PDP FOR EASING SYDNEY CONGESTION PROGRAM WIDE WORKS - PITT TOWN BYPASS ADDENDUM FLORA AND FAUNA ASSESSMENT

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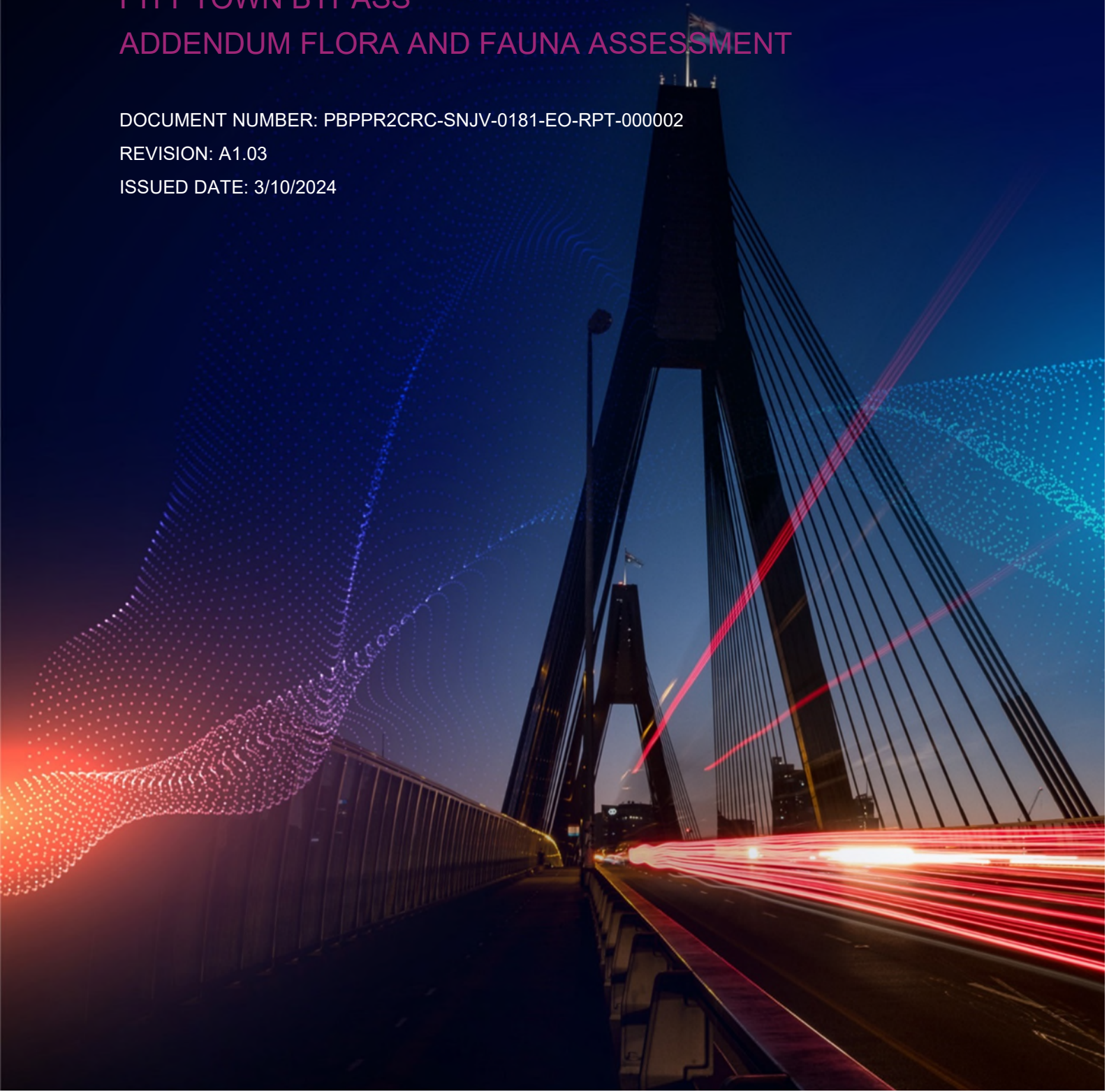

TRANSPORT FOR NSW
PDP FOR EASING SYDNEY CONGESTION

Pitt Town Bypass: Addendum Flora and Fauna Assessment

The Pitt Town Bypass Project – Detailed Design Development Scope

Transport Project Number: P.0089596

SustainJV Project Number: WO-047

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REVISIONS

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CONTENTS

GLOSSARY AND TERMS

Table 1-1: Glossary and Terms

Acronym	Name
AREF	Addendum Review of Environmental Factors
BAM 2020	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method and associated credit calculator
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CCTV	Closed Circuit Television
CEEC	Critically Endangered Ecological Community
CFFMP	Construction Flora and Fauna Management Plan
CMA	Catchment Management Area
CPSWSGTF	Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, the Environment and Water (State)
DCCEEW (federal)	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DPIE EES	Department of Planning and Environment, Environment, Energy and Science division
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979* (State)
EPBC Act	*Environment Protection Biodiversity Conservation Act 1999* (Commonwealth)
FFA	Flora and Fauna Assessment
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater dependent ecosystems
KTP	Key Threatening Process
LGA	Local Government Area
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
RAVP	Rapid Assessment Vegetation Points
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy
SIC	Significant Impact Criteria
SJV	Sustain Joint Venture
Submissions report	Pitt Town Bypass REF submissions report
SVTM	State Vegetation Type Mapping
TEC	Threatened Ecological Community
Transport	Transport for NSW

Acronym	Name
ToS	Test of Significance
TSPC	Threatened Species Profile Collection
TSPD	Threatened Species Profile Database
VI	Vegetation Integrity
VIS	Vegetation information system

1 INTRODUCTION

1.1 Proposal description

Transport for NSW (Transport) proposes to construct a new road that would bypass Pitt Town town centre, located about 45 kilometres north-west of Sydney, near Windsor. Pitt Town Road and Cattai Road comprise the main route north from Windsor, and surrounding areas (hereafter "the proposal"). Currently, this route carries vehicles through Pitt Town town centre via Bathurst Street and Eldon Street. The bypass would be located to the east of the town centre and would be about one kilometre long. The bypass would extend from south of the intersection of Pitt Town Road and Glebe Road, to north of the intersection of Cattai Road and Buckingham Road. The key features of the project include:

- Extending Pitt Town Road past Bathurst Street onto Cattai Road, east of Eldon Street
- Installing a new roundabout at the intersection of Pitt Town Road/Bathurst Street and Glebe Road
- Installing a new roundabout at Eldon Street and Old Pitt Town Road
- Closing a part of Cattai Road to maintain access to Buckingham Street
- Providing new road crossings of Hortons Creek at the southern and central parts of the project.

Temporary work areas would include site compounds, laydown areas, stockpiles and temporary access tracks. These areas form the 'approved project boundary'.

The primary objectives of this proposal are to establish a direct link between Pitt Town Road in the west and Cattai Road in the east, thereby diverting heavy freight traffic from the township. This initiative aims to enhance road safety, alleviate traffic congestion, and improve the quality of life for the local community.

1.2 Background

In 2018 Arcadis prepared a Review of Environmental Factors (REF) to satisfy Roads and Maritime duties under s.5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to "examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity" and s.5.7 in making decisions on the likely significance of any environmental impacts. The REF was placed on public display between Monday 12 November and Monday 10 December 2018 for community and stakeholder comment. The *Pitt Town Bypass REF submissions report* (submissions report) dated 25 February 2019 was prepared to respond to issues raised. After consideration of the REF and submissions report, Transport determined the project on 27 February 2019.

A consistency assessment (CA) was prepared by Arcadis in November 2019 following further design progress. The CA assessed environmental impacts where the design extended beyond the REF boundary. The CA was endorsed on 6 November 2019. Combined, the REF, submissions report and CA are hereafter referred to as the 'project approvals'.

Despite having approval, the project was not commenced, and the Pitt Town Bypass project is yet to be constructed.

In 2024, the Sustain Joint Venture (SJV) were engaged by Transport as part of the Easing Sydney Congestion (ESC) program of works to prepare an Addendum Review of Environmental Factors (AREF) to assess the proposed modifications and minor extension of the Study Area.

With the REF and supporting Biodiversity Assessment Report (Arcadis 2018) being completed over five years ago, Transport is undertaking due diligence review of the Flora and Fauna Assessment (FFA) previously undertaken in 2018. SJV ecologists have been engaged to prepare an addendum Flora and Fauna Assessment to assess any minor changes to the project design (referred to as the proposed modifications in this report) to quantify any additional impacts, and re-survey the approved project boundary and review the biodiversity values within the footprint.

1.2.1 Biodiversity impacts previously assessed (Arcadis 2018; 2019)

The REF and CA previously prepared for the project identified the following maximum direct impacts to biodiversity listed under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- The removal of 1.43 hectares Cumberland Plain Woodland in the Sydney Basin Bioregion
- The removal of 0.43 hectares of Shale Gravel Transition Forest in the Sydney Basin Bioregion
- The removal of 0.68 hectares of Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions
- Loss of 0.21 hectares of occupied habitat (containing five stems) of *Acacia pubescens* (Downy Wattle)
- Loss of 0.31 hectares of occupied habitat (containing four stems) of *Dillwynia tenuifolia*
- Loss of potential habitat resources for:
  - Grey-headed Flying-fox (*Pteropus poliocephalus*)
  - Eastern Bentwing-bat (*Miniopterus orianae oceanensiss*)
  - Eastern Freetail-Bat (*Mormopterus norfolkensis*)
  - Greater Broad-nosed Bat (*Scoteanax rueppellii*)
  - Southern Myotis (*Myotis macropus*)
- Loss of potential habitat for three additional threatened flora and fauna species that may occur but were not recorded during surveys including Cumberland Plain Land Snail, *Micromyrtus minutiflora* and *Pimelea spicata* (Spiked Rice-flower).

1.3 Proposed modification

The proposed modifications include:

- Adjustments to the road design including the horizontal curve of Glebe Road and the southern tie in of the bypass with Pitt Town Road
- Changes to the centre median at the Pitt Town Bypass intersection to allow right turns from Buckingham Street onto Pitt Town Bypass and removing the right turn from Pitt Town Bypass onto Buckingham Street
- Changes to property and maintenance accesses by adjusting the alignment and turnaround areas to accommodate service vehicles
- Refinement of the design including the installation of additional road safety barriers and fences along the Pitt Town Bypass and side streets and the removal of two previously proposed retaining walls at the northern roundabout
- Minor utility adjustment to accommodate revised road design
- Installation of a new Closed-Circuit Television (CCTV) camera in the vicinity of the southern roundabout, located at the intersection of Pitt Town Road/Bathurst Street and Glebe Road
- Permanent full acquisition of a property at 2R Lagoon Road (Lot 9 DP 124990)
- Minor adjustment of the approved project boundary to include property acquisition and adjustment.

Some of the proposed modifications extend beyond the approved project boundary. Additional impact areas have been shown in Figure 1-1; labelled ‘Proposed additional areas’.

1.4 Purpose of this Report

This FFA is being prepared to inform the AREF being prepared to assess the proposed modifications. The FFA will review the impacts to biodiversity within the approved project boundary against those identified in the BAR previously prepared by Arcadis (2018) as well as additional impacts to biodiversity within proposed additional areas. Transport have requested that the biodiversity assessment include desktop investigation and field survey[1]. The main aims of the investigation can be summarised into the following tasks:

- Undertaking database searches (BioNet; Protect Matter Search Tool) for state and federally listed threatened species and ecological communities to identify any new records within the locality of the proposal
- Carrying out a field assessment within the approved project boundary and additional areas to confirm:
  - threatened species presence, including counts for individuals of *Acacia pubescens* and *Dillwynia tenuifolia* previously known to occur on the site.
  - the identification and classification of native vegetation on the site against the current Plant Community Types (PCTs) for Eastern New South Wales (DPE 2024)
  - the extent and condition of PCTs and classification against any associated Threatened Ecological Communities
- Undertake an impact assessment for proposed additional areas, and increases in impacts areas within the approved project boundary as a result of re-surveying
- Updating Test of Significance (ToS) (BC Act) and Significant Impact Criteria (EPBC Act) assessments for threatened entities identified or considered to have a moderate or higher likelihood occur with the approved project boundary and proposed additional areas.
- Reassess impacts against the Guideline for Biodiversity Offsets (2016) and identifying offsetting requirement for impacts that trigger the offset threshold.

This assessment is not intended to be a comprehensive biodiversity assessment to reassess all likely impacts from the original project (described in the 2019 determined REF), as was completed in the BAR (Arcadis 2018). Rather, it is meant to assess impacts as a result of the proposal and be an update to the previously collected data and a re-evaluation of the project impacts where changes have been identified. Where impacts are consistent with the BAR, cross references will be made back to the relevant sections of that document.

1.5 Study Area

The Study Area for this assessment includes the approved project boundary and proposed additional areas. The Study Area is displayed in Figure 1-1.

In some instances, the desktop investigation extends beyond the Study Area, however all field investigations were focused within the Study Area where direct impacts to biodiversity will occur.

The Study Area encompasses several privately-owned rural residential properties that are located on the eastern periphery of Pitt Town town centre. Two unnamed drainage lines which are tributaries to Hortons Creek (hereafter referred to as Hortons Creek) transect the Study Area. Local sealed roads that fall within the Study Area include the western extent of Glebe Road and Old Pitt Town Road, and the eastern extent of Lagoon Road, Bathurst Street, Buckridge Street, Eldon Street, Cattai Road and Buckingham Street.

[1] In accordance with the Section 3.4 of the BAM Operation Manual (DPE EES 2022) it is suggested that field survey data collected over 5 years prior may not reflect the current biodiversity of the site.

1.6 Site context

The Study Area is located in the Sydney Basin bioregion, which lies on the central east coast of NSW and extends from Nelson Bay in the north to almost as far south as Batemans Bay. Within the Sydney Basin bioregion, the Study Area is situated within the Cumberland subregion, a broad shale basin in western Sydney.

The Study Area lies almost completely within Hawkesbury – Nepean Terrace Gravels Mitchell landscape, with the very southern edge of the Study Area extending into the Hawkesbury –Nepean Channels and Floodplains, within the Hawkesbury-Nepean Catchment Management Area (CMA).

The landscape of the Study Area is largely made up of rural residential development with patches of native vegetation, many of which have been grazed by stock to varying degrees. Road reserves and front gardens of properties contain a mix of native and exotic vegetation, often with an exotic groundcover. A waterway which traverses through the Study Area is dense in exotic vegetation.

The Study Area is located in a highly modified landscape, characterised by rural residential development. Rural dwellings are scattered across the Study Area with many attached to small horse paddocks or patches of vegetation.

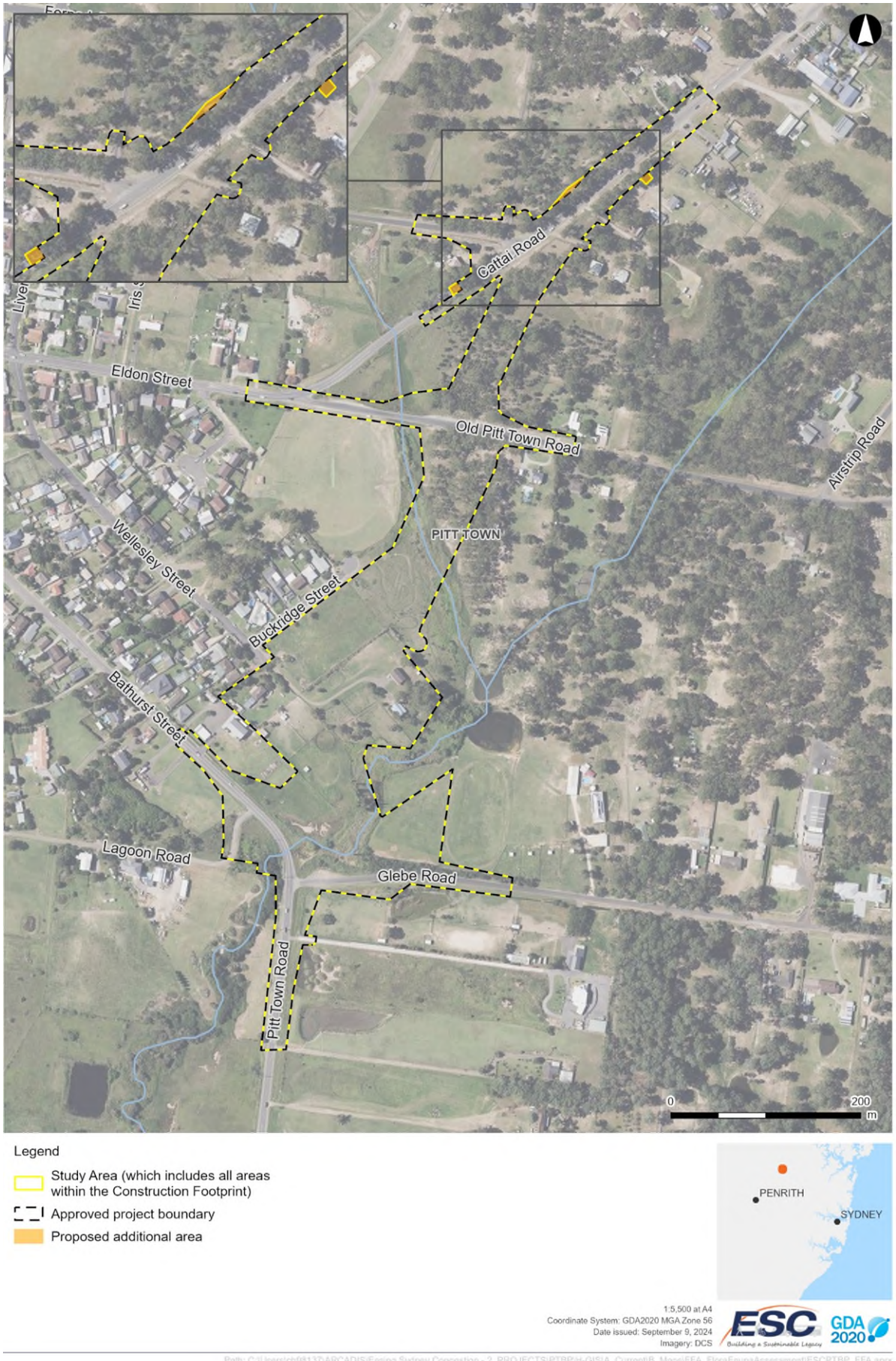

Figure 1-1 The Study Area which comprises the approved project boundary and proposed additional areas

2 ENVIRONMENTAL REQUIREMENTS

2.1 Legislative context

An AREF is being prepared to satisfy Transport assessment requirements under s.5.5 of the EP&A Act to “examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity” and s.5.7 in making decisions on the likely significance of any environmental impacts. This FFA forms part of the AREF being prepared to assesses the biodiversity impacts of the proposed additional areas to meet the requirements of the EP&A Act. An increase in impacts to biodiversity within the approved project boundary have also been considered in this assessment.

