miniopterus australis</i>	Little Bentwing-bat	V	-	-	Coastal north-eastern NSW and eastern Queensland. Little Bent-wing Bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel 100s km from feeding home ranges to breeding sites. Little Bent-wing Bat has a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.	Moderate	Low – no limiting habitat being modified or removed
<i>Myotis macropus</i>	Southern Myotis	V	-	-	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Notamacropus parma</i>	Parma Wallaby	-	-	V	The Parma Wallaby range is now confined to the coast and ranges of central and northern NSW from the Gosford district to the Queensland border. The species preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	Low	Low
<i>Petauroides volans</i>	Greater Glider	-	-	V	The Greater Glider occurs in eucalypt forests and woodlands. The Greater Glider occurs in eucalypt forests and woodlands. The species nests in hollows and are typically found in older forests. Generally the home range for the greater glider is between 0.7-3 hectares and tends to have a population density of 0.01-5 individuals per hectare. The home ranges of females can overlap with males and females however for the males the home ranges never overlap.	Low	Low
<i>Petaurus australis</i>	Yellow-bellied Glider	V	-	-	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	Low	Low
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range . Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias . There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Moderate	Low – no limiting habitat being modified or removed
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	-	V	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.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Phascolarctos cinereus</i>	Koala	V	-	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall.	Moderate	Low – no limiting habitat being modified or removed
<i>Potorous tridactylus</i>	Long-nosed Potoroo (southern mainland)	V		V	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. It inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	Low	Low
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	-	V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low	Low
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	-	V	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.	Moderate	Low – no limiting habitat being modified or removed
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	Low	Low
Fish							