2.1.1 *Biodiversity Conservation Act 2016*

The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act seeks to establish a framework for assessment and offsetting of development impacts as well as investment in biodiversity conservation:

- The NSW Biodiversity Offsets Scheme (BOS) is established under Part 6 of the BC Act.
- The Biodiversity Assessment Method (BAM) is established under section 6.7 of the BC Act.

The purpose of the BAM is to assess certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act. Section 7.3 of the BC Act provides a test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Where a significant impact is likely, a Species Impact Statement must be prepared. Alternatively, Transport could elect to enter into the BOS as an alternative to preparing a Species Impact Statement. This test has been applied to this proposal and is shown in Section 7 of this report.

2.1.2 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act is Commonwealth legislation that provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as Matters of National Environmental Significance (MNES). MNES identified in the EPBC Act include:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (listed under the Ramsar Convention).
- Threatened species and communities.
- Migratory species protected under international agreements.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mines).

In September 2015, a “strategic assessment” approval was granted by the Commonwealth Minister in accordance with the EPBC Act. The approval applies to Transport activities being assessed under Part 5 of the EP&A Act with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species. As a result, Transport proposals can be assessed via an REF which must address and consider potential impacts on nationally listed threatened species, populations, ecological communities and migratory species, including application of the “avoid, minimise, mitigate and offset” hierarchy. The proposal does not require referral to the Commonwealth

Department of Climate Change, Energy the Environment and Water for these matters, even if the activity is likely to have a significant impact.

This report will identify threatened species, populations, ecological communities as listed under the EPBC Act and make an assessment of the combined impacts within the approved project boundary and proposed additional areas on these species through assessment against the Significant Impact Criteria.

2.1.3 State Environmental Planning Policies

State Environmental Planning Policy (Biodiversity Conservation) 2021

Chapters 3 and 4 of the *State Environmental Planning Policy (Biodiversity Conservation) 2021* (Biodiversity Conservation SEPP) incorporate the Koala SEPP 2020 and Koala SEPP 2021, respectively. Chapter 3 (Koala SEPP 2020) does not apply to the City of Hawkesbury LGA however, although Chapter 4 (Koala SEPP 2021) does apply to all zones within the LGA.

The operative provision of both Koala SEPP 2020 and Koala SEPP 2021 apply to the determination of a development application. As Part 5 activities are not development requiring development consent the Koala SEPP does not apply. Regardless, this document has been considered when assessing potential impacts on koalas and koala habitat. No *Phascolarctos cinereus* (Koalas) or koala scats were recorded in the Study Area, with Koalas determined no longer present in Pitt Town or Scheyville Nature Reserves (NPWS 2000).

Under the 2018 BAR, the SEPP 44 was the applicable policy at the time of determination. As a result of the low density of *Eucalyptus tereticornis* (Forest Red Gum) (the only identified Koala feed tree) in the Study Area, the vegetation was not considered consistent with the definition of 'Potential Koala Habitat', in accordance with the provisions of SEPP 44.

State Environmental Planning Policy (Resilience and Hazards) 2021: Chapter 2: Coastal Management

The Coastal Management SEPP identifies development controls to help protect and manage sensitive coastal environments (coastal zone), manage risks from coastal hazards and support appropriate development. Clearing of native vegetation on land mapped as a Coastal wetland is 'designated development' under the EP&A Act. 'Designated development' requires the preparation of an EIS and public consultation before the relevant consent authority can determine the development application. The clearing of Coastal wetlands will also trigger a requirement for an assessment under the BC Act in the form of a Biodiversity Development Assessment Report (BDAR).

In some locations, the approved project boundary overlaps areas mapped as Coastal Wetlands and as Proximity Area for Coastal Wetlands (100 metre buffer of mapped Coastal Wetland). Impacts in these locations has not changed from those described and assessed in the REF (Arcadis 2019). Impacts in these location were assessed under the previous saving and transitional arrangements within the *Coastal Management SEPP 2018*, which was the applicable policy at the time of the initial project approval.

This assessment will determine if the proposed additional areas will impact areas mapped as Coastal Wetlands and Proximity Areas to Coastal Wetlands under the current *Resilience and Hazards SEPP 2021*.

2.2 Limitations

This report has been prepared by SustainJV for Transport and may only be used and relied on by Transport for the purpose agreed between SustainJV and Transport

SustainJV otherwise disclaims responsibility to any person other than Transport arising in connection with this report. SustainJV also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by SustainJV in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. SustainJV has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by SustainJV described in this report. SustainJV disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Conditions at other parts of the proposed footprint may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

3 METHODOLOGY

This section steps out the methodologies applied to investigate the Study Area for biodiversity values.

The SJV personnel involved in undertaking investigations and preparing this report are included in Table 3-1 below, including their roles and qualifications.

Table 3-1. Personnel involved in delivery of this assessment including their roles and qualifications

Personnel	Qualification	Role
Elijah Elias	B Bio Con Accredited Assessor BAAS 21012	Principal Ecologist / Technical review
Nathan Banks	B Zool Accredited Assessor BAAS 23023	Senior Ecologist
Acacia Jennings	B Animal BioSci (Wild. Con Man) (hons) M Con. Bio	Ecologist
Eva Mueller	B Sci (Env Man)	Senior GIS Consultant

3.1 Desktop investigation

Desktop investigations were undertaken prior to field surveys to provide ecologist with site context and to identify biodiversity values likely to occur. Following site survey field data was interrogated and processed to provide vegetation condition data and offsetting requirements. The different desktop tasks undertaken as part of the assessment are discussed below.

3.1.1 Database searches

A review of existing literature and database searches was undertaken in June 2024 to identify State and Commonwealth records of threatened entities and Commonwealth MNES that occur or have the potential to occur within a 10-kilometre radius of the Study Area. The databases interrogated for this purpose are listed in Table 3-2. All flora and fauna species identified in the database searches are listed in the Likelihood of Occurrence tables (Appendix C and Appendix D).

Table 3-2 Database searches

Database	Purpose of the search	Date the search was completed
BAM calculator (BAM-C)	The calculator uses the rules and calculations outlined in the BAM and allows the user to apply the BAM at a site and observe the results of the assessment.	Referenced throughout
BioNet Atlas of NSW Wildlife, managed by the Department of Planning and Environment, Environment, Energy and Science division (DPIE EES)	Used to compile a list of threatened species records listed under the BC Act to within 10 km of the Study Area	12 June 2024
BioNet Vegetation Classification database	Provides information on Plant Community Types (PCTs) and their relationship to a vegetation formation and vegetation class (managed and maintained in the Vegetation Information Systems (VIS) Classification database).	Referenced throughout
Coastal management areas identified by the Resilience and Hazards SEPP 2021.	The Resilience and Hazards SEPP maps the 4 coastal management areas making up the coastal zone	12 June 2024

Database	Purpose of the search	Date the search was completed
	for the purposes of both the *Coastal Management Act 2016* and the *Environmental Planning and Assessment Act 1979*.	
Commonwealth Atlas of Groundwater Dependent Ecosystems (GDE): GDE Atlas Map: Water Information: Bureau of Meteorology (bom.gov.au).	Maps GDEs in search area	12 June 2024
Core Koala Habitat identified by the Biodiversity and Conservation SEPP 2021.	Details state environmental planning policy for koala habitat protection.	12 June 2024
National Flying-fox monitoring viewer (environment.gov.au).	Provides mapping and data of threatened Flying-fox species and camps in Australia	12 June 2024
NSW DPI Fisheries Spatial Data Portal	Maps threatened fish species distribution in NSW.	12 June 2024
NSW SEED	Central sharing resource hub for accessing environmental data	12 June 2024
Protected Matters Search Tool managed by the Commonwealth Department of Agriculture, Water and the Environment (DAWE)	Used to compile a list of potentially occurring MNES listed under the EPBC Act to within 10 km of the Study Area	12 June 2024
State Vegetation Type Map: The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016)	Provides digital mapping of the native vegetation communities of the Sydney Metropolitan area.	12 June 2024
Threatened species, populations and ecological communities profile database, managed by DPIE EES	Contains information for all listed threatened species, populations and communities	Referenced throughout

3.1.2 Review of existing literature

A review of existing literature was conducted as part of the desktop assessment, including review of the following reports:

- Pitt Town Bypass Review of Environmental Factors, Roads and Maritime Services | November 2018 Volume 1 of 3 - Main report and Appendix A to Appendix C (Arcadis 2018)
- Pitt Town Bypass Biodiversity Assessment, Roads and Maritime Services | September 2018 (Arcadis 2018a)
- Pitt Town Bypass Review of environmental factors consistency review. Roads and Maritime Services | November 2019 (Arcadis 2019).

3.1.3 Habitat assessment

The likelihood of threatened biodiversity to occur within the Study Area was considered using knowledge of each species' habitat and lifecycle requirements regarding the habitat likely to be present within the Study Area. The location and number of nearby, recent records were also considered in determining the likelihood of occurrence. Table 3-3 outlines the criteria used to determine the likelihood of occurrence of threatened biodiversity within the Study Area.

Threatened species likelihood of occurrence was appraised before site surveys and updated after surveys to reflect ground-truthed habitat suitability and site observations. Likelihood of occurrence tables have been prepared for both flora and fauna and haven been included in Appendix C and Appendix D respectively.

Marine species were excluded from assessment as there is no marine habitat present in the Study Area.

Table 3-3 Likelihood of occurrence criteria

Likelihood of occurrence	Criteria - one or more of the following conditions applies for threatened flora species	Criteria - one or more of the following conditions applies for threatened fauna species
Low	The species has not been recorded previously within 10km of the proposal site. The species has historically (20 years ago) been recorded within 10km of the proposal site, and suitable habitat is no longer present. The proposal site is beyond the current known geographic range of the species. The species has specific habitat requirements that are not present on the proposal site. The species is considered extinct.	The species has not been recorded previously within 10km of the proposal site. The species has historically (20 years ago) been recorded within 10km of the proposal site, and suitable habitat is no longer present. The proposal site is beyond the current known geographic range. The species has specific habitat requirements that are not present on the proposal site. The species is considered extinct.
Moderate	The species has historically (20 years ago) been recorded on the proposal site or has been recorded more recently (20 years ago) within 10km of the proposal site. The species has historically (20 years ago) been recorded (no recent records) within 10km of the proposal site and suitable habitat is present on the proposal site. The species has specific habitat requirements that are present on the proposal site, but in a poor or modified condition.	The species has historically (20 years ago) been recorded on the proposal site or has been recorded more recently (20 years ago) within 10km of the proposal site. The species has historically (20 years ago) been recorded (no recent records) within 10km of the proposal site and suitable habitat is present on the proposal site. The species has recently (20 years) been recorded within 10km of the Proposal site and the proposal site contains marginally suitable habitat for the species. The species is unlikely to maintain a resident population on the Proposal site, however, may occasionally utilise resources within the proposal site.
High	The species has recently (within the last 20 years) been recorded on the Proposal site or nearby. The species has specific habitat requirements that are present on the proposal site and are in good condition. A known population of the species is located in similar habitat in proximity to the proposal site.	The species has recently (within the last 20 years) been recorded on the proposal site or nearby. The species has specific habitat requirements that are present on the proposal site. The species is known or likely to maintain resident populations in proximity to the proposal site and could utilise resources within the proposal site. The species is known or likely to regularly utilise resources on the proposal site.
Known	The species was recorded in the proposal site during the current survey.	The species was recorded on or in proximity to the proposal site during the current survey.

3.2 Field survey

A comprehensive field survey campaign was delivered to inform the BAR (Arcadis 2018a) for a Study Area that included the approved project boundary and proposed additional areas. Current surveys focused on confirming biodiversity values across these areas and updating vegetation extents and threatened species habitat where required. Survey tasks undertaken during each survey campaign is summarised below.

3.2.1 BAR surveys (Arcadis 2018a)

A detailed survey campaign was undertaken by Arcadis ecologist during preparation of the BAR for the original project. The Study Area, where surveys were focused, comprised a 50-metre buffer on the approved project boundary. Due to the similarity in footprint of the current proposal with that described and assessed in the REF (Arcadis 2018), all areas of the current project fall within those previously surveyed by Arcadis.

Field surveys previously undertaken by Arcadis included:

- Vegetation surveys
  - Plant Community Type mapping
  - Vegetation sampling plots using the Biodiversity Assessment Method (BAM) (2017)
  - Rapid assessment points
- Targeted flora surveys
  - Random meanders and parallel transects in were undertaken in in accordance with *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities* (DEC 2004) areas of suitable habitat.
  - Targeting the following threatened flora species: *Acacia bynoeana* (Bynoe's Wattle), *Allocasuarina glareicola, Callistemon linearifolius* (Netted Bottle Brush), *Dillwynia tenuifolia, Epacris purpurascens* var. *purpurascens*, *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea), *Micromyrtus minutiflora, Persoonia nutans* (Nodding Geebung), *Pimelea spicata* (Spiked Rice-flower) and *Pultenaea parviflora*.
  - Surveys were completed during the recommended survey months and to meet guidelines for each target species.
- Targeted fauna surveys
  - Survey techniques included spotlight transects, call-playback surveys, bird surveys, Cumberland plain land snail surveys and passive Anabat ultrasonic recorders
  - Nineteen threatened fauna species were identified as having and moderate to high likelihood to occur and were targeted during surveys.
  - Surveys were completed during the recommended survey months and to meet guidelines for each target species.

A summary of the survey effort for flora and fauna surveys carried out is included in section 2.5 of the BAR (Arcadis 2018).

3.2.2 SJV surveys (current)

Recent surveys were conducted by SJV ecologists Nathan Banks and Acacia Jennings on the 13 and 24 of June 2024 within the approved project boundary and proposed additional areas; not the broader Study Area surveyed by Arcadis for the BAR (Arcadis 2018a).

As a detailed survey campaign had already been completed for the BAR (Arcadis 2018a), current surveys focused on confirming biodiversity values previously recorded and to map any changes to vegetation extent and condition; not to comprehensively re-survey the Study Area.

Where possible surveys were undertaken to meet the requirements of the Biodiversity Assessment Method (BAM) (2020), however in some instances (i.e. threatened species survey) did not meet survey guidelines. This has been discussed further in section 2.2.

The following activities were undertaken during site inspection, with the outcome of these assessments given in Section 4 below:

- Ground-truthing existing vegetation against the (decommissioned) vegetation communities identified in the BAR and against the State Vegetation Type Mapping (SVTM) (DPE 2022c). Vegetation mapping from the BAR and SVTM were pre-loaded onto a Field Maps enabled iPad prior to field survey, allowing ecologist to determine whether the vegetation boundary extents were accurate or required updating.
- In locations where vegetation mapping was not reflective of what was observed in the field, boundaries for vegetation communities were updated on a Field Maps enabled iPad.
- Conducting Rapid Assessment Vegetation Points (RAVP) to confirm PCTs,
- Identifying and mapping Threatened Ecological Communities (TECs), and where necessary undertaking vegetation plots to determine whether patches meet the definition for listing as associated TECs listed in the EPBC Act.
- Identifying priority weed species as listed in the Greater Sydney Local Land Services Region
- Opportunistic searches for threatened flora and fauna species with a moderate or high likelihood of occurrence in areas of suitable habitat:
  - searches for the Cumberland Plain Land Snail (*Meridolum corneovirens*) and Dural Land Snail (*Pommerhelix duralensis*) in coarse woody debris and piled bark at the base of Eucalyptus trees, in areas of suitable habitat identified in the 2018 BAR.
  - targeted searches, in the form of random meanders, for *Acacia pubescens* (Downy Wattle) and *Dilwynia tenufolia* were conducted at locations where individuals were previously recorded in the 2018 BAR and opportunistically where suitable habitat was present. Surveys focused on confirming the persistence of population of these species within the Study Area and identifying any changes to numbers of individuals or extent of occupancy.
- Identifying and recording fauna habitat features, including
  - Hollow-bearing trees
  - Waterbodies
  - Caves, crevices, and culverts
  - Bird nests
  - Logs and rock habitat.

Biodiversity data, including vegetation and threatened species habitat mapping were spatially recorded using Field Maps on an iPad.

An additional day of survey was conducted by Nathan Banks and Elijah Elias on the 18 July 2024 in the locality of the proposal to collect additional information to inform the Test of Significance being prepared for the TECs Cumberland Plain Woodland and Shale Gravel transition Forest as listed under the BC Act. Surveys involved driving the local roads surrounding the Proposal site to verify the extent of these communities in the locality. Rapid Assessment Vegetation Points were conducted to

determine consistency or contrast with mapping and a Filed Maps enabled iPad was used to approximately map the extent of these communities.

Weather conditions on the date of survey, at the closest weather station (Richmond RAAF station ID: 067105) approximately 7.8 kilometres from site is given below in Table 3-4.

Table 3-4 Weather conditions during current surveys

Date	Temperature (°C)		Rain (mm)	Max wind gust (km/h)	Wind direction
	Min	Max			
13/06/2024	4.0	16.7	0.0	30	SW
24/06/2024	3.1	17.3	0.2	13	NE
18/07/2024	4.1	19.2	0.0	37	NNW

3.3 Limitations

Fieldwork was limited to two survey days and findings are based on the condition of the Study Area at the time of field investigations. Surveys did not include nocturnal tasks.

Whilst the seasonality of the survey did not coincide with the recommended seasonal survey window for some threatened species as identified in the previous BAR (*Acacia pubescens* (Downy Wattle) and *Dilwynia tenufolia)* (as described in the Threatened Biodiversity Data Collection), these species are conspicuous and easily distinguishable in the landscape without flowering material, thus having minimal limitation on the survey validity. Surveys for these species were not comprehensive or in accordance with targeted flora survey guidelines, with efforts focused on previous locations where threatened plants were found to occur (Arcadis 2018) to confirm their presence and record whether populations have increased or decreased in those locations. Other plant species (such as *Pimelea spicata*) are perennial but are inconspicuous or difficult to identify unless flowering. This limits the chance of a positive identification, particularly for flora when not in the flowering time.

Fauna behaviours may have also affected detectability; species that are easily disturbed or cryptic species may not have been detected during surveys. It is possible that a number of flora and fauna species occurring in the Study Area were not detected during the current survey due to the above factors.