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Macquaria australasica</i>	Macquarie Perch	-	E	E	Recent research indicates that there may be at least two distinct forms of Macquarie Perch, one from the western rivers (Murray-Darling Basin form) and one from the eastern rivers (the Shoalhaven and Hawkesbury-Nepean systems) (the coastal form). The species has also been stocked or translocated into a number of reservoirs including Talbingo, Cataract and Khancoban reservoirs and translocated into streams including the Mongarlowe River. Macquarie Perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries	None – no habitat within study area	None
Plants							
<i>Acacia baueri subsp. aspera</i>	-	V	-	-	Occurs in low, damp heathlands, often on exposed rocky outcrops over a wide range of climatic and topographical conditions. Appears to prefer open conditions; rarely observed where there is any shrub or tree canopy development; and many of the observations of this species have been made following fire, suggesting the species prefers early successional habitats. Restricted to the Sydney region, occurring on the Kings Tableland in the central Blue Mountains and with sporadic occurrences on the Woronora Plateau in the Royal National Park, Mt. Keira district and at Wedderburn. May also occur on the escarpment-Woronora Plateau in the Flat Rock Junction and Stanwell Tops area of the Illawarra.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	-	V	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morriset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Acacia pubescens</i>	Downy Wattle, Hairy Stemmed Wattle	V	-	V	Occurs mainly in Bankstown-Fairfield-Rookwood and Pitt Town areas, with outliers at Barden Ridge, Oakdale and Mountain Lagoon. Grows on alluviums, shales and shale/sandstone intergrades. Soils characteristically gravelly, often with ironstone. Occurs in open woodland and forest, in communities including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. Flowers from August to October.	Low	Low
<i>Acacia terminalis</i>	Sunshine Wattle (Sydney region)	-	-	E	Very limited distribution, mainly in near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay, with most records from the Port Jackson area and the eastern suburbs of Sydney. Recorded from North Head, Middle Head, Dover Heights, Parsely Bay, Nielsen Park, Cooper Park, Chifley, Watsons Bays, Wollstonecraft and Waverley.	Low	Low
<i>Allocasuarina glareicola</i>		E	-	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and Melaleuca decora. Common associated understorey species include Melaleuca nodosa, Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, Acacia brownei, Themeda australis and Xanthorrhoea minor.	Low	Low
<i>Astrotricha crassifolia</i>	Thick-leaf Star-hair	V	-	V	Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Also in Victoria. Occurs in dry sclerophyll woodland on sandstone.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Caladenia tessellata</i>	Thick-lip Spider Orchid	E	-	V	The Tessellated Spider Orchid is found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Callistemon linearifolius</i>		V	-	-	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Grows in dry sclerophyll forest on the coast and adjacent ranges.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Calochilus pulchellus</i>	Pretty Beard Orchid, Pretty Beard-orchid	E	-	E	<i>Calochilus pulchellus</i> is known from the Sydney Basin Bioregion, where a total of less than 30 adult plants have been recorded in three sites over a range of 40 km on the South Coast of NSW, at altitudes from 20-560 m above sea level. All currently known sites are within the Shoalhaven Local Government Area. The cryptic nature of the species, with a single leaf above ground for only a few months and a flowering stem lasting a few days or a week, makes detection difficult for most of the year. It is likely that additional scattered individuals and small colonies exist within the area of occurrence.	Low	Low
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	-	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).	Moderate	Low – no limiting habitat being modified or removed
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	-	E	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	Low	Low
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V	-	-	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Eucalyptus camfieldii</i>	Heart-leaved Stringybark	V	-	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E	-	E	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park and may also occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	Moderate	Low – no limiting habitat being modified or removed
<i>Grevillea parviflora</i>	Small-flower Grevillea	-	-	V	Sporadically distributed throughout the Sydney Basin with sizeable populations around Picton, Appin and Bargo (and possibly further south to the Moss Vale area) and in the Hunter at in the Cessnock - Kurri Kurri area (particularly Werakata NP). Separate populations are also known from Putty to Wyong and Lake Macquarie on the Central Coast.	Low	Low
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	V	-	V	Occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the central coast, south coast and north-western slopes botanical subdivisions of NSW. The species appears to require protected and shaded damp situations in riparian habitats.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Hibbertia acaulothrix</i>		-	-	E	<i>Hibbertia acaulothrix</i> occurs on rocky outcrops within <i>E. sieberi</i> woodland or in association with black she-oak, red bloodwood and flaky-barked tea-tree. It is known from several widely separated localities in NSW, from Wadbilliga National Park in the Southern Tablelands, through the Nattai Wollondilly area in the Southern Central Tablelands, to the Mt Baker and Mt Coricudgy (Wollemi) area in northern part of the Central Coast and Tablelands. The only estimate for subpopulation numbers is for the Nattai-Wollondilly area—south, with 40 plants observed in 2001.	Low	Low
<i>Leucopogon exolasius</i>	Woronora Beard-heath	V	-	V	Grows in woodland on sandstone. Restricted to the Woronora and Grose Rivers and Stokes Creek, Royal National Park.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	-	V	Scattered, disjunct populations in coastal areas from Jervis Bay to Port Macquarie, with most populations in the Gosford-Wyong areas. Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low	Low
<i>Melaleuca deanei</i>	Deane's Paperbark	V	-	V	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Persicaria elatior</i>	Knotweed, Tall Knotweed	V	-	V	Tall Knotweed has been recorded in south-eastern NSW from Ulladulla to the Victorian border. In northern NSW it is known from Raymond Terrace and the Grafton area. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Persoonia hirsuta</i>	Hairy Geebung	E	-	E	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other <i>Persoonia</i> spp. are) but will regenerate from seed.	Moderate	Low – no limiting habitat being modified or removed. Not detected during survey.
<i>Persoonia nutans</i>	Nodding Geebung	E	-	E	Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks woodland or Castlereagh Scribbly Gum woodland. Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south.	Low	Low
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	-	V	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shaley-lateritic soils over sandstone and shale-sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Low	Low
<i>Pomaderris brunnea</i>	Rufous Pomaderris	E	-	V	Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Low	Low
<i>Prasophyllum affine</i>	Jervis Bay Leek Orchid	E	-	E	Known from three areas south-east of Nowra on South Coast. These are Kinghorn Point, Wowly Gully near the town of Callala Bay, and near the township of Vincentia. Grows on poorly drained clay soils that support low heathland and sedgeland communities.	Low	Low
<i>Prostanthera densa</i>	Villous Mint-bush	V	-	V	Villous Mintbush is generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	-	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where <i>Pterostylis saxicola</i> occurs are sclerophyll forest or woodland on shale-sandstone transition soils or shale soils.	Low	Low
<i>Pultenaea aristata</i>	Prickly Bush-pea	V	-	V	Grows in moist, dry sclerophyll woodland to heath on sandstone, specifically the drier areas of Upland Swamps. Restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Keira above Wollongong.	Known	Low – all known individuals will be demarcated and/or avoided during proposed works
<i>Rhizanthella slateri</i>	Eastern Underground Orchid	V		E	Currently known only from 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. The species grows in eucalypt forest but no informative assessment of the likely preferred habitat for the species is available. Flowers September and November.	Low	Low
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	-	-	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of <i>R. rubescens</i> typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m above sea level (a.s.l) in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Low	Low
<i>Rhodomyrtus psidioides</i>	Native Guava	CE		CE	Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. This species is characterised being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Low	Low

Scientific Name	Common Name	BC Act	FM Act	EPBC Act	Habitat	Likelihood of Occurrence	Potential for impact
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	-	V	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities	Low	Low
<i>Thelymitra kangaloonica</i>	Kangaloon Sun Orchid	CE	-	CE	Thelymitra sp. Kangaloon is only known to occur on the southern tablelands of NSW in the Moss Vale - Kangaloon - Fitzroy Falls area at 550-700 m above sea level. It is known to occur at three swamps that are above the Kangaloon Aquifer. It is found in swamps in sedgelands over grey silty grey loam soils	Low	Low
<i>Thesium australe</i>	Austral Toadflax	V	-	V	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on kangaroo grass tussocks but has also been recorded within the exotic coolatai grass.	Low	Low
<i>Xerochrysum palustre</i>	Swamp Everlasting	-	-	V	Found in Kosciuszko National Park and the eastern escarpment south of Badja. Also found in eastern Victoria. Grows in swamps and bogs which are often dominated by heaths. Also grows at the edges of bog margins on peaty soils with a cover of shrubs or grasses.	Low	Low

Annex 5 Assessment of Significance (5-part test) (BC Act)

Coastal Upland Swamp in the Sydney Basin Bioregion TEC (Coastal Upland Swamp)

Distribution: Coastal Upland Swamp is listed as an threatened ecological community (TEC) under Part 2 of Schedule 2 of the BC Act. The following description of Coastal Upland Swamp is from the Final Determination for the TEC (NSW Scientific Committee 2012):

“Coastal Upland Swamp in the Sydney Basin Bioregion is the name given to the ecological community in the Sydney Basin bioregion associated with periodically waterlogged soils on Hawkesbury sandstone plateaus, generally where mean annual rainfall exceeds 950 mm. Coastal Upland Swamp is generally associated with soils that are acidic and vary from yellow or grey mineral sandy loams with a shallow organic horizon to highly organic spongy black peats with pallid subsoils. They vary in depth from a few centimetres to at least 4 metres. The vegetation is dominated by sclerophyll shrubs and/or sedges, with dynamic mosaics of structural forms that may include tall scrub, open heath and/or sedgeland. Although typically treeless, Coastal Upland Swamp may include scattered trees.”

Extent: Extensive areas of Coastal Upland Swamp exist within the locality (498 ha within five km of the proposal according to NPWS 2003).

Impact summary: A maximum of 0.11 ha of Coastal Upland Swamps will be temporarily impacted by the proposed works via clearing. All of the 12 proposed swamp piezometer groundwater monitoring sites are within *PCT 3924 Sydney Coastal Upland Swamp Heath*. The works will be temporary in nature and would be the tracks and borehole sites will be rehabilitated on competition in accordance with Section 7 of the *Metropolitan Coal Rehabilitation Management Plan*.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Criteria	Address of Criteria	Likelihood
In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	N/A	N/A
In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Extent and composition Approximately 498 ha of Coastal Upland Swamp exists within five km of the study area (NPWS 2003), which is considered to be the local occurrence of Coastal Upland Swamp in this instance. Of this local occurrence, 0.11 ha will be removed or modified by the proposal. Assessment 0.11 ha of Coastal Upland Swamp will be temporarily removed or modified. With mitigation measures for soil and vegetation the action proposed is considered unlikely to have an adverse effect on either the extent or composition of the TEC such that its local occurrence of 498 ha is placed at risk of extinction.	Unlikely