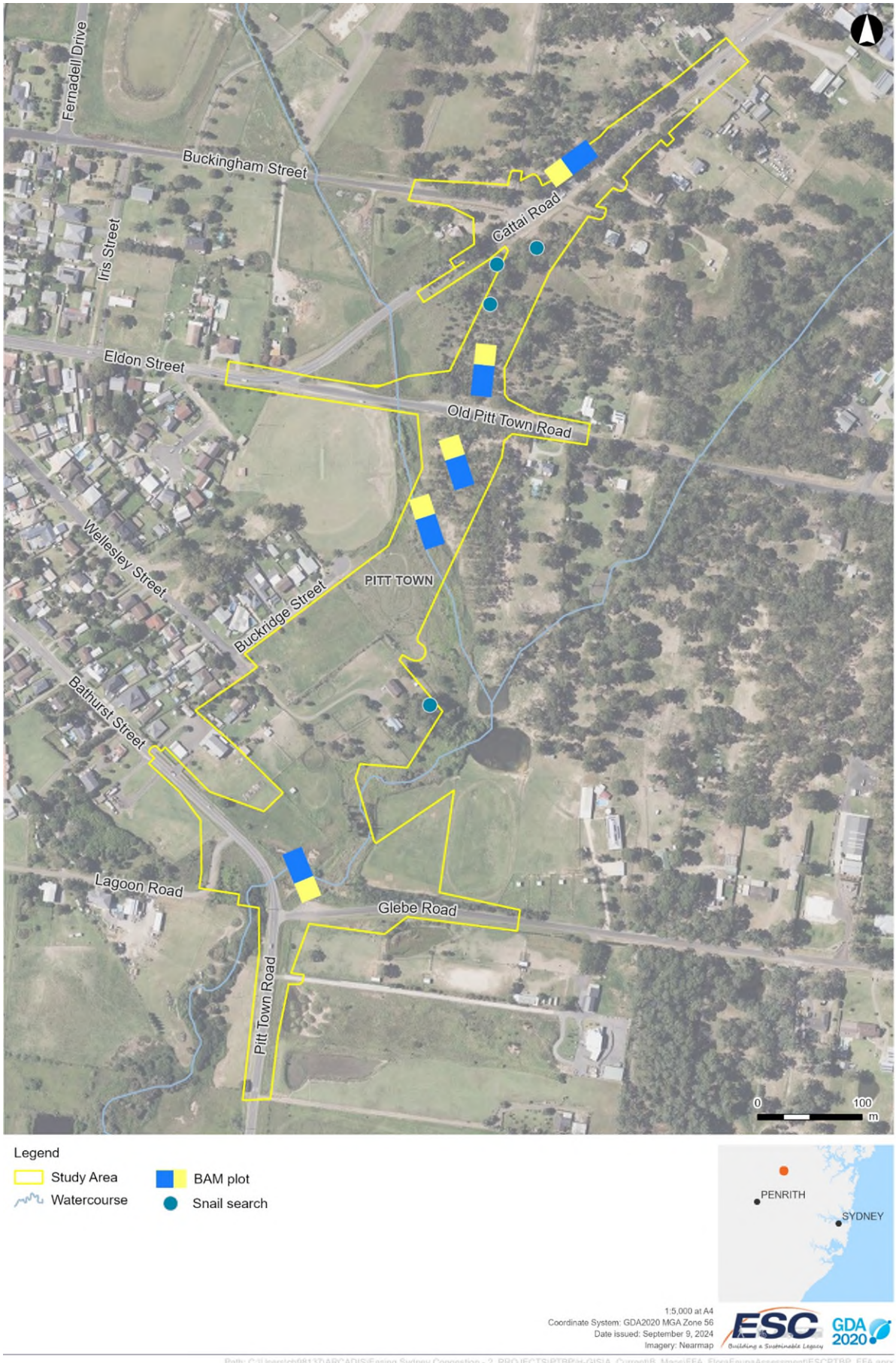

Figure 3-1 Surveys undertaken including BAM plots and targeted snail searches.

4 EXISTING ENVIRONMENT

4.1 Soils and Geology

Consistent to the 2018 BAR, two soil landscapes are mapped across the Study Area (Bannerman and Hazelton 1990). Freemans Reach soil landscape covers the majority of the Study Area while the very northern and southern extent of the site is located on the Berkshire Park soil landscape.

Freemans Reach soil landscape is an active floodplain of the Nepean River on alluvium derived from Narrabeen Group, Hawkesbury Sandstone and Wianamatta Group materials. It occurs discontinuously on either bank of the Nepean and Hawkesbury Rivers and is mainly level with minor (10 m) relief. Soils are deep brown sands and loams, pedal to moderately structured, usually friable (Bannerman and Hazelton 1990).

Berkshire Park soil landscape is associated with gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean River system. The soils of this landscape are the result of three depositional phases of Tertiary alluvial/colluvial origin. St Marys formation is overlain by Rickabys Creek gravel formation which is then topped by the Londonberry Clay formation. These formations are derived from sandstone and clay and have eroded on the surface resulting in the exposure of all three in different locations (Bannerman and Hazelton 1990).

4.2 Vegetation

Vegetation within the Study Area is predominantly comprised of modified grasslands with some patches of native woodland vegetation. There is a watercourse that runs centrally through the Study Area which supports a mixture of native and exotic species, with some sections resembling a native wetland. Native vegetation which can be classified as a Plant Community Type (PCT) is discussed in Section 4.2.1. Vegetation in the Study Area that does not conform to a PCT as listed on the BioNet Vegetation Classification Database (DPE, 2024) is discussed in Section 4.2.2.

4.2.1 Plant Community Types

PCTs are the finest level of classification in the NSW vegetation classification hierarchy. In 2022, an update introduced a plot-based and data-driven quantitative typology replacing the regionally sourced qualitative PCTs in operation between 2011 and 2022. The PCTs referenced in the 2018 BAR have been decommissioned. As such this assessment includes a review of the lineage between the current PCT classification and decommissioned PCTs from the 2018 BARs. The PCTs included in the 2018 BAR were:

- PCT 724: Broad-leaved Ironbark – Grey Box –Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- PCT 849 - Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- PCT 1071 - Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion

A review of the PCT lineages, which was documented as part of the reclassification, was undertaken to determine if there were any relationships between the previously identified PCTs and those currently mapped on the SVTM. The offspring of the PCTs previously mapped (Arcadis 2018) are presented in Table 4-1.

Table 4-1 Decommissioned PCTs (2018 BAR) and their offspring, as present in the Study Area

2018 BAR Plant Community Types (parent) (decommissioned)	Plant Community Type (offspring)
PCT 724: Broad-leaved Ironbark – Grey Box – *Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Complex split to the following offspring: • PCT 3448: Castlereagh Ironbark Forest

2018 BAR Plant Community Types (parent) (decommissioned)	Plant Community Type (offspring)
	• PCT 3320 Cumberland Shale Plains Woodland
PCT 849 - Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Single split to offspring: • PCT 3320: Cumberland Shale Plains Woodland
PCT 1071 - *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion	Complex split to 11 offspring PCTs, of which one was: • PCT 3962: Coastal Floodplain Phragmites Reedland

SVTM (DPE 2024) was used to determine if any of the offspring PCTs have been mapped in the Study Area under the current classification. A total of three PCTs were mapped to occur in the Study Area, of which two are offspring of previously mapped PCTs. These PCTs are listed in Table 4-2.

Table 4-2 Vegetation communities mapped in the Study Area (DPE 2024)

Mapped vegetation (DPE 2022)	PCT ID
Castlereagh Ironbark Forest	3448
Cumberland Shale Plains Woodland	3320
Cumberland Red Gum Riverflat Forest	4025

Of the three PCTs mapped by the SVTM, field survey confirmed only two occur within the Study Area (PCT 3448 and 3320). A third PCT was present in the Study Area that was not mapped by the SVTM, this is PCT 3962. PCT 3962 is listed as an offspring of PCT 1071 which was identified to occur in the 2018 assessment.

A description of the ground-truthed PCTs within the Study Area and further justification of their consistency with previously mapped PCTs is discussed below.

Castlereagh Ironbark Forest (PCT 3448)

In the 2018 BAR, the legacy PCT, 724 Broad-leaved Ironbark – Grey Box –Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion is a parent PCT with a complex split to two Offspring PCTs 3448 (Castlereagh Ironbark Forest) and PCT 3320 (Cumberland Plains Woodland). The relationship between the legacy PCT and PCT 3448 is strong because of the dominance of Ironbark's, namely *Eucalyptus fibrosa* (Broad-leaved Ironbark). Furthermore, this description of the soil landscape and the geographic distribution of PCT 3448 is consistent with the location and soils of the Study Area.

Vegetation which has been mapped as PCT 3448 is present within the northern portion of the Study Area (Figure 4-1). This vegetation is associated with the intergrade between clay-rich shale soil and the sandier substrates. The canopy is dominated by Broad-leaved Ironbark. Disturbance and weeds are evident within the vegetation, specifically within Private Properties and along Cattai and Old Pitt Town Roads.

A description of PCT 3448 and a list of the diagnostic species used to determine this PCT within the Study Area is provided in Table 4-3. The VIS for sampled patches of this community has also been included.

Table 4-3 Description of PCT 3448 - Castlereagh Ironbark Forest (Bionet Vegetation Classification DPIE, 2024)

PCT name	Castlereagh Ironbark Forest
PCT number	3448
Vegetation formation	Dry Sclerophyll Forest
Vegetation class	Cumberland Dry Sclerophyll Forest

PCT name	Castlereagh Ironbark Forest
Conservation status	Associated with: Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (BC Act) **Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act)** Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (EPBC Act) **Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)**
Distribution	Sydney Basin
Vegetation description	A tall sclerophyll open forest with a dense mid-stratum of Melaleucas and a patchy ground layer of grasses and graminoids or a dense thicket of Melaleucas with ergent eucalypts that is found on the Cumberland Plain to the west of Sydney. It is one of a suite of forests that are associated with the subtle intergrade between clay-rich shale soil and the sandier substrates. The canopy almost always includes ironbark eucalypts (primarily *Eucalyptus fibrosa*), occasionally accompanied by stringybark eucalypts (*Eucalyptus sparsifolia, Eucalyptus oblonga* or *Eucalyptus globoidea*). The dense shrub to small tree layer almost always includes melaleucas and acacias of which *Melaleuca decora* and *Acacia falcata* are the most frequent. The smaller shrubs *Bursaria spinosa* and *Daviesia ulicifolia* are both common. The ground layer is a sparse cover of graminoids, forbs, twiners and a hardy fern. *Entolasia stricta* is almost always present while *Aristida vagans, Cheilanthes sieberi subsp. sieberi, Microlaena stipoides, Dianella revoluta, Lomandra multiflora subsp. multiflora, Lepidosperma laterale* and *Opercularia diphylla* are very frequent.
Vegetation Integrity Score (VIS)	57.3
Total extent in the Study Area	0.47 ha
Species identified during site investigation relied upon for PCT identification	*Eucalyptus fibrosa* (Broad-leaved ironbark), *Melaleuca decora* (White feather honey myrtle), *Bursaria spinosa* (Australian blackthorn)

Plate 4-1Castlereagh Ironbark Forest (BAM plot 4 0m facing north)

Cumberland Shale Plains Woodland (PCT 3320)

In the 2018 BAR, the legacy PCT, 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion is a parent PCT with a single split to Offspring PCT 3320. The relationship between the legacy PCT and new PCTs is strong with a high classification confidence level. Under the updated PCT Classification system Cumberland Shale Plains Woodland is PCT 3320.

Patches of vegetation consistent with the description of PCT 3320 is present within the middle portion of the Study Area (Figure 4-1, Figure 4-2, Figure 4-3). PCT 3320 forms a tall sclerophyll open woodland within the Study Area, with a canopy dominated by *Eucalyptus moluccana* (Grey box) and sparsely dispersed occurrences of *Eucalyptus tereticornis* (Forest red gum) and *Eucalyptus crebra* (Narrow-leaved ironbark). Disturbance and weeds are evident within the vegetation, specifically along Old Pitt Town Road with evidence of rubbish dumping.

A description of PCT 3320 and a list of the diagnostic species used to determine this PCT within the Study Area is provided in Table 4-4. The VIS for sampled patches of this community has also been included.

Table 4-4 Description of PCT 3320 - Cumberland Shale Plains Woodland (Bionet Vegetation Classification DPIE, 2024)

PCT name	Cumberland Shale Plains Woodland
PCT number	3320
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Conservation status	Associated with: **Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act)** Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act) **Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)**
Distribution	Sydney Basin
Vegetation description	A tall sclerophyll open forest or woodland with a sparse mid-stratum of soft-leaved shrubs and small trees with a grassy ground cover on the undulating Wianamatta Group shale plains of western Sydney. The canopy very frequently includes *Eucalyptus tereticornis* and *Eucalyptus moluccana*, with ironbarks (*Eucalyptus crebra* and *Eucalyptus fibrosa*) occasionally present and sometimes prominent in localised areas. The sparse shrub to small tree layer very frequently includes *Bursaria spinosa* and one or more species of Acacia, of which *Acacia parramattensis, Acacia decurrens* and *Acacia falcata* are the most frequent and abundant. Presence of these Acacia species helps to distinguish this PCT from the related PCT 3319 on rises of the southern Cumberland Plain which typically includes *Acacia implexa*. The mid-dense ground layer typically includes grasses, forbs, twiners and hardy small ferns. *Microlaena stipoides* is almost always present and *Themeda triandra*, *Dichondra repens, Brunoniella australis, Cheilanthes sieberi subsp. sieberi, Desmodium varians, Aristida vagans* and *Glycine tabacina* are very frequent. This is the most widespread PCT on the Cumberland Plain, occupying much of the plain between Bankstown and the Hawkesbury and Nepean rivers.
Vegetation Integrity Score (VIS)	58.7
Total extent in the Study Area	1.80 ha
Species identified during site investigation relied upon for PCT identification	*Eucalyptus moluccana* (Grey box)(dominant), *Eucalyptus tereticornis* (Forest red gum), *Eucalyptus crebra* (Narrow-leaved ironbark)and *Acacia parramattensis* (Parramatta Wattle).

Plate 4-2 Cumberland Shale Plains Woodland (north-east corner of BAM plot 1)

Plate 4-3 Cumberland Shale Plains Woodland (50m of BAM plot 1 facing north)

Plate 4-4 Cumberland Shale Plains Woodland (20m of BAM plot 3 facing north)

Coastal Floodplain Phragmites Reedland (PCT 3962)

Under the updated PCT Classification system, Coastal Floodplain Phragmites Reedland is PCT 3962. In the 2018 BAR, the legacy PCT (PCT 1071 - Phragmites australis and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion) is a parent PCT with a complex split to 11 Offspring PCTs.

Of the Offspring PCTs only 3962 and 3975 occur in the Cumberland IBRA subregion. The relationship between the legacy PCT and PCT 3975 has a low classification confidence, and 3962 has a high classification confidence. Furthermore, PCT 3975 is a freshwater wetland characterised by *Phragmities australis* not being dominant. As *Phragmities australis* is the dominant species present the PCT can confidently be classified as 3962. Under the updated PCT Classification system Coastal Floodplain Phragmites Reedland is PCT 3962.

This was additionally compared against the SVTM (DPE 2024), which had this area mapped as PCT Cumberland Red Gum Riverflat Forest (4025). PCT 4025 is not an offspring of the decommissioned PCT 1071 and is characterised by the presence of red gums, which were absent from the vegetation assessed. As such, this mapping was disregarded in favour of the ground-truthed assessment of the vegetation community.

Patches of vegetation consistent with the description of PCT 3962 are present within the southern portion of the Study Area (Figure 4-2, Figure 4-3). PCT 3962 is associated with wetlands on alluvial backswamps on coastal floodplains which occurs along the riparian corridor across the Study Area. The vegetation is dominated by *Phragmites australis* (Common reeds). Disturbance and edge effects are evident within the vegetation, with a high level of weed incursion specifically of invasive species such as *Asparagus asparagoides* (Bridal creeper), *Lonicera japonica* (Japanese Honeysuckle), *Rubus fruticosus* (Blackberry) and *Senecio madagascariensis* (Fireweed).

A description of PCT 3962 and a list of the diagnostic species used to determine this PCT within the Study Area is provided in Table 4-5. The VIS for sampled patches of this community has also been included.

Table 4-5 Description of PCT 3962 - Coastal Floodplain Phragmites Reedland (Bionet Vegetation Classification DPIE, 2024)

PCT name	Coastal Floodplain Phragmites Reedland
PCT number	3962
Vegetation formation	Freshwater Wetlands
Vegetation class	Coastal Freshwater Lagoons
Conservation status	Associated with: Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (EPBC Act)
Distribution	Sydney Basin, South Eastern Queensland, NSW North Coast
Vegetation description	A very tall *Phragmites australis* freshwater reedland occurring on alluvial backswamps on coastal floodplains, usually at elevations of below 5 metres asl. *Phragmites australis* almost always forms a mid-dense to dense upper layer which is sometimes accompanied by a sparse lower layer of sedges and aquatic forbs. Individual species in the lower layer are rare, however examples include *Azolla filiculoides, Bolboschoenus caldwellii, Eleocharis equisetina, Spirodela polyrhiza, Persicaria strigosa* and *Alternanthera denticulata*. A very sparse cover of the tree *Casuarina glauca* commonly occurs, while a sparse cover of *Melaleuca quinquenervia* or other melaleucas is rare. This PCT lacks a woody shrub layer. This community has been separated from the floristically related PCT 3963 based on its occurrence in alluvial rather than estuarine

PCT name	Coastal Floodplain Phragmites Reedland
	environments and its lack of exposure to marine influence. PCT 3963 occurs within the tidal limit or in lagoons permanently or intermittently open to the ocean. PCT 3962 may occur in similar environments as other coastal lowland non-woody wetlands, particularly PCT 3967, however is distinguished floristically by the strong dominance of *Phragmites australis*.
Vegetation Integrity Score (VIS)	52.1
Total extent in the Study Area	0.78 ha
Species identified during site investigation relied upon for PCT identification	*Phragmites australis* (Common reed)

Plate 4-5 Coastal Floodplain Phragmites Reedland (BAM plot 5 15m facing south)

Plate 4-6 Coastal Floodplain Phragmites Reedland (BAM plot 2, south east corner)

4.2.2 Other vegetation types (non- PCT)

Vegetation in the Study Area that does not conform to a PCT on the BioNet Vegetation Classification Database has been classified into the vegetation types listed in Table 4-6.

The vegetation types used in the BAR (Arcadis 2018) have been adopted for classifying non-PCT vegetation within the Study Area during the recent investigation. The descriptions provided for these vegetation types in the original assessment remain relevant to vegetation classification across the site. These vegetation types and description have been summarised in Table 4-6.