In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Extent and composition Approximately 498 ha of Coastal Upland Swamp exists within five km of the study area (NPWS 2003), which is considered to be the local occurrence of Coastal Upland Swamp in this instance. Of this local occurrence, 0.11 ha will be removed or modified by the proposal. Assessment 0.11 ha of Coastal Upland Swamp will be temporarily removed or modified. With mitigation measures for soil and vegetation the action proposed is considered unlikely to have an adverse effect on either the extent or composition of the TEC such that its local occurrence of 498 ha is placed at risk of extinction.	Unlikely
In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity.	Minimal clearing is proposed to be undertaken within areas of Coastal Upland Swamp, with impacts limited to trittering of 0.11 ha for access track and borehole site clearing to access the swamp areas to install piezometers. Therefore, the extent to which habitat is likely to be removed or modified as a result of the action proposed is considered to be minimal.	Unlikely
In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity.	The proposal will result in the modification of a negligible amount of habitat including a 1 m wide access tracks and 25 m² borehole site (0.11 ha in total across all 12 boreholes), none of which presents a hostile barrier to the movement of pollinators or the dispersal of seed. Habitat for <i>Pultenaea aristata</i> would not be fragmented as a result of the proposal.	Unlikely
In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	Approximately 498 ha of Coastal Upland Swamp exists within five km of the study area and approximately 0.11 ha of Coastal Upland Swamp would be temporarily modified by trittering up to 1 m wide access tracks and up to 25 m² borehole sites. Habitat to be removed is typical of habitat for this community and representative sub-communities within the locality and is not considered to be of any special importance in regard to the long-term survival of the community. The proposal is unlikely to have a significant impact on Coastal Upland Swamp within the locality.	Unlikely
Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	Areas of Outstanding Biodiversity Value (AOBV) in NSW include: - Gould's Petrel- critical habitat declaration; - Little penguin population in Sydney's North Harbour; - Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and - Wollemi Pine.	Unlikely

	None of these areas of AOBV will be affected by the proposal.	
Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	The only KTP that will be affected as a result of the proposal is the clearing of native vegetation. In this case, the proposed program effectively equates to clearing of native vegetation structure of 0.64 ha, with only 0.11 ha being within the TEC. The proposed development is not likely to significantly increase the impact of this key threatening process.	Unlikely
Conclusion: Based on the above information, the local occurrence of Coastal Upland Swamp is unlikely to be significantly affected by the proposal.		

***Pultenaea aristata* (Prickly bush-pea) (Vulnerable)**

Distribution: *Pultenaea aristata* (Fabaceae) is listed as a vulnerable species on the BC Act.

Pultenaea aristata is restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong. The species occurs in either dry sclerophyll woodland, upland swamp or wet heath on sandstone. Extensive areas of potential habitat occur within and on the margins of Coastal Upland Swamps exist within the study area.

Extent: Extensive areas of Coastal Upland Swamp exist within the locality (498 ha within five km of the proposal according to NPWS 2003).

Impact summary: Many individuals of *Pultenaea aristata* were recorded in the study area along Track 8

Overall, it is likely that there are many hundreds of plants of *Pultenaea aristata* within suitable habitat in the study area. The preferred habitat for the species (Upland Swamps and their margins) is unavoidable by the proposal. Mitigation measures and barrier fencing will be implemented to protect individual plants so impacts to *Pultenaea aristata* would be minimal. However, given the density of the species where it occurs, there is the potential that the proposal would impact on a few individuals during construction through trampling or damage to the root zone. To minimise this impact, an ecologist would be on site during proposed clearing in the vicinity of known locations of the species to ensure the vast majority of plants are not impacted.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Criteria	Address of Criteria	Likelihood
In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	Viable local population <i>Pultenaea aristata</i> is known extensively from the locality and probably has a population in the tens of thousands (N. Smith pers. com.). The species was recorded in the study area at numerous locations as described above. <i>Pultenaea aristata</i> individuals at all sites will be made known to project personnel so they can be avoided and protected during works. Within dense areas of threatened plants the vegetation clearing will be reduced and completed by hand-held devices, this will ensure the proposed works avoid direct clearing of any individuals of <i>Pultenaea aristata</i>. Life cycle factors The following description has been paraphrased from Benson and MacDougall (1996). <i>Pultenaea aristata</i> is a small erect shrub to one metre high and lives for five to 20 years. Peak flowering is in September and fruits mature in December. The seed is hard-coated with a high germination rate after being scarified, suggesting that recruitment is mainly after fire. Fire kills the mature plants. Assessment There is the potential that some individuals of <i>Pultenaea aristata</i> will be affected by the proposal given the density of the species where it occurs. To minimise the impacts of the proposal, the species preferred habitat on the margins of Coastal Upland Swamps will be avoided and an ecologist would be on site during clearing operations to ensure impacts are minimised. Therefore, the action proposed is unlikely to have an adverse effect on the life cycle of <i>Pultenaea aristata</i> such that a viable local population of the species is likely to be placed at risk of extinction.	Unlikely

In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	N/A	N/A
In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	N/A	N/A
In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity.	Extent of impact on habitat The extent of <i>Pultenaea aristata</i> habitat to be modified is up to 0.11 ha as a result of the proposed activity. The proposed activity is clearing ground water borehole sites and access tracks to the borehole site.	Unlikely
In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity.	Habitat fragmentation The proposal will result in the primary clearing of up to 0.11 ha of habitat, including a 1 m wide access tracks and 25 m² borehole site, none of which presents a hostile barrier to the movement of pollinators or the dispersal of seed. Habitat for <i>Pultenaea aristata</i> would not be fragmented as a result of the proposal.	Unlikely

In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	Importance of habitat to be impacted The proposal will have no impact on the extent of habitat for <i>Pultenaea aristata</i> within the locality and none will be fragmented.	Unlikely
Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	Critical habitat declarations in NSW include: - Gould's Petrel- critical habitat declaration; - Little penguin population in Sydney's North Harbour; - Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and - Wollemi Pine. None of these areas of critical habitat will be affected by the proposal.	Unlikely
Whether the proposed development or activity is or is part of a key threatening process (KTP) or is likely to increase the impact of a key threatening process.	The only KTP that will be affected as a result of the proposal is the clearing of native vegetation. In this case, the proposed program effectively equates to clearing of native vegetation structure of 0.64 ha, with only 0.11 ha being within the TEC. This is less than 1% of the total community within the 5 km radius and therefore will not significantly impact the population.	Unlikely
Conclusion: A viable local population of <i>Pultenaea aristata</i> is unlikely to be significantly affected by the proposal as: An ecologist would be on site during proposed clearing works in the vicinity of known and previous records of the species to ensure impacts are minimised; The action proposed is unlikely to have an adverse effect on the life cycle of the species; The habitat potentially affected by the proposal is likely to be of little or no importance to the long-term survival of the species in the locality; The proposal is consistent with Keep-watch species management stream under the SoS program; and The proposal would not exacerbate KTPs in the long term.		

Red-crowned Toadlet (*Pseudophryne australis*) (Vulnerable)

Distribution

The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains.

Habitat requirements

Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter. Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Criteria	Address of Criteria	Likelihood
In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	The proposed development or activity is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction. No individuals of Red-crowned Toadlet was heard calling within the study area during the current surveys. Controls will be implemented to avoid sedimentation of breeding habitat as outlined within this assessment. The action is unlikely to place the local population at risk of extinction.	Unlikely
In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	N/A	N/A

In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	N/A	N/A
In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity.	The extent of Red-crowned Toadlet habitat to be modified is up to approximately 0.11 ha of swamps as a result of the proposed activity. The proposed activity is clearing of access tracks no wider than 1 m wide, and up to 25 m ² for each borehole site.	Unlikely
In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity.	The area of habitat is unlikely to become fragmented or isolated from other areas of habitat as a result of the proposed activity. Due to the tracks and associated impacts would not be sufficiently wide to act as a barrier to movement for the Red-crowned Toadlet.	Unlikely
In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	Ephemeral creeks and associated habitat are important feature for Red-crowned Toadlet. However, the proposed exploration program largely avoids such habitat. Furthermore, any potential impacts would be mitigated by a suite of measures, which would assist in the prevention of impacts to any suitable habitat. Therefore, the negligible amount of habitat to be temporarily modified is of low importance to the long-term survival of the species in the locality.	Unlikely
Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	Areas of Outstanding Biodiversity Value (AOBV) in NSW include: - Gould's Petrel- critical habitat declaration; - Little penguin population in Sydney's North Harbour; - Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and - Wollemi Pine.	Unlikely

	None of these areas of AOBV will be affected by the proposal.	
Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	The only KTP that will be affected as a result of the proposal is the clearing of native vegetation. In this case, the proposed program effectively equates to clearing of native vegetation structure of 0.64 ha, with only 0.11 ha being within the TEC. This is less than 1% of the total community within the 5 km radius and therefore will not significantly impact the population.	Unlikely
Conclusion: Based on the above information, the proposal is unlikely to result in a significant impact of Red-crowned Toadlet.		