Table 4-6. Descriptions of non-PCT vegetation types in the proposal site

Vegetation type (non-PCT)	Description (Arcadis 2018)
Mixed native and exotic vegetation	The mixed native and exotic vegetation typically occurs in landscaped and roadside areas where planted native and exotic shrubs and trees are present over a largely weedy understorey. Planted species included *Populus nigra* (Lombardy Poplar), *Corymbia citriodora* (Lemon-scented Gum), *Grevillea robusta* (Silky Oak), Callistemon cultivars and *Nerium oleander* (Oleander). Weed species present include *Ricinus communis* (Castor Oil Plant), *Senna pendula var. glabrata* (Cassia), *Erythrina crista-galli* (Cockspur Coral Tree), *Trifolium repens* (White Clover), *Vicia sativa* (Common Vetch), *Modiola caroliniana*(Red-flowered Mallow), *Ligustrum lucidum*(Large-leaved Privet), (*Ligustrum sinense* Small-leaved Privet), *Plantago lanceolata* (Lamb's Tongues), *Foeniculum vulgare* (Fennel), *Araujia sericifera* (Moth Vine), *Asparagus aethiopicus* (Asparagus Fern), *Asparagus asparagoides* (Bridal Creeper), *Anagallis arvensis* (Scarlet Pimpernel), *Rubus fruticosus* (Blackberry complex), *Salix sp.* (Willow), *Cestrum parqui(*Green Cestrum), *Lycium ferocissimum*(African Boxthorn), *Solanum mauritianum* (Wild Tobacco Bush), *Solanum nigrum(*Black-berry Nightshade) and *Verbena bonariensis* (Purpletop).
Exotic Grassland	The majority of the properties and roadside verges across the Study Area consist of exotic grassland with a small number of scattered and isolated native and exotic trees. Typical species in exotic grassland across the Study Area include: *Eragrostis curvula* (African Lovegrass), *Paspalum dilatatum* (Paspalum), *Chloris gayana* (Rhodes Grass), *Andropogon virginicus* (Whisky Grass), *Avena fatua* (Wild Oats), *Vicia sativa* (Common Vetch), *Axonopus fissifolius* (Narrow-leafed Carpet Grass), *Bromus catharticus* (Prairie Grass), *Echinochloa crusgall I* (Barnyard Grass), *Ehrharta erecta* (Panic Veldtgrass), *Eragrostis tenuifolia (*Elastic Grass), *Modiola caroliniana* (Red-flowered Mallow), *Holcus lanatus* (Yorkshire Fog), *Lolium perenne* (Perennial Ryegrass), *Paspalum urvillei* (Vasey Grass), *Pennisetum clandestinum* (Kikuyu Grass), *Sida rhombifolia* (Paddy's Lucerne) and *Phalaris aquatica* (Phalaris).

4.2.3 Priority Weeds

Of the exotic species recorded in the Study Area, eight are listed as priority weeds under the *Greater Sydney Regional Strategic Weed Management Plan 2023-2027*. These weeds are listed in Table 4-7 with the associated biosecurity duty.

Table 4-7 Priority weeds present in the Study Area

Scientific name	Common name	Biosecurity duty	2018 BAR
Opuntia sp.	Prickly Pear	Containment and/or Asset Protection Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation	Yes

Scientific name	Common name	Biosecurity duty	2018 BAR
		2017): A person must not import into the State or sell.	
Asparagus asparagoides	Bridal Creeper		Yes
Asparagus aethiopicus	Asparagus fern		Yes
Rubus fruticosus	Blackberry complex		Yes
Cestrum parqui	Green cestrum		Yes
Senecio madagascariensis	Fireweed		Not listed
Salix sp.	Willow		Not listed
Arundo donax	Giant Reed		Not listed

4.3 Threatened ecological communities

In the 2018 BAR the TECs associated with the vegetation within the Study Area were identified as:

- Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act)
- Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act),
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions (BC Act).

From the current site assessment, it was confirmed that the four previously identified TECs are still present within the Study Area.

Cumberland Plain Woodland (BC Act)

The assemblage of PCT 3320 within the Study Area has been compared against the diagnostic characteristics of the Critically Endangered Ecological Community, Cumberland Plain Woodland in the Sydney Basin Bioregion as listed under the BC Act (NSW Scientific Committee 2009). The distribution, vegetation composition, landscape position and supporting geologies of this PCT are consistent with the CEEC, as was described in the 2018 BAR.

Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act)

The assemblage of PCT 3448 within the Study Area has been compared against the diagnostic characteristics of the Endangered Ecological Community, Shale Gravel Transition Forest in the Sydney Basin Bioregion as listed under the BC Act (NSW Scientific Committee 2000). The distribution, vegetation composition, landscape position and supporting geologies of this PCT are consistent with the EEC despite the degraded understorey. This is consistent with the 2018 BAR, in which it is stated that *"Disturbed Shale Gravel Transition Forest remnants are considered to form part of the community*".

Freshwater Wetlands on Coastal Floodplains (BC Act)

PCT 3962 within the Study Area is equivalent to the Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner TEC. This TEC was recorded in the named drainage line that flows north to south through the Study Area. This community is consistent with Clause 1, 2 and 3 of the Scientific Determination (OEH 2010) as the distribution, vegetation

composition, landscape position and supporting geologies of this PCT are consistent with the TEC, as was described in the 2018 BAR.

No equivalent TEC is listed under the EPBC Act.

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)

To be considered the Critically endangered Ecological Community (CEEC) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CPSWSGTF) a patch of vegetation must meet:

- The key diagnostic characteristics, and
- At least the minimum condition thresholds for the moderate condition.

All patches of PCT 3320 within the Study Area met the diagnostic characteristics of the CEEC because they:

- included species consistent with vascular plant species across all stratum which are characteristic of the nationally listed community as listed in Appendix A of the Conservation Advice (TSSC 2009)
- have *Eucalyptus moluccana* (Grey Box) as the dominant canopy species with a projected canopy cover of greater than 10 per cent
- are interconnected with bushland remnants that have a collective patch size of greater than five hectares

Quantitative assessment of understorey vegetation in PCT 3320 was undertaken using vegetation plots in accordance with the BAM to determine whether 30 per cent of the perennial understorey vegetative cover is made up of native species and therefore meet the definition of the CEEC.

One patch of PCT 3320 located to the south of Old Pitt Town Road within the Study Area was determined to meet the condition threshold to be listed as the nationally listed CEEC with a total native understorey cover of 65.5 per cent; comprising the following species *Microlaena stipoides* (Weeping grass), *Paspalidium distans* (Shotgrass), *Cynodon dactylon* (Common couch), *Carex spp.* (sedges), *Eragrostis brownie* (Brown's Lovegrass), *Aristida spp*,(Threeawn grass) and *Dichondra repens* (Kidney Weed). The patch of PCT 3320 north of Old Pitt Town Road was also sampled with a vegetation plot but was found to have a total native cover of 13.8 per cent and therefore didn't meet the condition threshold be identified as the EPBC listed community. This plot was dominated by *Eragrostis curvula* (African love grass). The extent of CPSWSGTF within the Study Area has been depicted in Figure 4-1 and Figure 4-2.

Patches of PCT 3448 within the Study Area meet the diagnostic characteristics of the federally listed community however quantitative assessment of the understorey found that it did not meet native understorey condition threshold of greater than 30 percent native cover, and therefore does not qualify for listing. The total cover of understorey species accounted to 51.1 per cent, of which 28.2 percent was native (20 per cent comprised of Common couch).

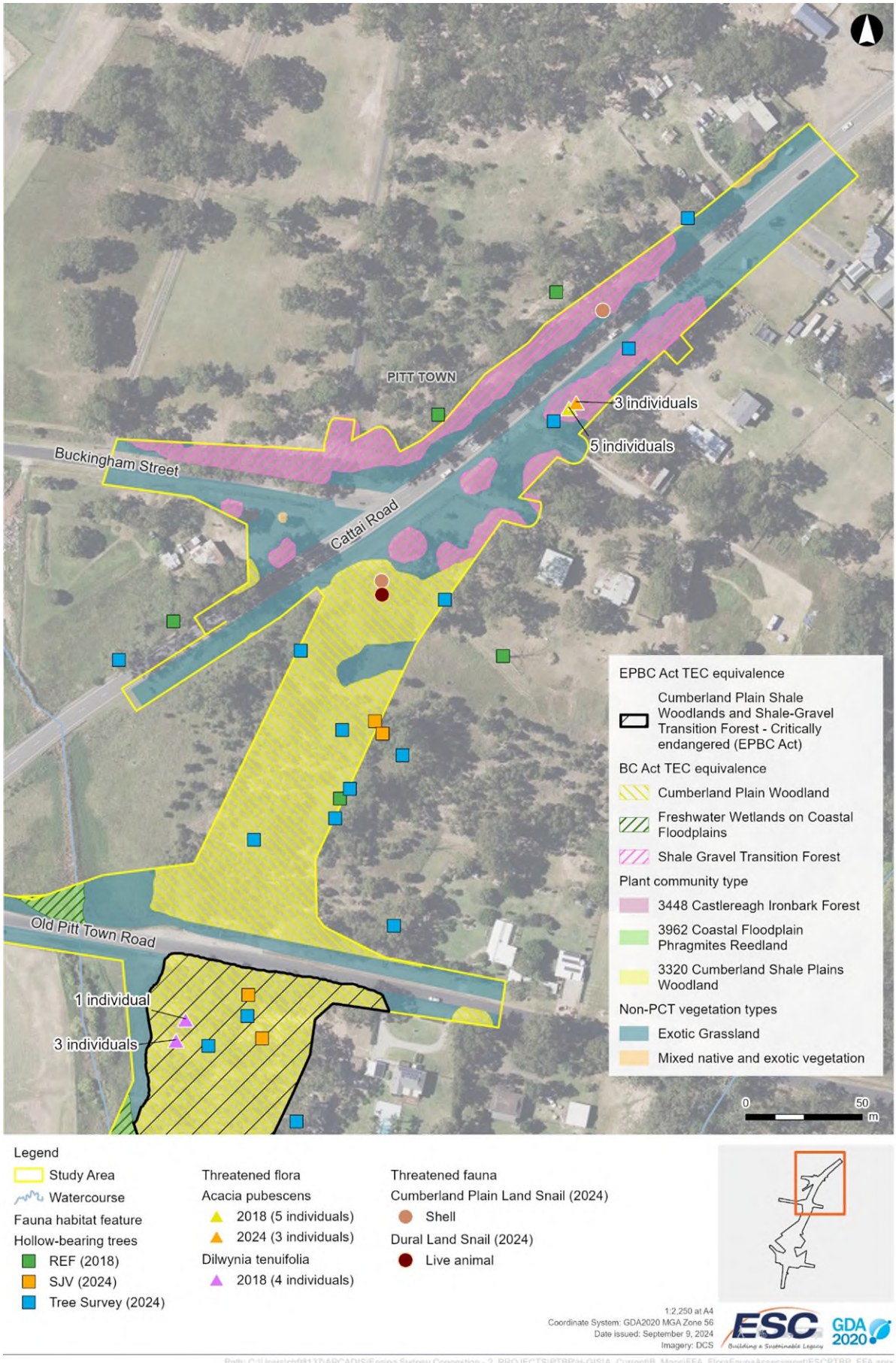

Figure 4-1 Ground-truthed vegetation and biodiversity values in the north of the Study Area

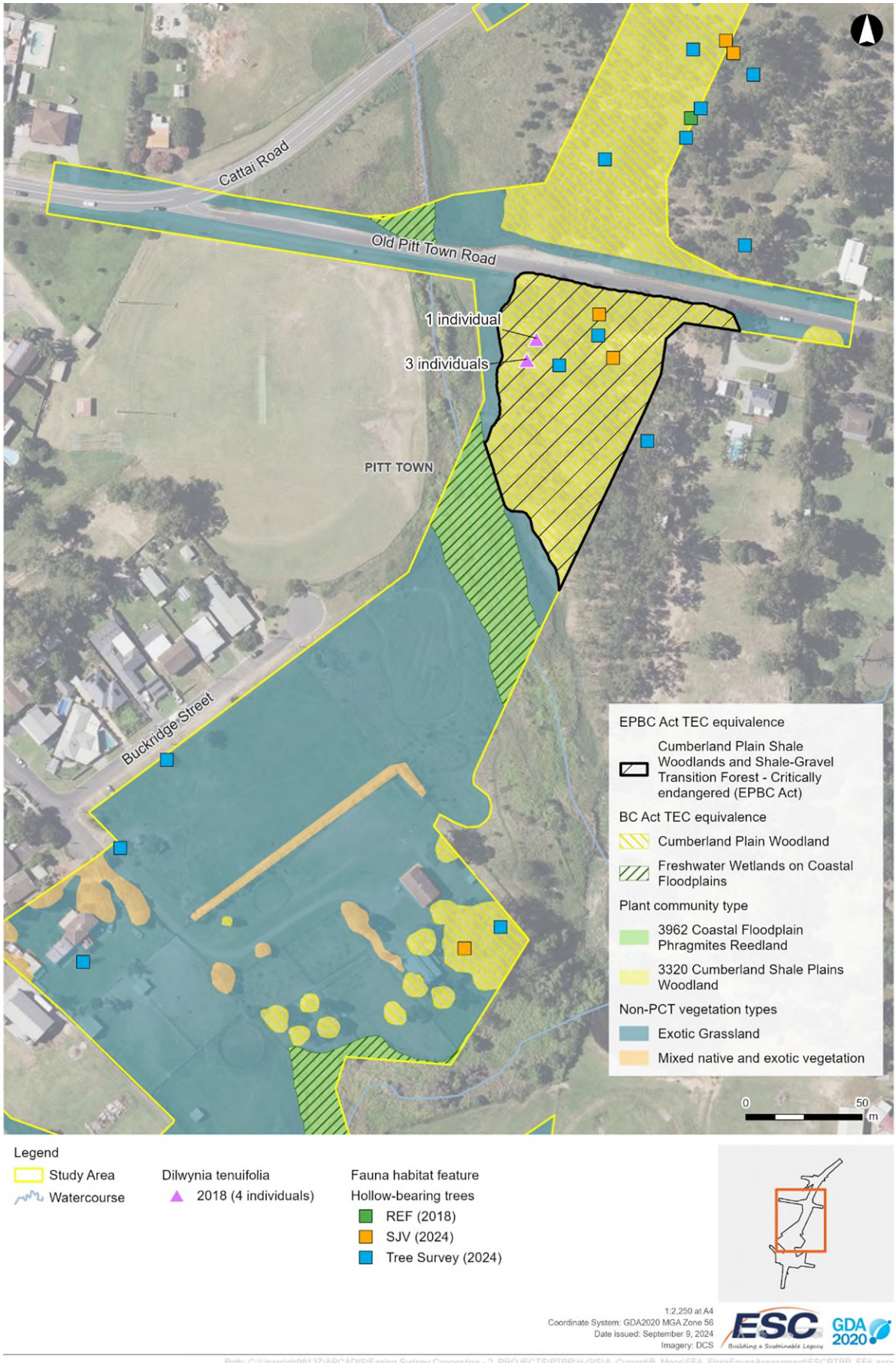

Figure 4-2 Ground-truthed vegetation and biodiversity values in the centre of the Study Area

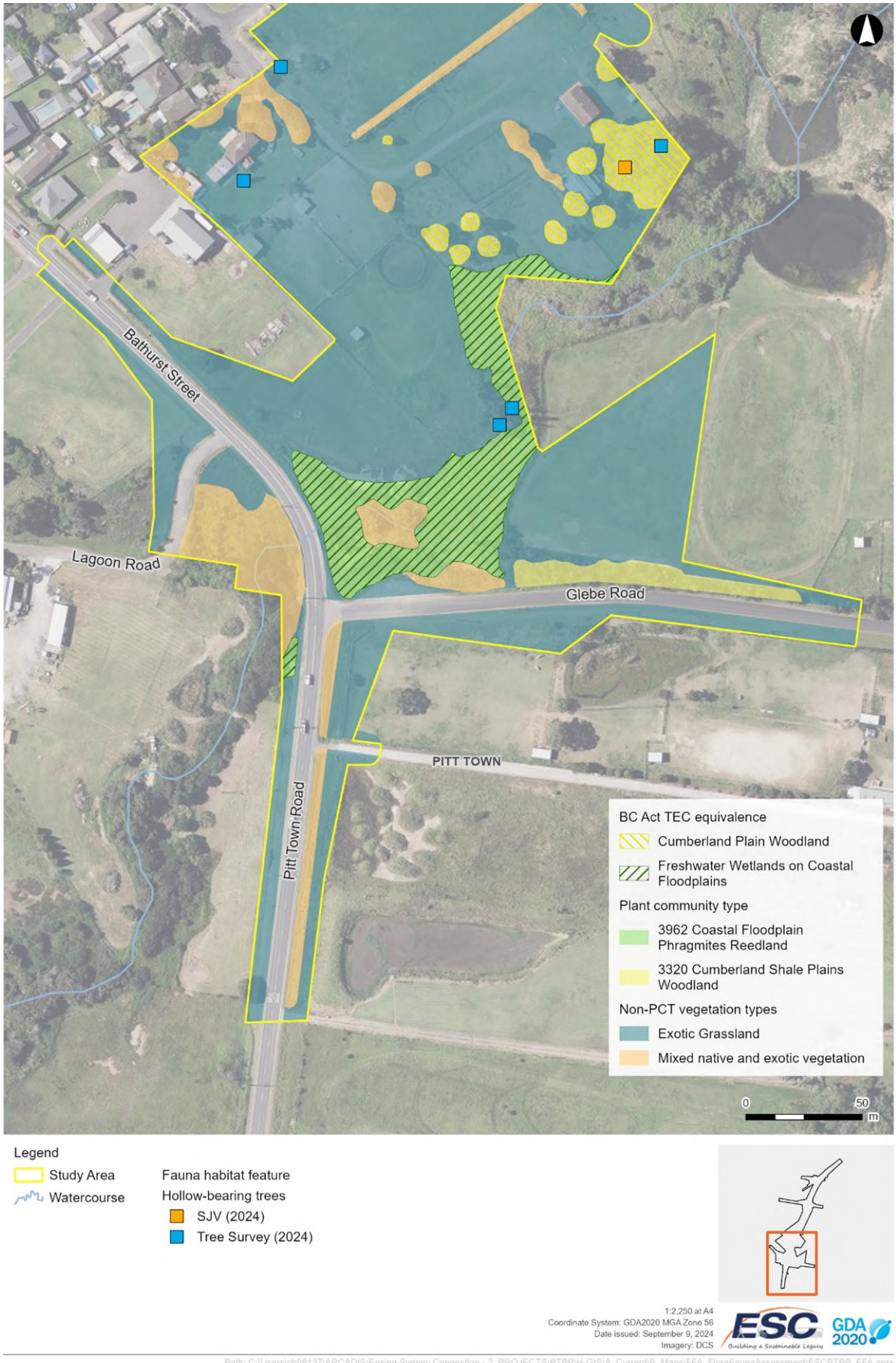

Figure 4-3 Ground-truthed vegetation and biodiversity values in the south of the Study Area

4.4 Threatened species and populations

Surveys of the Study Area by Arcadis (2018a) and SJV ecologist identified two threatened flora species and seven threatened fauna species as listed under BC Act and/or EPBC Act. Suitable habitat for additional threatened species was also considered to be present within the Study Area. These species are discussed below.

4.4.1 Threatened flora species

Database searches identified 34 threatened flora species as having potential to occur within the Study Area, of which 13 were determined to have a moderate or higher likelihood to occur based on historical observation records (BioNet) and mapped habitat. Of these, 2 were still considered to have potential to occur following field survey due to being cryptic, hard to detect and suitable habitat being present.

The threatened flora species *Acacia pubescens* (Downy Watte) and *Dillwynia tenuifolia* were recorded within the Study Area during field survey. The populations of these threatened species is discussed below.