Annex 6 Assessment of Significance (EPBC Act)

Coastal Upland Swamp in the Sydney Basin Bioregion TEC (Coastal Upland Swamp)

Distribution: Coastal Upland Swamp is listed as an threatened ecological community (TEC) under Part 2 of Schedule 2 of the BC Act. The following description of Coastal Upland Swamp is from the Final Determination for the TEC (NSW Scientific Committee 2012):

“Coastal Upland Swamp in the Sydney Basin Bioregion is the name given to the ecological community in the Sydney Basin bioregion associated with periodically waterlogged soils on Hawkesbury sandstone plateaus, generally where mean annual rainfall exceeds 950 mm. Coastal Upland Swamp is generally associated with soils that are acidic and vary from yellow or grey mineral sandy loams with a shallow organic horizon to highly organic spongy black peats with pallid subsoils. They vary in depth from a few centimetres to at least 4 metres. The vegetation is dominated by sclerophyll shrubs and/or sedges, with dynamic mosaics of structural forms that may include tall scrub, open heath and/or sedgeland. Although typically treeless, Coastal Upland Swamp may include scattered trees.”

Extent: Extensive areas of Coastal Upland Swamp exist within the locality (498 ha within five km of the proposal according to NPWS 2003).

Impact summary: A maximum of 0.11 ha of Coastal Upland Swamps will be temporarily impacted by the proposed works via clearing. All of the 12 proposed swamp piezometer groundwater monitoring sites are within *PCT 3924 Sydney Coastal Upland Swamp Heath*. The works will be temporary in nature and would be the tracks and borehole sites will be rehabilitated on competition in accordance with Section 7 of the *Metropolitan Coal Rehabilitation Management Plan*.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Criteria	Address of Criteria	Likelihood
Lead to a long-term decrease in the size of an important population of a species.	N/A	Unlikely
Reduce the area of occupancy of an important population.	Approximately 0.11 ha of Coastal Upland swamp would be temporarily modified by the proposal. The proposed boreholes sites and access tracks have been designed to avoid needing to clear large areas supporting Coastal Upland Swamp. The local extent of Coastal Upland Swamp will not be significantly reduced by the proposal.	Unlikely
Fragment an existing important population into two or more populations.	The proposal will result in the modification of a negligible amount of habitat including a 1 m wide access tracks and 25 m ² borehole site (0.11 ha in total across all 12 boreholes), none of which presents a hostile barrier to the movement of pollinators or the dispersal of seed. Habitat for <i>Pultenaea aristata</i> would not be fragmented as a result of the proposal.	Unlikely
Adversely affect habitat critical to the survival of a species.	The following species are listed on the EPBC Act Register of Critical Habitat: Wandering Albatross (<i>Diomedea exulans</i>) - Macquarie Island <i>Lepidium ginninderrense</i> (Ginninderra peppergrass) - Northwest corner Belconnen Naval Transmission Station, ACT Black-eared Miner (<i>Manorina melanotis</i>) - Gluepot Reserve, Taylorville Station and Calperum Station. Shy Albatross (<i>Thalassarche cauta</i>) - Albatross Island, The Mewstone, Pedra Branca Grey-headed Albatross (<i>Thalassarche chrysostoma</i>) - Macquarie Island	Unlikely