Acacia pubescens (Downy Wattle)

Acacia pubescens is listed as Vulnerable under the BC and EPBC Act.

In the 2018 BAR, two populations of *Acacia pubescens* were identified within patches of PCT 3448 (decommissioned PCT 724). One population comprising a dense cluster of about 35 individuals (stems) was located to the north of Cattai Road and a second population was found on the southern side of Cattai Road within the front yard of a private property comprising five individuals (stems).

SJV ecologists re-surveyed the location where a cluster of five individuals of Downy Wattle was previously found on the southern side of Cattai Road. Three individuals (stem) were re-found in the cluster during the current survey. Downy Wattle is easily differentiated from other types of acacias present in the locality, by the bipinnate leaves which are divided twice pinnately and conspicuously hairy branchlets. These individuals occur within the Study Area.

No individuals were re-found at the population outside of the Study Area, north of Cattai Road. Current surveys found that the location which previously supported the population comprises a degraded patch of PCT 3448 which was being used as a horse holding paddock. No signs of previous occurrence (i.e. senescent individuals) of Downy Wattle was observed. It is possible that individuals previously recorded had naturally died back, had been removed during maintenance activities within the paddock or died back due to impacts from livestock.

No other individuals of Downy Wattle were found within the Study Area.

The locations, recorded during 2018 and current field surveys, for these threatened species has been presented in Figure 4-1 to Figure 4-3.

Plate 4-7 One stem of Acacia pubescens within the Impact Area

Dillwynia tenuifolia

Dillwynia tenuifolia is listed as Vulnerable under the BC Act.

Four individuals of this species were identified in the 2018 BAR, in a patch of vegetation classified as PCT 3320 (decommissioned PCT 849) south of Old Pitt Town Road.

SJV ecologists re-surveyed the location where *Dillwynia tenuifolia* was previously identified, however no individuals were re-found. Current surveys found that the location which previously supported the population comprises a moderate quality patch of PCT 3320. Whilst the understorey had a good condition, grasses and forbs were very short indicating that the area is likely to be subject to regular mowing; this was also identified in the 2018 BAR. It is possible that individuals previously identified have been mowed and have not regrown. Seeds for this species are still considered to be present in the location.

No other individuals of *Dillwynia tenuifolia* were found within the Study Area, however searches for this species during the recent surveys were not comprehensively undertaken in accordance with the BAM, rather were opportunistically undertaken in areas of potential habitat.

Threatened flora habitat

Following a review of observational records (BioNet), the 2018 BAR and field survey, two threatened flora species additional to those found in the Study Area, are considered moderately likely to occur given the presence of potential habitat. These include:

- *Pimelea spicata* (Spiked Rice-flower), associated with PCT 3320
- *Micromyrtus minutiflora,* associated with PCTs 3320 and 3448

Unlike more conspicuous species like *Pultenaea parviflora* and *Grevillea juniperina* subsp. *juniperina*, these species are small, are known to sporadically flower and have a high potential to be overlooked during targeted surveys.

4.4.2 Threatened fauna species

A BioNet search was undertaken which identified 40 threatened species, including 6 threatened flora and 34 threatened fauna species, 20 bird species, 13 mammal and one invertebrate has been recorded in the locality over the past 20 years. The PMST revealed 96 threatened species and 37

listed migratory species (34 threatened flora, 39 birds, 9 mammal, two amphibians, one invertebrate, seven reptiles, and 4 fish) occur within the locality.

Of these, seven species were recorded on the project site during field surveys undertaken for the current assessment and for the BAR (Arcadis 2018a) and an additional six area considered to have moderate or higher likelihood to occur based on potential habitat present on the project site. The following threatened fauna species were observed during the field survey:

- *Meridolum corneovirens* (Cumberland Plain Land Snail) (CPLS)
- *Pommerhelix duralensis* (Dural Land Snail) (DLS)

In the 2018 BAR, the following threatened fauna species were recorded:

- *Pteropus poliocephalus* (Grey-headed Flying Fox)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus orianae oceanensiss* (Eastern Bentwing-bat)
- *Myotis macropus* (Southern Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Cumberland Plains Land Snail

The Cumberland Plain Land Snail (CPLS) is listed as Endangered under the BC Act. This terrestrial snail species primarily inhabits Cumberland Plain Woodland, west of Sydney from Richmond in the north, south to Picton and from Liverpool in the east to the base of the Blue Mountains. They are often found under litter of bark and leaves, sheltering in loose soil around grass clumps or occasionally under debris.

Targeted searches undertaken in preparation of the BAR (Arcadis 2018a) did not identify this species in the Study Area. However, the species was considered highly likely to occur given the presence of preferred habitat.

Two dead specimens (shells) were identified during recent targeted searches beneath leaf litter at the base of large *Eucalyptus moluccana* (Grey box) in the northern extent of the project. One of the shells was located in a degraded patch of PCT 3448 on the northern verge of Cattai Road. The other shell was located in a patch of PCT 3320 south of Cattai Road, however nearby to where this PCT intergrades with PCT 3448. The locations where these shells were found can be seen in Figure 4-1. Patches of PCT 3320 and 3348 adjoining habitat where these shells were located is considered to be occupied.

Shells were compared against the identification features of CPLS, specifically shell measurements, colourations, habit and habitat. SJV ecologist surveying the Study Area were familiar with CPLS, having encountered this species on several projects across Western Sydney. The dead specimens (shells) aligned with SJV ecologist expectations and descriptions for CPLS. Potential habitat for CPLS is deemed to be present in patches of PCT 3320 and PCT 3448 where ground timber, debris and leaf litter around the base of eucalypts is present; this includes all occurrence of PCT 3320 and 3448 within the Study Area. Therefore 2.27 hectares of suitable habitat is considered to be present for CPLS in the Study Area.

Plate 4-8 Photograph of Cumberland Plain Land Snail shell found at the northern extent of the project site, on the northern verge of Cattai Road.

Dural Land Snail

The Dural Land Snail (DLS) is listed as Endangered under the BC Act and the EPBC Act. This terrestrial snail species is a shale-influenced-habitat specialist that inhabits forested habitats that have good native cover and woody debris. Individuals occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. It favours sheltering under rocks or inside curled-up bark, beneath leaves, and light woody debris.

Targeted searches undertaken in preparation of the BAR (Arcadis 2018a) did not identify this species in the Study Area and a population was considered unlikely to occur.

One live individual of DLS was found during recent targeted searches at the northern extent of the project, just south of Cattai Road. The snail was found sheltering beneath a loose, decaying tree stump in vegetation representative of an intergrade between PCT 3220 and 3448.

The location where this individual was found can be seen in Figure 4-1. The patch of PCT 3320 where this individual was found and the patch of PCT 3348 adjoining is considered to be occupied by this species.

Photographs of the live DLS in its habitat were compared against the identification features, specifically regarding shell measurements, colourations, habit and habitat. The individual in the photograph was also compared against the features of CPLS, for which they can be confused with. The live specimen did not superficially appear to align with CPLS based on the experience of SJV ecologists, instead having a mottled colouration (which is different to CPLS that has a uniform colouration).

Suitable habitat for DLS is deemed to include occupied habitat and all occurrences of PCT 3320 and PCT 3448 within the Study Area. These patches of vegetation support ground timber, debris, rocks and leaf litter which provides habitat to this species. Therefore, 2.27 hectares of suitable habitat is considered to be present in the Study Area for DLS.

Plate 4-9 Photograph of live Dural Land Snail found beneath a decaying tree stump at the northern extent of the site, in a patch of PCT 3320 south of Cattai Road.

Grey-headed Flying-fox

The Grey-headed Flying-fox is listed as Vulnerable under the BC and EPBC Act. In field surveys undertaken for the 2018 BAR, individuals were observed in the approved project boundary foraging in the canopy of flowering eucalypts at several locations. During spotlight transects, three individuals were observed foraging on the blossoms of flowering Grey Box trees and a large number were seen flying overhead.

The Study Area does not support a camp, and therefore does not support critical roosting habitat for the species. The nearest nationally important Grey-headed Flying-fox camp as mapped by National Flying-fox monitoring viewer (DEE 2017a) is at Yarramundi (Camp ID 97), approximately 16 km west of the site. It has supported up to 10,000 flying-foxes in recent years. It is possible that the flying-foxes recorded in the Study Area were from this camp and were observed flying overhead to their foraging grounds. Other camps are located further south at u Plains (Camp ID 237) and Paramatta Park (Camp ID 134), located 24 and 27 kilometres from the Study Area, respectively. The Study Area provides foraging habitat for the Grey-headed Flying-fox, with a number of preferred blossom species in the blossom diet recorded in the Study Area.

Microbats

Four threatened microbat species were recorded on Anabats in the approved project boundary during targeted surveys undertaken for the BAR (Arcadis 2018a).

Eastern Bentwing-bat is listed as a Vulnerable species under the BC Act. A definite recording of this species was made by two Anabats, in the northern extent of the Study Area. The Study Area does not support a maternity cave. While the Study Area contains a number of small culverts (with diameter's of 900mm or less) at creek crossings of existing roads, an investigation of these culverts determined that due to their small size, frequent risk of inundation and low height they were unsuitable as roosting sites. Assessment of culvert suitability for inhabitation by microbats was consistent with the Microbat Management Guidelines (Transport 2023). The Study Area therefore does not support preferred roosting habitat for the species.

The Eastern Freetail Bat is listed as Vulnerable under the BC Act. A definite recording of this species was made by both Anabats, in the northern extent of the Study Area. The Eastern Freetail Bat roost mainly in tree hollows; usually in hollow spouts of large mature trees, but will also roost under exfoliating bark or in man-made structures and buildings (OEH 2018c, Churchill 2008). Hollow-bearing trees and stags within Study Area offer potential roosting habitat to the species. Eastern Freetail Bat may forage above the canopy of Open forest/woodland habitat, or in open areas associated with Modified and disturbed habitat.

Southern Myotis is listed as a Vulnerable species under the BC Act. A possible recording of this species was made by one of the Anabats, in the northern extent of the Study Area. The Study Area does not support caves. Hollow-bearing trees and stags within Study Area offer potential roosting habitat to the species, while bridges, sheds and buildings within the locality area offer marginal roosting habitat. Small box culverts present within the Study Area were investigated and deemed unsuitable as roosting habitat due to their small size. Assessment of culvert suitability for inhabitation by microbats was consistent with the Microbat Management Guidelines (Transport 2023).

Greater broad-nosed bat is listed as a Vulnerable species under the BC Act. A probable recording of this species was made by both of the Anabats, in the northern extent of the Study Area. Greater Broad-nosed Bats typically roost in tree hollows, although it has also been found roosting in buildings. Hollow-bearing trees and stags within Study Area offer potential roosting habitat to the species. Greater Broad-nosed Bat may forage above the canopy of Open forest/woodland habitat, or in open areas associated with Modified and disturbed habitat.

Threatened fauna habitat

Following a review of observational records (BioNet), the 2018 BAR and the findings from field survey, six threatened fauna species additional to those observed in the Study Area, are considered to have a moderate or higher likelihood to occur given the presence of potential habitat. These include:

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Circus assimilis* (Spotted Harreir)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Lophoictinia isura* (Square-tailed Kite)
- *Ninox strenua* (Powerful Owl)

Habitat for these species was identified areas supporting native vegetation assemblages, including open woodland and freshwater wetlands.

Woodland vegetation occurs in patches of PCT 3320 and 3448 throughout the Study Area. Woodland habitat is exposed to disturbance associated with edge effects due to its proximity to the roadside, exotic grasslands, and residential areas. Although the understorey is degraded the trees are in good condition and offer potential habitat to locally occurring fauna species. The woodland supports a mixture of eucalypt species which may be intermittently used by threatened woodland birds when flowering to forage. Myrtaceous trees and shrubs within the Study Area would provide foraging habitat for some nectivorous birds and threatened species such as Grey-headed Flying Fox, which may forage in this vegetation on occasion. Woodland within the Study Area also contains a moderate amount of fallen debris and logs which provides refuge habitat for reptiles and threatened terrestrial snails.

Within woodlands 19 hollow-bearing trees were identified with hollows of varying sizes located on the trunks and limbs, in addition to other mature woodland trees with decorticating bark and small fissures. An increase in hollow-bearing trees has been recorded since the 2018 BAR, whereby, one living tree and one hollow-bearing stags containing hollows were identified in the Study Area. Tree hollows were generally small (five to 10 cm in diameter) or medium (10 to 20 centimetres in diameter) in size. This vegetation may support hollow dependent microbats and woodland birds. No large tree hollows (greater than 30 centimetres in diameter) were identified in the Study Area, which are typically required by threatened forest owls and large cockatoos.

4.5 Aquatic and riparian habitats

Two watercourses traverse the Study Area and several dams are located in the southern portion of the Study Area. The watercourse is a tributary to Hortons Creek which begins further to the south of the project site.

Riparian habitat and aquatic vegetation occurs in association with these hydrological features, and corresponds with the distribution of PCT 3962 Coastal Floodplain Phragmites Reedland.

The central portion of the Study Area is mapped as Coastal Wetlands and Proximity areas to Coastal Wetlands under the *State Environmental Planning Policy Resilience and Hazards (2021)*. Mapped areas support a mixture of native and exotic vegetation and open water. Native vegetation in mapped areas is characteristic of freshwater wetlands and is classified as PCT 3962 Coastal Floodplain Phragmites Reedland and the threatened ecological community Freshwater Wetlands on Coastal Floodplains as listed under the BC Act. A description for assemblages of PCT 3962 is included in section 4.2.1

Figure 4. In-stream vegetation characteristic of PCT 3962 in areas mapped as Coastal Wetlands in the Resilience and Hazards SEPP (2021).

4.6 Groundwater dependent ecosystems

The Bureau of Meteorology's GDE Atlas (BOM, 2024) identified a strip of terrestrial GDE at the southern end of the Study Area. This GDE is broadly aligned with the two watercourses that transect the Study Area, and the extent of PCT 3962 and the Freshwater Wetlands on Coastal Floodplains TEC. This is consistent with the GDE mapping from the 2018 BAR.

The vegetation assemblage Coastal Floodplain Phragmites Reedland (PCT 3962) is considered to have a have a high dependency on ground-water, whereas the woodland assemblages (PCT 3320 and 3448) are considered to be less sensitive to groundwater fluctuations.

5 IMPACT ASSESSMENT

This section reviews the proposed impacts to biodiversity within the Study Area. Impacts have been described for the approved project boundary and those in the proposed additional areas.

The approved project boundary and proposed additional areas covers a total area of 10.98 hectares. Of the total area, 10.95 hectares comprises the approved project boundary and the proposed additional areas cover 0.03 hectares.

Impacts to biodiversity in the approved project boundary were described and assessed in the previous REF (Arcadis 2018) and CA (Arcadis 2019). As part of this addendum assessment the biodiversity values within the approved project boundary have been re-evaluated; finding changes to the extent of vegetation and threatened species habitats than what was previously recorded.

This report therefore assesses:

- Changes in impacts from those previously identified within the approved project boundary that are occurring as a result of changes to biodiversity values found. Additional impacts will be assessed for significance against the relevant criteria and offset as per Transport's biodiversity offset policy (discussed further in section 7)
- Impacts arising from the clearing of the additional project areas. These impacts will be described, quantified and assessed.

It is assumed that all biota within the approved project boundary and proposed additional areas will be completely removed.

5.1 Direct impacts

A total of 9.63 hectares of vegetation will be removed by the project, of which 3.05 hectares is native vegetation characteristic of a Plant Community Type. The area of impact to native vegetation can be further stratified across areas of the project within the approved project boundary and those which occur in proposed additional areas. These areas are shown in Table 5-1.

Table 5-1. Total extents of vegetation in approved project boundary and proposed additional areas

Vegetation type	Approved project boundary	Proposed additional areas	Total area
PCT vegetation	3.03	0.020	3.05
Non-PCT vegetation	6.58	0.002	6.58
Total	9.61	0.022	9.63

5.1.1 Removal of native vegetation

Impacts to native vegetation within the approved project boundary and the proposed additional areas are discussed below.

Approved project boundary

Removal of native vegetation within the approved project boundary has already been assessed and approved as part of the REF (Arcadis 2018) and CA (Arcadis 2019), however the extent of vegetation removal within this area has changed following re-survey of the site for the current assessment. The differences in vegetation extents mapped by the BAR (Arcadis 2018a) and current assessment within the approved project boundary are included in Table 5-2.

A total of 3.03 hectares of native vegetation is present in the approved project footprint comprising three PCTs. Of the 3.03 hectares of native vegetation, 2.54 hectares was described and assessed for removal in the REF (Arcadis 2018) and CA (Arcadis 2019). Therefore, an additional 0.49 hectares of native vegetation extent requires assessment for impacts. A breakdown of the extent of native vegetation by PCT, that requires assessment, is included in Table 5-3.

Table 5-2 Comparison of current vegetation extents within approved project footprint with 2018 BAR.

Plant Community Type	Updated areas within the approved project footprint (ha)	Previously identified for removal within approved project footprint (ha)			Difference
		BAR (Arcadis 2018)	CA (Arcadis 2019)	Total	
PCT 3448: Castlereagh Ironbark Forest	0.45	0.39	0.041	0.43	+ 0.02
PCT 3320: Cumberland Shale Plains Woodland	1.80	1.41	0.015	1.43	+ 0.37
PCT 3962: Coastal Floodplain Phragmites Reedland	0.78	0.67	0.013	0.68	+ 0.10
Sub-total	3.03	2.47	0.069	2.54	+ 0.49
Exotic Grassland (non - PCT)	6.06	4.87	0.133	5.00	+ 1.06
Native and exotic vegetation (non-PCT)	0.52	0.63	0.004	0.63	- 0.11
Sub-total	6.58	5.5	0.137	5.63	+ 0.95
Total	**9.61**	**7.97**	**0.206**	**8.17**	**+ 1.44**

Table 5-3. Additional PCT extents in approved project footprint that require assessment.

Plant Community Type	Area (ha)
PCT 3448: Castlereagh Ironbark Forest	0.02
PCT 3320: Cumberland Shale Plains Woodland	0.37
PCT 3962: Coastal Floodplain Phragmites Reedland	0.10
Sub-total	0.49

Proposed additional areas

A total of 0.020 hectares of native vegetation characteristic of PCT 3448: Castlereagh Ironbark Forest will be removed within proposed additional areas. A breakdown of impacts by vegetation types is included in Table 5-4.

Table 5-4. Impact to native vegetation in proposed additional areas

Plant Community Type	Area (hectares)
PCT 3448: Castlereagh Ironbark Forest	0.020
PCT 3320: Cumberland Shale Plains Woodland	0.000
PCT 3962: Coastal Floodplain Phragmites Reedland	0.000
Sub-total	**0.020**

Plant Community Type	Area (hectares)
Exotic grassland (non PCT)	0.002
Native and exotic vegetation	0.000
Sub-total	**0.002**
Total	**0.022**

Cumulative project impact

A total of 0.51 hectares of native vegetation comprising three PCTs will be assessed for impacts from the approved project boundary and the proposed additional areas. A breakdown of this impact area by PCT is included in Table 5-5. Offsetting required for the impacts to the additional 0.51 hectares of native vegetation against Transport's offsetting policy is discussed in section 7.

Table 5-5. A breakdown of total impacts from the project on Plant Community Types

Plant Community Type	Additional PCT extents in approved project footprint (ha)	Impact to native vegetation in proposed additional areas (ha)	Total impact areas requiring assessment (ha)	Total impact from the proposal (ha)
PCT 3448: Castlereagh Ironbark Forest	0.02	0.020	0.04	0.47
PCT 3320: Cumberland Shale Plains Woodland	0.37	0.000	0.37	1.80
PCT 3962: Coastal Floodplain Phragmites Reedland	0.10	0.000	0.10	0.78
Sub-total	**0.49**	**0.020**	**0.51**	**3.05**

5.1.2 Removal of Threatened Ecological Communities

Impacts to threatened ecological communities within the approved project boundary and the proposed additional areas are discussed below.

Approved project boundary

Removal of threatened ecological communities (TEC) within the approved project boundary has already been assessed and approved as part of the REF (Arcadis 2018) and CA (Arcadis 2019), however the extents of TEC removal within this area has changed following re-survey of the site for the current assessment. The difference in the extents within the approved project boundary for TECs listed under the BC Act, mapped by the BAR (Arcadis 2018a) and current assessment, is included in Table 5 6.

An additional 0.39 hectares of BC Act listed TECs has been mapped in the approved project boundary. A breakdown of the additional area for each TEC, that requires additional assessment is included in

Table 5-7.

Table 5-6 Comparison of BC Act listed threatened ecological communities (BC Act) extents within approved project footprint with 2018 BAR

Threatened Ecological Community as listed under BC Act	Updated areas within the approved project footprint (ha	Previously identified for removal within approved project footprint (ha)			Difference
		BAR (Arcadis 2018)	CA (Arcadis 2019)	Total	
Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered)	**1.70**	1.41	0.015	1.43	+ 0.27
Shale Gravel Transition Forest in the Sydney Basin Bioregion (endangered)	**0.45**	0.39	0.041	0.43	+ 0.02
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (endangered)	**0.78**	0.67	0.013	0.68	+ 0.10
Total	**2.93**	2.47	0.069	2.54	+ 0.39

Table 5-7. Additional extents to BC Act listed threatened ecological communities in approved project footprint

Threatened Ecological Community as listed under BC Act	Area (ha)
Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered)	0.27
Shale Gravel Transition Forest in the Sydney Basin Bioregion (endangered)	0.02
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (endangered)	0.10
Sub-total	0.39

The difference in the extents within the approved project boundary for TECs listed under the EPBC Act, mapped by the BAR (Arcadis 2018a) and current assessment, is included in Table 5-8. A total of 0.69 hectares of the EPBC Act listed community Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest in the Sydney Basin Bioregion (CPSWSGTF) is present in the approved project boundary. The extent of this TEC has reduced by 0.74 hectares within the approved project boundary in comparison to the BAR (Arcadis 2018a), as a result of re-classifying a patch of PCT 3320 north of Old Pitt Town Road due to not meeting then criteria of the EPBC Act listed community. Therefore, no additional impacts to EPBC listed communities requires consideration.

Table 5-8 Comparison of EPBC Act listed threatened ecological communities (BC Act) extents within approved project footprint with 2018 BAR

Threatened Ecological Community as listed under EPBC Act	Updated areas within the approved project footprint (ha	Previously identified for removal within approved project footprint (ha)			Difference
		BAR (Arcadis 2018)	CA (Arcadis 2019)	Total	
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest in the Sydney Basin Bioregion (critically endangered)	**0.69**	1.41	0.015	1.43	- 0.74

Proposed additional areas

A total of 0.018 hectares of PCT 3448 which meets the criteria to the Endangered Ecological Community (EEC) Shale Gravel Transition Forest in the Sydney Basin Bioregion as listed under the BC Act will be removed from the proposed additional areas. A breakdown of impacts by TEC types is included in Table 5-9.

Table 5-9. Impact to threatened ecological communities in proposed additional areas

Threatened Ecological Community as listed under BC Act	Area (hectares)
Shale Gravel Transition Forest in the Sydney Basin Bioregion (endangered)	0.020
Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered)	0.000
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (endangered)	0.000
Total	**0.020**

There are no EPBC Act TECs within proposed additional areas.

Cumulative project impact

A total of 0.41 hectares of native vegetation comprising three BC Act listed TECs has been assessed for impacts for the approved project boundary and proposed additional areas. A breakdown of these impacts by TEC is included in Table 5-5.

Table 5-10. A breakdown of total impacts from the project on threatened ecological communities as listed under the BC Act

Threatened Ecological Community as listed under BC Act	Additional PCT extents in approved project footprint (ha)	Impact to native vegetation in proposed additional areas (ha)	Total impact areas requiring assessment (ha)	Total impact from the proposal (ha)
Cumberland Plain Woodland in the	0.27	0.000	0.27	1.70

Threatened Ecological Community as listed under BC Act	Additional PCT extents in approved project footprint (ha)	Impact to native vegetation in proposed additional areas (ha)	Total impact areas requiring assessment (ha)	Total impact from the proposal (ha)
Sydney Basin Bioregion (critically endangered)				
Shale Gravel Transition Forest in the Sydney Basin Bioregion (endangered)	0.02	0.020	0.04	0.47
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (endangered)	0.10	0.000	0.10	0.78
Sub-total	**0.39**	**0.018**	**0.41**	**2.95**

Updated Test of Significance (ToS) have been prepared to assess the cumulative impacts from the project to TECs listed under the BC Act. The Test of Significance (ToS) for each TEC has been included in Appendix F and found a consistent determination that the proposal was unlikely to result in a significant impact. A justification as to why a significant impact is considered unlikely for each TEC is summarised in the dot points below:

- Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW) - the project is considered unlikely to have a significant impact on this CEEC because:
  - the removal of up to 1.70 ha represents a small fraction (0.09%) of the local occurrence of CPW and its removal is unlikely to place the broader patch at risk of extinction.
  - the removal of the edge of a larger contiguous patch (1953 hectares) is unlikely to fragment contiguous patches of the community or areas of suitable habitat.
  - the composition of retained areas of CPW adjoining the Study Area are unlikely to significantly change as a result of the proposed activities such that the local occurrence would be further reduced.
- Shale Gravel Transition Forest in the Sydney Basin Bioregion (SGTF) - the project is considered unlikely to have a significant impact on this EEC because:
  - the removal of up to 0.47 hectares of SGTF from the edge of a broader patch (~184 hectares), represents a small fraction (0.26%) of the local occurrence of EEC and will not result in fragmentation of the broader patch into two smaller patches.
  - the patch of SGTF to be removed is road-side vegetation in a modified state, with a high composition of weeds
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (FWCF) - the project is considered unlikely to have a significant impact on this EEC because:
  - The patch in the study area is in moderate condition due to the lack of complexity and low native species diversity and is unlikely to be considered of high importance to the survival of the community in the locality.

- The removal of up to 0.78 hectares of this community represents a small fraction (0.29%) of the local occurrence of FWCF and its removal is unlikely to place the broader expanses of the community present in the locality (Pitt Town Lagoon, Bushells Lagoon, Longneck Lagoon) at risk of extinction.

The determination of significance from these assessments has been summarised in section 5.3.

5.1.3 Removal of threatened flora species and habitat

Impacts to threatened flora species and suitable habitat within the approved project boundary and the proposed additional areas are discussed below.

Approved project boundary

The two threatened flora species *Acacia pubescens* and *Dillwynia tenuifolia* were previously recorded with the approved project boundary during preparation of the BAR (2018). Downy Wattle was confirmed to occur during recent surveys, however the population of *Dillwynia tenuifolia* was not re-found but is assumed to present in the seed bank.

Both *Dillwynia tenuifolia* and *Acacia pubescens* are listed as 'area species' in the Threatened Biodiversity Data Collection. In the BAR (Arcadis 2018a) impacts to these species were calculated in using an area of occupancy (or species polygon) rather than by the number of stems being removed. A species polygon was calculated in accordance with Section 6.4.1.29 of the BAM, by applying a 30-metre buffer to recorded plants. These areas are referred to as occupied habitat.

The species polygons prepared in the BAR (Arcadis 2018a) have been adopted for this assessment to quantify area of habitat within the construction footprint. Although fewer individuals were recorded for both species (and in the case of *D. tenuifolia* no individuals) during the current survey it is likely that viable seed from both species is present in the seedbank at the locations where individuals were previously found and as such should be considered for impacts. Further the land use and condition of vegetation at the locations where these species were previously recorded has not significantly changed since the original assessment which would make either species unlikely to occur.

Two additional threatened species were considered moderately likely to occur within the Study Area (despite not having been recorded) and have potential to be impacted by the project, these include *Micromyrtus minutiflora* and *Pimelea spicata*. This was consistent with what was determined in the previous BAR (Arcadis 2018). Potential habitat for these species has been assumed for all associated PCTs.

Impact to threatened flora species and their habitat within the approved project boundary has been summarised in Table 5-11 and changes to areas of impact identified compared to the BAR (Arcadis 2018), where applicable.

Table 5-11 Impacts on threatened flora species including comparison to 2018 BAR

Threatened species	Status		Updated impacts within the approved project footprint	Previously identified for removal within approved project footprint	Difference
	BC Act	EPBC Act			
Acacia pubescens	V	V	3 individuals (stems) 0.21 ha occupied habitat 2.25 ha potential habitat	5 individuals (stems) 0.21 ha occupied 1.80 ha potential habitat	2 individuals (stems) less No increase in occupied habitat

Threatened species	Status		Updated impacts within the approved project footprint	Previously identified for removal within approved project footprint	Difference
					An additional 0.45 ha of potential habitat.
Dillwynia tenuifolia	-	V	No individuals identified 0.31 ha of occupied habitat 2.25 ha potential habitat	4 individuals 0.31 ha of occupied habitat 1.80 ha potential habitat	4 individuals less No increase in occupied habitat An additional 0.45 ha of potential habitat.
Micromyrtus minutiflora	V	E	2.25 ha potential habitat	0.39 ha of potential habitat in Shale Gravel Transition Forest	An additional 1.86 ha of potential habitat
Pimelea spicata	E	E	1.80 ha potential habitat	1.41 ha potential habitat in Cumberland Plain Woodland	An additional 0.39 ha of potential habitat

Proposed additional areas

No individuals of threatened flora species were identified in the proposed additional areas, however the Plant Community Type present in these areas are considered to offer potential habitat to three threatened flora species. A list of these threatened flora species and a breakdown of the area of suitable habitat to be impacted in these proposed additional areas is included in Table 5-12.

Table 5-12. Impact to threatened flora species in proposed additional areas

Threatened species	Status		Area of habitat (PCT 3448) to be impacted
	BC Act	EPBC Act	
Acacia pubescens	V	V	0.020 ha potential habitat
Dilwynia tenufolia	-	V	0.020 ha potential habitat
Micromyrtus minutiflora	V	E	0.020 ha potential habitat

Cumulative project impacts

Impacts to occupied habitat of *Acacia pubescens* and *Dillwynia tenuifolia* in the approved project boundary has not changed and there is no occupied habitat in proposed additional areas. Therefore, impacts to occupied habitat of these species is the same as what was described, assessed and approved in the BAR (Arcadis 2018).

Increases in impacts to potential habitat for four threatened species will occur as a result of re-mapping of suitable habitat (PCTs) within the approved project boundary and additional impacts in proposed additional areas. A breakdown of additional impacts to these species, that requires assessment and consideration for offset is provided in Table 5-13.

Table 5-13. Additional impacts to threatened flora that require assessment

Threatened species	Additional impacts to threatened flora in approved project footprint (ha)	Impact to native vegetation in proposed additional areas (ha)	Total impact areas requiring assessment (ha)	Total impact from the proposal (ha)
Acacia pubescens	0.45 ha of potential habitat.	0.020 ha potential habitat	0.47 ha potential habitat	2.27

Threatened species	Additional impacts to threatened flora in approved project footprint (ha)	Impact to native vegetation in proposed additional areas (ha)	Total impact areas requiring assessment (ha)	Total impact from the proposal (ha)
Dillwynia tenuifolia	0.45 ha of potential habitat.	0.020 ha potential habitat	0.47 ha potential habitat	2.27
Micromyrtus minutiflora	1.86 ha of potential habitat	0.020 ha potential habitat	1.88 ha potential habitat	2.27
Pimelea spicata	0.39 ha of potential habitat	No additional impacts	0.39 ha potential habitat	2.19

As impacts assessed to threatened flora have increased since the BAR (Arcadis 2018) and the CA (Arcadis 2019), updated Test of Significance (ToS) and assessment against the Significant Impact Criteria (SIC) have been conducted to determine if the significance determination is consistent to what was previously determined.

The ToS and assessment against the SIC included in Appendix E and Appendix F for each threatened flora species found a consistent determination that the proposal was unlikely to result in a significant impact. A justification as to why a significant impact is considered unlikely for each threatened flora species is summarised in the dot points below:

- Downy Wattle - The proposal will result in the removal of one cluster (sub-population) of Downy Wattle containing approximately 3 stems and 0.21 hectares of occupied habitat. There are nearby clusters (sub-populations) of Downy Wattle which will not be impacted by the proposal which are considered to be part of the same population. Removal of 2.27 hectares of potential habitat is not deemed to be a significant area of habitat or of importance to the long-term survival of the species due to the extensive area of similar or higher quality habitat in the locality, including within the nearby Scheyville National Park. As a result, it is considered unlikely that the proposal will significantly impact Downy Wattle.
- *Dillwynia tenuifolia* – The proposal will result in the removal of 0.31 hectares of occupied habitat and 1.96 ha of associated habitat (PCT 3320, PCT 3448) of *Dillwynia tenuifolia*. There are a large number of individuals near the site which will not be impacted by the proposal and therefore the local population will be unlikely to be placed at risk of extinction. This vegetation to be cleared is heavily modified and is not deemed to be a significant area of habitat or of importance to the long-term survival of the species. As a result, it is considered unlikely that the proposal represents a significant impact to this threatened species.
- *Micromyrtus minutiflora* and *Pimelea spicata* - No individuals of either species was detected during comprehensive targeted surveys across the site in 2018. The proposal will impact potential habitat for these species in patches of PCT 3320 and 3448, however the habitat is fragmented in the landscape and subject to modification and is removal is considered unlikely to be important to the long-term survival of either species in the locality. As a result, it is considered unlikely that the proposal represents a significant impact to these threatened species.

5.1.4 Removal of threatened fauna species and habitat

Impacts to threatened fauna species and suitable habitat within the approved project boundary and the proposed additional areas are discussed below.

Approved project boundary

A total of seven threatened fauna species have been identified within the approved project boundary, of which two were recorded during recent field surveys including *Meridolum corneovirens* (Cumberland Plain Land Snail) and *Pommerhelix duralensis* (Dural Land Snail) (DLS).

Associated Plant Community Types for threatened species recorded in the approved project boundary have been assumed as potential habitat and used to quantify areas of impact to these species. In the case of less mobile fauna species like CPLS and DLS, which are likely to occupy habitat within the site, estimates of occupied habitat have also been calculated for the purpose of undertaking impact assessments.

Six threatened species, additional to those identified in the BAR (Arcadis 2018), are considered moderately likely to occur within the Study Area (despite not having been recorded) and have potential to be impacted by the project these include Dusky Woodswallow, Gang-gang Cockatoo, Little Lorikeet, Powerful Owl, Spotted Harreir and Square-tailed Kite. Potential habitat for these species has been assumed for all associated PCTs.

Impacts to threatened fauna habitat will include the removal of woodland habitat (PCT 3320 and 3448) and freshwater wetland habitat (PCT 3962. Non-PCT vegetation is considered have a low habitat value to locally occur threatened species within the construction footprint. Native vegetation assemblages (PCTs) in the Study Area comprise general foraging, roosting and/or nesting habitat.

Additional to the removal of potential threatened species foraging habitat, a total of 19 hollow bearing trees will be removed by this proposed modification. This is an increase of 17 hollow-bearing trees, from what was identified in the 2018 BAR.

Impact to threatened fauna species and their habitat within the approved project boundary has been summarised in Table 5-4 and changes to areas of impact identified compared to the BAR (Arcadis 2018), where applicable.

Table 5-14 Impacts on threatened fauna species and their habitats including comparison to 2018 BAR

Threatened species	Status		Updated impacts within the approved project footprint	Previously identified for removal within approved project footprint	Difference
	BC Act	EPBC Act			
Grey-headed Flying Fox	V	V	Loss of 2.25 ha of foraging habitat in native vegetation (all PCTs)	Loss of 1.80 ha of foraging habitat	Increased impact Loss of an additional 0.47 ha of foraging habitat
Cumberland Plain Land Snail	E	-	Loss of 1.18 ha of occupied habitat comprising 0.82 ha of PCT 3320 and 0.36 ha of PCT 3448. Loss of an additional 1.07 ha of potential foraging and breeding habitat in PCTs 3320, 3448 (of the 2.25 ha of associated PCTs 1.07 is not known to be occupied).	Loss of 1.41 of potential foraging and breeding habitat.	Increased impact Loss of an additional 1.18 ha of occupied habitat Reduced impact Potential breeding and foraging impact in PCTs 3320, 3448 by 0.34 ha
Dural Land Snail	E	E	Loss of 0.90 ha of occupied habitat comprising 0.82 ha of PCT 3320 and 0.08 ha of PCT 3448. Loss of an additional 1.35 ha of potential foraging and breeding habitat in PCTs 3320, 3448 (of the 2.25 ha	Species not assessed for impacts	Increased impact Loss of an additional 0.90 ha of occupied habitat Loss of and additional 1.35 ha of foraging and breeding habitat in PCTs 3320, 3448.