	No critical habitat has been declared for Coastal Upland Swamp. Given no areas of Coastal Upland Swamp would be removed by the proposal, the proposal is not likely to adversely affect habitat critical to the survival of Coastal Upland Swamp.	
Disrupt the breeding cycle of an important population.	N/A	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	N/A	Unlikely
Result in invasive species that are harmful to an endangered species becoming established in the vulnerable species' habitat.	The ecological processes required to enable the establishment of invasive species are unlikely to eventuate. Vehicle quarantining procedures will mitigate against this. On-site work will be tightly regulated and controlled by a series of mitigation measures and environmental safeguards to ensure against events such as the mobilisation of pollutants. These measures are described the Metropolitan Coal Construction Management Plan.	Unlikely
Introduce disease that may cause the species to decline.		Unlikely
Interfere substantially with the recovery of the species.	To date, there is no recovery plan or threat abatement plan for Coastal Upland Swamp. Management objectives have been identified for Coastal Upland Swamps under the Saving Our Species program: The extent and condition of this ecological community will be improved or maintained primarily via positive management consistent with Catchment Action Plans, water management plans, and by regulating clearing. Where it occurs on private lands, this ecological community will also benefit from voluntary agreements with landholders to manage the land for conservation purposes. Given the proposal would not result in significant clearing of Coastal Upland Swamp, the proposal is not inconsistent with this management action.	Unlikely
Conclusion: Based on the above information, the proposed action is unlikely to have a significant impact on Coastal Upland Swamp.		

	No critical habitat has been declared for <i>Pultenaea aristata</i>. Habitat critical to the survival of <i>Pultenaea aristata</i> is not likely to be impacted by the proposal known individuals would be avoided as far as practicable during clearing operations, with an ecologist on site to mark exclusion zones.	
Disrupt the breeding cycle of an important population.	There is the potential for a few individuals of <i>Pultenaea aristata</i> to be affected by the proposal, but this impact would be minimised by having an ecologist on site prior to clearing works to ensure impacts are minimised. Therefore, the action proposed is unlikely to have an adverse effect on the breeding cycle of an important population of <i>Pultenaea aristata</i> .	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	The modification of native vegetation that represents potential habitat for the species is unlikely to have long-term negative consequences for <i>Pultenaea aristata</i> as impacts will be avoided <i>Pultenaea aristata</i> individuals at all sites will be made known to project personnel and avoided during clearing.	Unlikely
Result in invasive species that are harmful to an endangered species becoming established in the vulnerable species' habitat.	The proposal will introduce tracks into relatively pristine habitat, which generally increases the potential for invasive predators to move into new areas. However, the proposed tracks are minor in nature and the tracks will be rehabilitated. The risk of introducing invasive species would be ameliorated through vehicle quarantining procedures. The proposal is not likely to lead to the introduction of invasive species in <i>Pultenaea aristata</i> habitat. On-site work will be tightly regulated and controlled by a series of mitigation measures and environmental safeguards to ensure against events such as the mobilisation of pollutants. These measures are described the Metropolitan Coal Construction Management Plan.	Unlikely
Introduce disease that may cause the species to decline.	Whilst there is some potential for works plant and machinery to transport and disperse soil pathogens throughout the study area, this risk will be managed through the use of vehicle quarantining procedures. It is considered unlikely that the proposed action will introduce disease that may cause the <i>Pultenaea aristata</i> to decline.	Unlikely
Interfere substantially with the recovery of the species.	To date, there is no recovery plan or threat abatement plan for <i>Pultenaea aristata</i>. No recovery programs are known to occur within the study area. A number of state-wide conservation actions have also been identified for this species under the Saving Our Species program: • Confirm location details of existing records. • Review fire management requirements and apply. • Provide map of known occurrences to Rural Fire Service and seek inclusion of mitigative measures on Bush Fire Risk Management Plan(s), risk register and/or operation map(s). • Reserve Fire Management Strategy to include operational guidelines to protect this species from fire. The proposal is not likely to interfere with the recovery of <i>Pultenaea aristata</i>.	Unlikely
Conclusion: Based on the above information, the proposed action is unlikely to have a significant impact on <i>Pultenaea aristata</i> .		

Contact Us

Niche Environment and Heritage
02 9630 5658
info@niche-eh.com

NSW Head Office – Sydney
PO Box 2443 North Parramatta
NSW 1750 Australia

QLD Head Office – Brisbane
PO Box 540 Sandgate
QLD 4017 Australia

Sydney
Illawarra
Central Coast
Newcastle
Armidale
Mudgee
Port Macquarie
Brisbane
Cairns



Our services

Ecology and biodiversity

Terrestrial
Freshwater
Marine and coastal
Research and monitoring
Wildlife Schools and training

Heritage management

Aboriginal heritage
Historical heritage
Conservation management
Community consultation
Archaeological, built and landscape values

Environmental management and approvals

Impact assessments
Development and activity approvals
Rehabilitation
Stakeholder consultation and facilitation
Project management

Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)