Threatened species	Status		Updated impacts within the approved project footprint	Previously identified for removal within approved project footprint	Difference
			of associated PCTs 1.35 is not known to be occupied).		
Hollow dependent Microbats:					
Eastern Freetail-bat	V	-	Loss of 3.03 ha of foraging habitat in native vegetation (all PCTs). Loss of 19 hollow-bearing trees which constitute potential roosting/breeding habitat for tree roosting species.	Loss of 1.8 ha of foraging habitat within open forest/woodland Loss of potential roosting habitat in one live tree and one stag Increased impact Loss of an additional 1.23 ha foraging habitat in native vegetation (all PCTs Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	Loss of 1.8 ha of foraging habitat within open forest/woodland Loss of potential roosting habitat in one live tree and one stag Increased impact Loss of an additional 1.23 ha foraging habitat in native vegetation (all PCTs Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.
Eastern False Pipistrelle	V	-			
Southern Myotis	V	-			
Greater Broad-nosed Bat	V	-			
Cave dependent Microbats:					
Little Bent-winged Bat	V	-	Loss of 3.03 ha of foraging habitat in native vegetation (all PCTs). Loss of 1.8 ha of foraging habitat within open forest/woodland	Increased impact	Loss of and additional 1.23 ha of foraging habitat in native vegetation (all PCTs)
Large Bent-winged Bat	V	-			
Woodland Birds:					

Threatened species	Status		Updated impacts within the approved project footprint	Previously identified for removal within approved project footprint	Difference
Dusky Woodswallow	V	-	Loss of 2.25 ha of foraging habitat in PCT 3320 and 3448. Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	Species not assessed for impacts Increased impact	Loss of an additional 2.25 ha of foraging habitat in PCT 3320 and 3448. Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.
Gang-gang Cockatoo	E	E			
Little Lorikeet	V	-			
Raptors:					
Spotted Harrier	V	-	Loss of 3.03 ha of hunting habitat in PCT 3320, 3448 and 3962. Species not assessed for impacts	Increased impact	Loss of an additional 3.03 ha of hunting habitat in PCT 3320, 3448 and 3962.
Square-tailed Kite	V	-			
Powerful Owl	V	-			

Proposed additional areas

No threatened fauna were identified in the proposed additional areas, however the Plant Community Types present in these areas are considered to offer potential habitat to all fifteen of the threatened fauna species known or considered to have a moderate or higher likelihood of occurrence. A list of these threatened flora species and a breakdown of the area of suitable habitat to be impacted in these proposed additional areas is included in Table 5-15.

Table 5-15. Impact to threatened fauna species in proposed additional areas

Threatened species	Status		Updated impacts within the approved project footprint
	BC Act	EPBC Act	
Grey-headed Flying Fox	V	V	Loss of 0.02 ha of foraging habitat in PCT 3448
Cumberland Plain Land Snail	E	-	Loss of 0.02 ha of foraging and breeding habitat in PCT 3448
Dural Land Snail	E	E	Loss of 0.02 ha of foraging and breeding habitat in PCT 3448
Hollow dependent Microbats:			
Eastern Freetail-bat	V	-	Loss of 0.02 ha of foraging habitat in PCT 3448.

Threatened species	Status		Updated impacts within the approved project footprint
Eastern False Pipistrelle	V	-	
Southern Myotis	V	-	
Greater Broad-nosed Bat	V	-	
Cave dependent Microbats:			
Little Bent-winged Bat	V	-	Loss of 0.02 ha of foraging habitat in PCT 3448
Large Bent-winged Bat	V	-	
Woodland Birds:			
Dusky Woodswallow	V	-	Loss of 0.02 ha of foraging habitat in PCT 3448
Gang-gang Cockatoo	E	E	
Little Lorikeet	V	-	
Raptors:			
Spotted Harrier	V	-	Loss of 0.02 ha of hunting habitat in PCT 3448
Square-tailed Kite	V	-	
Powerful Owl	V	-	

Cumulative project impacts

The proposal will impact occupied habitat for the threatened fauna species Cumberland Plain Land Snail and Dural Land Snail and potential habitat for an additional thirteen species. Majority of impacts to these species has been described, assessed and approved through the REF and CA.

A review of hollow-bearing trees within the approved project footprint identified an additional 18 hollow-bearing trees, to that one identified in the BAR (Arcadis 2018).

A breakdown of additional impacts from the entire project to these species, that requires assessment is provided in Table 5-16.

Table 5-16. Additional impacts to threatened fauna that require assessment

Threatened species	Additional impacts to threatened fauna in approved project boundary	Impacts to threatened fauna in proposed additional areas (ha)	Total impacts to threatened fauna requiring assessment	Total impact from the proposal (ha)
Grey-headed Flying Fox	Loss of 0.47 ha of foraging habitat	Loss of 0.02 ha of foraging habitat in PCT 3448	Loss of 0.49 ha of habitat	2.27
Cumberland Plain Land Snail	Loss of 1.18 ha of occupied habitat Loss of 1.07 ha of potential foraging and breeding habitat in PCTs 3320, 3448.	Loss of 0.02 ha of foraging and breeding habitat in PCT 3448	Loss of 1.18 ha of occupied habitat Loss of 1.09 ha of potential foraging and breeding habitat in PCTs 3320, 3448.	2.27

Threatened species	Additional impacts to threatened fauna in approved project boundary	Impacts to threatened fauna in proposed additional areas (ha)	Total impacts to threatened fauna requiring assessment	Total impact from the proposal (ha)
Dural Land Snail	Loss of 0.90 ha of occupied habitat Loss of 1.35 ha of potential foraging and breeding habitat in PCTs 3320, 3448.	Loss of 0.02 ha of foraging and breeding habitat in PCT 3448	Loss of 0.90 ha of occupied habitat Loss of 1.37 ha of potential foraging and breeding habitat in PCTs 3320, 3448.	2.27
Hollow dependent Microbats: Eastern Freetail-bat Eastern False Pipistrelle Southern Myotis Greater Broad-nosed Bat	Loss of 1.23 ha foraging habitat in native vegetation (all PCTs 19 hollow-bearing trees	Loss of 0.02 ha of foraging habitat in PCT 3448.	Loss of 1.25 ha foraging habitat in native vegetation (all PCTs 19 hollow-bearing trees	3.05
Cave dependent Microbats: Little Bent-winged Bat Large Bent-winged Bat	Loss of 1.23 ha of foraging habitat in native vegetation (all PCTs)	Loss of 0.02 ha of foraging habitat in PCT 3448	Loss of 1.25 ha of foraging habitat in native vegetation (all PCTs)	3.05
Woodland Birds: Dusky Woodswallow Gang-gang Cockatoo Little Lorikeet	Loss of 2.25 ha of foraging habitat in PCT 3320 and 3448. Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	Loss of 0.02 ha of foraging habitat in PCT 3448	Loss of 2.27 ha of foraging habitat in PCT 3320 and 3448. Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	2.27
Raptors: Spotted Harrier Square-tailed Kite Powerful Owl	Loss of 3.03 ha of hunting habitat in PCT 3320, 3448 and 3962.	Loss of 0.02 ha of hunting habitat in PCT 3448	Loss of 3.05 ha of hunting habitat in PCT 3320, 3448 and 3962.	3.05

As impacts assessed to threatened fauna have increased since the BAR (Arcadis 2018) and the CA (Arcadis 2019), updated Test of Significance (ToS) and assessment against the Significant Impact Criteria (SIC) have been conducted to determine if the significance determination is consistent to what was previously determined.

The ToS and assessment against the SIC included in Appendix E and Appendix F for each threatened fauna species found a consistent determination that the proposal was unlikely to result in a significant impact. A justification as to why a significant impact is considered unlikely for threatened fauna species recorded on the proposal site is summarised in the dot points below:

- Grey-headed Flying Fox - The proposal would require the removal of 3.05 ha potential foraging habitat for the Grey-headed Flying-fox. This is a negligible amount in comparison to the extensive amount of suitable foraging habitat in the wider locality. There are no roosting camps and the Study Area is unlikely to be used by this species for breeding. Therefore, the proposed action is unlikely to have an adverse impact on the life cycle of a local population or impact the species habitat such that it will affect its long-term survival. As a result, it is considered unlikely that the proposed action represents a significant impact to the Grey-headed Flying-fox.
- Cumberland Plain Land Snail and Dural land Snail - The proposal would require the removal of 2.27 ha of potential habitat, of which 1.18 hectares is considered to be occupied by CPLS and 0.90 hectares is considered to be occupied by DLS. The area of habitat that will be removed by the

proposal is a small portion of the habitat adjoining the Study Area, which provides similar habitat resources to CPLS and DLS and would offer habitat to the local population. Reduction in available habitat and loss of individuals has the potential to reduce the genetic diversity of the local population through higher rates of inbreeding, however this is considered unlikely to cause a local population to be placed at risk of extinction. The proposal is unlikely to cause further fragmentation of potential habitat for CPLS and DLS, as all impacts will occur to the edge of existing habitat. Based on the above points, although the proposal may impact a population of these threatened snail species it is unlikely that the scale of the impacts, when compared with the extent of similar habitat adjoining the Study Area, is likely to cause a local population to be placed at risk of extinction.

- Threatened microbat species - The proposal would require the removal of 3.05 hectares of potential habitat, including 19 hollow bearing trees which could be used by the tree roosting species *Myotis macropus* (Southern Myotis) and Eastern Free-tailed Bat (*Micronomus norfolkensis*). While the proposal may impact roosting and/or foraging habitat for Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Southern Myotis, and Greater Broad-nosed Bat, the removal of this habitat is unlikely to significantly impact the species as it is unlikely to impact individuals of these species and would not fragment the local population. Further, extensive similar habitat resources are present in the locality which can utilised by these mobile flying mammal species, including in the nearby Scheyville National Park. The potential habitat to be cleared is not considered to be a significant area of habitat or of importance to the long-term survival of threatened microbats in the locality.

5.1.5 Injury and mortality

As per the 2018 BAR, fauna injury and mortality may occur during the clearing of vegetation or as a result of collisions with work vehicles or plant, or accidental entrapment in plant, trenches or other works. The majority of fauna species recorded within the Study Area were highly mobile bird species which are likely to be able to move away from vegetation clearing activities quite readily.

During the operation of the road, vehicle strike may increase slightly from current levels as the new road will be constructed in areas which are currently unimpacted by a road. Furthermore, the new road will likely have an increased speed limit to current roads running through the site. This will make it more difficult for fauna to move away from oncoming traffic, resulting in an increase in fauna mortalities.

5.1.6 Removal of aquatic habitat

Direct impacts (removal) to aquatic habitats (PCT 3962) including Coastal Wetlands and Proximity Areas to Coastal Wetland, are the same as what was assessed in the 2018 BAR.

Impacts to aquatic habitats will occur to the waterways that transects Pitt Town Road, the unnamed creek that transects Old Pitt Town Road and several dams located within the Study Area. Impacts described in the BAR include:

- Construction activities, particularly culvert upgrades at the two watercourse crossings, which could result in potential alteration and/or degradation of aquatic habitat in these areas. Impacts during construction could arise from:
  - Sediment-laden run-off from cleared and disturbed areas adversely affecting water quality in watercourses.
  - Stockpiling of soil near waterways and overland flow paths.
  - Spills or leaks of road construction materials including fuels, lubricants and hydraulic oils from construction plant and equipment.
- During operation impacts on aquatic habitats is likely to be negligible, because surface flows (stormwater run-off) from the bypass, potentially containing pollutants associated with the operation of the road (hydrocarbons, suspended solids and nutrients), would be directed towards and contained within drainage infrastructure, to be constructed as part of the proposed modification.

As the impacts to aquatic habitat is the same as has already been described, assessed and approved within the BAR (Arcadis 2018a) no additional direct impacts to aquatic habitats will occur.

5.1.7 Impact to Groundwater Dependant Ecosystems

Although the construction footprint in locations known to support Groundwater Dependent Ecosystems (GDEs) is that same as what was described and assessed in the REF (Arcadis 2018) changes to construction methodologies has potential to exacerbate impacts. Specifically, the 'remove and replace'' approach for the five cell culvert at the southern roundabout, instead of the surcharge method described in the REF has the potential exacerbate impacts as a result of minor interaction with the groundwater, groundwater inflow, the need for de-watering.

A Surface and Groundwater Assessment working paper (Sustain JV 2024) was prepared to review the risks to GDEs associated with the proposed changes in methodology against the Departments primary Industries NSW Office or Water Aquifer Interference Policy. It was determined that the development will induce "minimal" impact of groundwater resources.

For these reasons, apart from direct impact to aquatic habitats and native vegetation during construction, it is considered unlikely that the proposal would result in a significant impact to GDEs beyond the clearing footprint. Rather, impacts will likely be short lived and limited to the construction period. Permanent changes to the ground water table that could impact GDEs is unlikely to occur as a result of the proposal.

Native vegetation and habitats which have a greater reliance on groundwater within the Study Area includes freshwater wetlands characteristics of PCT 3962. Hortons creeks has variable rates of flow and instream vegetation is likely to be resilient to short and medium term periods of reduced groundwater availability. Therefore any short term changes to water availability as a result of construction activities and de-watering is unlikely to significantly impact adjoining areas supporting ground-water dependant vegetation communities.

5.2 Indirect/operational impacts

Indirect and operation impacts anticipated from the proposal are considered to be the similar to what was assessed in the BAR (Arcadis 2018). The indirect/operation impacts considered in the BAR are listed in Table 5-17 along with the section where the potential impacts are discussed. Any additional indirect impacts from the proposal have also been described.

Table 5-17 Indirect impacts from the proposal assessed in the BAR (Arcadis 2018).

Indirect impact	Section in BAR (Arcadis 2018)	Additional indirect impacts that require assessment?
Wildlife connectivity and habitat fragmentation	4.2.1	None.
Edge effects on adjacent native vegetation and habitat	4.2.2	None.
Invasion and spread of weeds	4.2.3	None.
Invasion and spread of pests	4.2.4	None.
Invasion and spread of pathogens and disease	4.2.5	None.
Changes to hydrology	4.2.6	Some minor changes to hydrology will occur as a result of increased inclusion of impervious areas for maintenance access and adjustments of the drainage system to fit the updated road design.

Indirect impact	Section in BAR (Arcadis 2018)	Additional indirect impacts that require assessment?
		Minor increases in surface flow are considered negligible. Grass swales, bioretention basins and wetlands will accommodate changes and minimise impacts to retained areas of biodiversity beyond the approved project boundary and proposed additional areas.
Noise, light and vibration	4.2.7	None.
Groundwater dependent ecosystems	4.2.8	Increased direct impacts to GDEs has been discussed in section 5.1.7. Impacts to GDEs are considered to be temporary and only occurring during construction. Therefore, indirect impacts to GDEs is unlikely.

5.3 Assessments of significance

In accordance with Section 7.3 of the BC Act, a Test of Significance assessment, and under the EPBC Act, Significant Impact Criteria Assessments were conducted for threatened species and ecological communities as listed under the BC and/or EPBC Act respectively to determine the significance of threatened species and ecological communities with a moderate to high likelihood of occurrence in the Study Area. A summary of these assessments has been included in Table 5-18.

Table 5-18 Summary of significant impact assessments for threatened ecological communities and species.

Scientific name	Common name	BC Act	EPBC Act	Likely significant impact
Threatened Ecological Communities				
Cumberland Plain Woodland in the Sydney Basin Bioregion	n/a	CE	-	No
Shale Gravel Transition Forest in the Sydney Basin Bioregion	n/a	E	-	No
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest in the Sydney Basin Bioregion	n/a	-	CE	No
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions	n/a	E	-	No
Threatened Flora				
Acacia pubescens	Downy Wattle	V	V	No
Dillwynia tenuifolia		V	-	No
Micromyrtus minutiflora		V	E	No
Pimelea spicata	Spiked Rice-flower	E	E	No
Threatened Fauna				
Pteropus policephalus	Grey-headed Flying Fox	V	V	No
Meridoleum corneovirens	Cumberland Plain Land Snail	E	-	No
Pommerhelix duralensis	Dural Land Snail	E	E	No
Hollow dependent Microbats:		V	-	No

Scientific name	Common name	BC Act	EPBC Act	Likely significant impact
Mormopterus norfolkensis	Eastern Freetail-bat			
Falsistrellus tasmaniensis	Eastern False Pipistrelle			
Myotis Macropus	Southern Myotis and			
Scoteanax rueppellii	Greater Broad-nosed Bat			
Cave dependent Microbats:				
Miniopterus australis	Little Bent-winged Bat	V	-	No
Miniopterus orianae oceanensis	Large Bent-winged Bat			
Woodland Birds:				
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	E	No
Callocephalon fimbriatum	Gang-gang Cockatoo			
Glossopsitta pusilla	Little Lorikeet			
Raptors:				
Circus assimilis	Spotted Harrier	V	-	No
Lophoictinia isura	Square-tailed Kite			
Ninox strenua	Powerful Owl			

6 AVOID, MINIMISE AND MITIGATE IMPACTS

Where possible, during further design and construction consideration should be given to retain high biodiversity values. Areas supporting the federally listed Critically Endangered Ecological Community (CEEC) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest should be prioritised for retention as well as hollow-bearing trees on the edges of the construction footprint.

6.1 Mitigation measures

Where impacts cannot be avoided, safeguards will be implemented to mitigate these impacts during construction and operation. The mitigation measures are described in Table 6-1. The mitigation measures proposed in the BAR are comprehensive and are still considered relevant to the proposed modification. Additional mitigation measures and necessary updates to legislation and current guidelines has been denoted in bold text.

Table 6-1 Mitigation measures

Impact	Mitigation Measures	Phase	Efficacy	Residual Impacts
Removal of native vegetation (including TECs), threatened species and habitat	Measures to further minimise the construction boundary and avoid native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Design	Effective	**Yes – a residual impact of 3.05 ha of native vegetation loss, including removal of occupied habitat of the following threatened species:** - ***Acacia pubescens* (Downy Wattle): 0.21 ha** - ***Dillwynia tenuifolia:* 0.31 ha** - **Cumberland Plain land Snail: 1.18 ha** - **Dural Land Snail: 0.90 ha**
	Pre-clearing surveys will be undertaken in accordance with **Guide 1: Pre-clearing process of the Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).**	Pre-construction	Effective	
	Vegetation removal will be undertaken in accordance with **Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024)**	Construction	Effective	
	Where feasible, and where it does not substantially affect maintenance and safe operation of the proposed modification, native vegetation will be re-established in accordance with **Guide 3: Re-establishment of native vegetation of the Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).**	Post construction	Effective	
	Investigation will occur during detailed design for opportunities to replace or reinstate habitat where practical and feasible in accordance with **Guide 5: Re-use of woody debris and bushrock** and **Guide 8: Artificial hollows of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).**	Construction	Proven	
	The unexpected threatened species finds procedure template will be followed from **Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024)**, if threatened ecological	Construction	Proven	

Impact	Mitigation Measures	Phase	Efficacy	Residual Impacts
	communities, flora or fauna not assessed in the biodiversity assessment are identified within the construction boundary. **For all other animals an unexpected animal onsite protocol will need to be developed as part of the Construction Flora and Fauna Management Pla (CFFMP)n to ensure that the Environment Manager and site supervisor are notified when unexpected animals are found, that potentially harmful works cease in the vicinity of an animal and, in the case of a potentially dangerous animal, all personnel leave the area. The protocol should also cover the steps required to manage any injured animal, following Guide 9: Fauna handling from the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).**			
Aquatic impacts	Aquatic habitat will be protected in accordance with **Guide 10: Aquatic habitats and riparian zones from the Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).** Section 3.3.2 Standard Precautions and Mitigation Measures of the Policy and Guidelines for Fish Habitat Conservation and Management Update 2013 (DPI (Fisheries NSW), 2013).	Construction	Effective	Unlikely
Changes to hydrology	Changes to existing surface water flows would mimic surface water flows during construction stage and re-established during operation.	Design	Effective	Unlikely
Edge effects on adjacent native vegetation and habitat	Exclusion zones will be set up at the limit of clearing in accordance with **Guide 2: Exclusion zones of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).** The limit of clearing will be confirmed within the construction footprint during the detailed design process.	Construction	Effective	Unlikely
Injury and mortality of fauna	**Detailed searches will be conducted in all areas of suitable habitat (all mapped occurrences of PCT 3320 and 3448) for Cumberland Plain Land Snail and Dural Land Snail. Any live animals will be captured and relocated to areas of suitable habitat outside of the construction footprint. A description of the process for undertaking these surveys will be detailed in the CFFMP with suitable relocation sites identified.**	**Pre-construction**	**Effective**	**Possible –snails are overlooked during pre-clearance surveys and killed during construction**
	Fauna will be managed in accordance with **Guide 9: Fauna handling from the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).**	Construction	Effective	Unlikely
Invasion and spread of weeds	Weed species will be managed in accordance with **Guide 6: Weed management the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).**	Construction	Effective	Unlikely

Impact	Mitigation Measures	Phase	Efficacy	Residual Impacts
Invasion and spread of pests, **pathogens and disease**	Appropriate weed, disease and pest assessment needs to be undertaken prior to clearing in accordance with **Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).** Pathogens will be managed in accordance with **Guide 2: Exclusion zones of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).** **Follow the Arrive Clean, Leave Clean guidelines (DoE 2015) and the Saving our Species Hygiene guidelines (DEES 2020) to help protect biodiversity and prevent the spread of invasive diseases (*Phtophthora cinnamomi*, myrtle rust, amphibian chytrid fungus) and weeds threatening our native plants, animals and ecosystems.**	Construction	Effective	Unlikely
Noise, light and vibration	Artificial light impacts will be minimised through detailed design.	Design	Effective	Unlikely

7 OFFSET STRATEGY

Due to the date of determination of the REF, impacts are required to be offset in accordance with the former Guidelines for Biodiversity Offsets (RMS 2016). As the project is an addendum to the original approval, these offsetting guidelines are still applicable and will be used to determine the required offsets for project impacts.

It is understood that project impacts and offsetting liabilities calculated in the project REF (Arcadis 2018) were not delivered following project approval. As such, offsetting requirements for the cumulative project impacts will be described in this section.

7.1 Offsetting thresholds for REFs (Guidelines for Biodiversity Offsets 2016)

The biodiversity assessment and REF for a project details offset requirements, consistent with the Thresholds in Table 7-1.

Table 7-1. Offsetting thresholds for REFs

Description of activity or impact	Consider offsets or supplementary measures
Activities in accordance with Roads and Maritime Services Environmental assessment procedure: Routine and Minor Works (RTA 2011)	No
Works on cleared land, plantations, exotic vegetation where there are no threatened species or habitat present	No
Works involving clearing of vegetation planted as part of a road corridor landscaping program (this includes where threatened species or species comprising listed ecological communities have been used for landscaping purposes)	No
Works involving clearing of national or NSW listed critically endangered ecological communities (CEEC)	Where there is any clearing of an CEEC in moderate to good condition
Works involving clearing of nationally listed threatened ecological community (TEC) or nationally listed threatened species habitat	Where clearing >1 ha of a TEC or habitat in moderate to good condition
Works involving clearing of NSW endangered or vulnerable ecological community	Where clearing > 5 ha or where the ecological community is subject to an SIS
Works involving clearing of NSW listed threatened species habitat where the species is a species credit species as defined in the OEH Threatened Species Profile Database (TSPD)	Where clearing > 1ha or where the species is the subject of an SIS
Works involving clearing of NSW listed threatened species habitat and the species is an ecosystem credit species as defined in OEH's Threatened Species Profile Database (TSPD)	Where clearing > 5ha or where the species is the subject of an SIS
Type 1 or Type 2 key fish habitats (as defined by NSW Fisheries)	Where there is any net loss of habitat

7.2 Summary of impacts

A summary of the cumulative impacts to Plant Community Types, Threatened Ecological Communities and threatened species from the proposal that require consideration for offsetting is included in Table 7-2 and Table 7-3, respectively.

Table 7-2. Summary of impacts to native vegetation and threatened ecological communities that require consideration for impacts

Plant Community Type	Threatened Ecological Communities	REF & CA project impacts requiring (ha)	Additional project impacts (ha)	Total project impacts (ha)
PCT 3448: Castlereagh Ironbark Forest	Shale Gravel Transition Forest in the Sydney Basin Bioregion (endangered – BC Act)	0.43	0.04	0.47
PCT 3320: Cumberland Shale Plains Woodland	Does not meet listing criteria	0.00	0.10	0.10
	Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered – BC Act)	1.43	0.27	1.70
PCT 3962: Coastal Floodplain Phragmites Reedland	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (endangered)	0.68	0.10	0.78
Sub-total		**2.54**	**0.51**	**3.05**

Table 7-3. Summary of impacts to threatened species that requires consideration for impacts

Threatened species	Status BC Act	EPBC Act	REF & CA project impacts requiring (ha)	Additional project impacts (ha)	Total project impacts (ha)
Threatened flora					
Acacia pubescens	V	V	0.21 ha of occupied habitat 1.80 ha of potential habitat	0.47 ha of potential habitat	0.21 ha of occupied habitat 1.27 ha of potential habitat
Dillwynia tenuifolia	-	V	0.31 ha of occupied habitat 1.80 ha of potential habitat	0.47 ha of potential habitat	0.31 ha of occupied habitat 1.27 ha of potential habitat
Micromyrtus minutiflora	V	E	0.39 ha of potential habitat	1.88 ha of potential habitat	2.27 ha of potential habitat
Pimelea spicata	E	E	1.80 ha of potential habitat	0.39 ha of potential habitat	2.19 ha of potential habitat
Threatened fauna					
Grey-headed Flying Fox	V	V	1.80 ha of foraging habitat	0.47 ha of foraging habitat	2.27 ha of foraging habitat
Cumberland Plain Land Snail	E	-	1.18 ha of occupied habitat 1.41 of potential habitat.	Loss of 1.18 ha of occupied habitat Reduction in impact to potential habitat in	1.18 ha of occupied habitat 1.09 ha of potential habitat

Threatened species	Status		REF & CA project impacts requiring (ha)	Additional project impacts (ha)	Total project impacts (ha)
				PCTs 3320, 3448 by 0.34 ha	
Dural Land Snail	E	E	No impacts identified	Loss of 0.90 ha of occupied habitat Loss of 1.37 ha of potential foraging and breeding habitat in PCTs 3320, 3448	0.90 ha of occupied habitat 1.37 ha of potential habitat
Hollow dependent Microbats:					
Eastern Freetail-bat	V	-	Loss of 1.8 ha of foraging habitat within open forest/woodland Loss of potential roosting habitat in one live tree and one stag	Loss of 1.23 ha foraging habitat in native vegetation (all PCTs) Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	3.03 ha of potential habitat including 19 hollow-bearing trees
Eastern False Pipistrelle	V	-			
Southern Myotis and	V	-			
Greater Broad-nosed Bat	V	-			
Cave dependent Microbats:					
Little Bent-winged Bat	V	-	Loss of 1.8 ha of foraging habitat	Loss of 1.23 ha of foraging habitat	3.03 ha of potential habitat
Large Bent-winged Bat	V	-			
Woodland Birds:					
Dusky Woodswallow	V	-	No impacts identified Loss of 2.27 ha of foraging habitat in PCT 3320 and 3448.	Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	Loss of 2.27 ha of potential habitat including 19 hollow-bearing trees
Gang-gang Cockatoo	V	E			
Little Lorikeet	V	-			
Raptors:					
Spotted Harrier	V	-	No impacts identified	Loss of 3.05 ha of hunting habitat in PCT 3320, 3448 and 3962.	Loss of 3.05 ha of potential habitat

Threatened species	Status		REF & CA project impacts requiring (ha)	Additional project impacts (ha)	Total project impacts (ha)
Square-tailed Kite	V	-			
Powerful Owl	V	-			

7.3 Offsetting threshold for impacts

Assessment of impacts to biodiversity from the proposal (as summarised in 7.2) against the offsetting thresholds in the Biodiversity Offset Guidelines found that two entities trigger offsetting as per the guideline:

- Cumberland Plain Woodland (listed as critically endangered under the BC Act) – *Any clearing of a CECC in moderate to good condition*
- Cumberland Plain Land Snail (listed as endangered under the BC Act) - *Where clearing of a NSW listed threatened species habitat where the species is a species credit species is > 1ha*

Only impacts to occupied habitat for threatened species has been considered against the offsetting guidelines. Potential habitat for threatened species describes areas of suitable habitat that was not found to support a population and direct impacts to a population of the species is considered unlikely and therefore does not require offsetting. An assessment of impacts against the offsetting threshold for native vegetation and threatened species which have occupied habitat being impacted by the proposal is included in Table 7-4.

Impacts to native vegetation and threatened species for the fifteen species (two flora; thirteen fauna) identified as having a moderate or higher likelihood to occur does not trigger the requirement for offsetting under the Biodiversity Offset Guidelines.

Table 7-4. Assessment of vegetation and threatened species impacts against thresholds

Vegetation zone / threatened species	Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?
Plant Community Types and Threatened Ecological Communities					
3448 (BC Act TEC)	PCT 3448: Castlereagh Ironbark Forest	Moderate – Good	Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act - endangered)	0.04	No. Less than 2 ha of this EEC in moderate to good' condition will be cleared.
PCT 3320 (non-TEC)	PCT 3320: Cumberland Shale Plains Woodland	Low	Does not meet criteria to be listed.	0.1 ha	No. Does not have 'moderate to good' condition and therefore does not require offsetting.
3320 (BC Act TEC	PCT 3320: Cumberland Shale Plains Woodland	Moderate – Good	Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act - critically endangered)	0.27 ha	Yes. This is a CEEC and therefore any impacts require offsetting

Vegetation zone / threatened species	Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?
3962 (BC Act TEC)	PCT 3962: Coastal Floodplain Phragmites Reedland	Moderate – Good	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (BC Act - endangered)	0.10	No. Less than 2 ha of this EEC in moderate to good' condition will be cleared.
Threatened species habitat (occupied habitat)					
Acacia pubescens	PCT 3448: Castlereagh Ironbark Forest - 3448 (BC Act TEC)	Moderate – Good	Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act - endangered)	0.21 ha	No. The total removal of occupied habitat does not exceed the clearing threshold of >1ha.
Dillwynia tenuifolia	PCT 3320: Cumberland Shale Plains Woodland - 3320 (BC Act TEC	Moderate – Good	Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act - critically endangered)	31 ha	No. The total removal of occupied habitat does not exceed the clearing threshold of >1ha.
CPLS	PCT 3320: Cumberland Shale Plains Woodland - 3320 (BC Act TEC	Moderate – Good	Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act - critically endangered)	0.82	Yes. Clearing > 1ha of occupied habitat of a species credit species. However, habitat within PCT 3320 (BC Act TEC) has already been offset above for Cumberland Plain Woodland (as per the CEEC offset requirements)

Vegetation zone / threatened species	Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?
CPLS	PCT 3448: Castlereagh Ironbark Forest - 3448 (BC Act TEC)	Moderate – Good	Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act - endangered)	0.36	Yes. Clearing > 1ha of occupied habitat of a species credit species.
DLS	PCT 3320: Cumberland Shale Plains Woodland 3320 (BC Act TEC	Moderate – Good	Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act - critically endangered)	0.82	No. The total removal of occupied habitat does not exceed the clearing threshold of >1ha.
DLS	PCT 3448: Castlereagh Ironbark Forest 3448 (BC Act TEC)	Moderate – Good	Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act - endangered)	0.08	No. The total removal of occupied habitat does not exceed the clearing threshold of >1ha.

7.4 Preliminary offset calculations

A preliminary offset calculations for impacts to native vegetation and threatened species which triggered the threshold for offsetting in accordance with the Biodiversity Offset Guidelines has been included in Table 7-5 and Table 7-6, respectively.

Table 7-5. Preliminary credit calculations for impacts to threatened ecological communities

Plant community type	EPBC Act	BC Act	VI score	BRW	HBT	Impact (ha)	Ecosystem credits
PCT 3320: Cumberland Shale Plains Woodland	None	Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered)	58.7	2.5	Yes	1.70	62

Table 7-6. Preliminary credit calculations for impacts to threatened species.

Species name	EPBC Act	BC Act	Impact (ha)	Species credits
Meridolum corneovirens (Cumberland Plain Land Snail)	Not listed	Endangered	0.36 – PCT 3448	10
			0.82 – PCT 3320	No species credit required. Habitat within PCT 3320 (BC Act TEC) has already been offset above for Cumberland Plain Woodland (as per the CEEC offset requirements)

8 CONCLUSION

In 2018 Arcadis prepared a Review of Environmental Factors (REF) for Transport to assesses impacts from the proposed construction and operation of a new road that would bypass Pitt Town town and provide a direct link between Pitt Town Road in the west and Cattai Road in the east. A Biodiversity Assessment Report (BAR) was prepared to inform the REF which included comprehensive field survey of the proposal location. The REF was determined by Transport in February 2019. A consistency assessment was prepared in November 2019 following further design progress, which was endorsed later the same year.

In 2024, Sustain Joint Venture (SJV) were engaged by Transport as part of the ESC program to prepare an Addendum REF (AREF), to assess the minor extension of the Study Area and some minor modifications to the initial project design. SJV ecologists were engaged to prepare a Flora and Fauna Assessment (FFA) for the AREF to assess additional impacts to biodiversity in proposed additional areas. Additionally, Transport requested that biodiversity values within the approved project boundary be reviewed to confirm if impacts are similar to those previously described and assessed in the BAR (Arcadis 2018a).

Recent surveys confirmed the presence of most biodiversity values within the approved project boundary described and assessed in the BAR (Arcadis 2018a). Two additional threatened species were opportunistically identified during field survey, including Cumberland Plain Land Snail and Dural Land Snail. A list of biodiversity values within the approved project boundary and proposed additional areas include:

- Native vegetation comprising three Plant Community Types (PCTs):
  - PCT 3320 Cumberland Shale Plains Woodland
  - PCT 3448 Castlereagh Ironbark Forest
  - PCT3962 Coastal Floodplain Phragmites Reedland
- Three Threatened Ecological Communities (TECs) listed under the BC Act and one under the EPBC Act
  - Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act)
  - Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act)
  - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions (BC Act)
  - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)
- Occupied habitat of two threatened flora species and two threatened fauna species including *Acacia pubescens* (Downy Wattle), *Dillwynia tenuifolia*, Cumberland Plain Land Snail and Dural Land Snail.
- Potential habitat for an additional two threatened flora species and eleven threatened fauna species.
- A total of 19 hollow-bearing trees

A review of impacts to these values within the approved project boundary and additional areas identified minor increases in impacts to native vegetation, threatened ecological communities, threatened species and their habitats to that which was described and assessed in the BAR (Arcadis 2018a) and CA (Arcadis 2019). Changes in impacts is summarised in Table 8-1 - Table 8-4; with the total impacts from the proposal included in the column furthest the right.

Table 8-1. Summary of additional impacts to Plant Community Types and cumulative impacts from the proposal

Plant Community Type	Additional impact areas (ha)	Total impact from the proposal (ha)
PCT 3448: Castlereagh Ironbark Forest	0.04	0.47

Plant Community Type	Additional impact areas (ha)	Total impact from the proposal (ha)
PCT 3320: Cumberland Shale Plains Woodland	0.37	1.80
PCT 3962: Coastal Floodplain Phragmites Reedland	0.10	0.78
Sub-total	**0.51**	**3.05**

Table 8-2. Summary of additional impacts to Threatened Ecological Communities and cumulative impacts from the proposal

Threatened Ecological Community as listed under BC Act	Additional impact areas (ha)	Total impact from the proposal (ha)
Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered)	0.27	1.7
Shale Gravel Transition Forest in the Sydney Basin Bioregion (endangered)	0.04	0.47
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (endangered)	0.10	0.78
Sub-total	**0.41**	**2.95**

Table 8-3. Summary of additional impacts to threatened species and cumulative impacts from the proposal

Threatened species	Additional impact areas (ha)	Total impact from the proposal (ha)
Acacia pubescens	0.47 ha potential habitat	2.27
Dillwynia tenuifolia	0.47 ha potential habitat	2.27
Micromyrtus minutiflora	1.88 ha potential habitat	2.27
Pimelea spicata	0.39 ha potential habitat	1.8

Table 8-4. Summary of additional impacts to threatened fauna species and cumulative impacts from the proposal

Threatened species	Additional impact areas (ha)	Total impact from the proposal (ha)
Grey-headed Flying Fox	Loss of 0.49 ha of habitat	2.27
Cumberland Plain Land Snail	Loss of 1.18 ha of occupied habitat Loss of 1.09 ha of potential foraging and breeding habitat in PCTs 3320, 3448.	2.27
Dural Land Snail	Loss of 0.90 ha of occupied habitat Loss of 1.37 ha of potential foraging and breeding habitat in PCTs 3320, 3448.	2.27
Hollow dependent Microbats: Eastern Freetail-bat Eastern False Pipistrelle Southern Myotis Greater Broad-nosed Bat	Loss of 1.25 ha foraging habitat in native vegetation (all PCTs 19 hollow-bearing trees	3.05

Threatened species	Additional impact areas (ha)	Total impact from the proposal (ha)
Cave dependent Microbats: Little Bent-winged Bat Large Bent-winged Bat	Loss of 1.25 ha of foraging habitat in native vegetation (all PCTs)	3.05
Woodland Birds: Dusky Woodswallow Gang-gang Cockatoo Little Lorikeet	Loss of 2.27 ha of foraging habitat in PCT 3320 and 3448. Removal of 19 hollow-bearing trees which constitute potential breeding habitat for these species.	2.27
Raptors: Spotted Harrier Square-tailed Kite Powerful Owl	Loss of 3.05 ha of hunting habitat in PCT 3320, 3448 and 3962.	3.05

Tests of Significance and Significant Impact Criteria assessments were updated for threatened ecological communities and threatened species and their habitat using the revised total impacts to determine the likelihood of a significant impact. It was determined that impacts from the project was unlikely to significantly impact any entities listed as threatened under the BC Act and EPBC Act.

The additional areas of impact identified were considered against Transports Guidelines for Biodiversity Offsets (RMS 2016). As the proposal is an addendum to the original approval, these offsetting guidelines are still applicable and have been used to determine the required offsets for the project impacts. It is understood that project impacts and offsetting liabilities calculated in the project REF (Arcadis 2018) were not delivered following project approval. As such, offsetting requirements for the cumulative project impacts were considered.

It was determined that one threatened ecological community and one threatened species triggered offsetting as per the guideline. These entities have been included in Table 8-5 and Table 8-6 respectively, with the preliminary biodiversity credit offset calculations included.

Table 8-5. Preliminary credit calculations for impacts to threatened ecological communities

Plant community type	BC Act	HBT	Impact (ha)	Ecosystem credits
PCT 3320: Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion (critically endangered)	Yes	1.70	62

Table 8-6. Preliminary credit calculations for impacts to threatened species

Species name	EPBC Act	BC Act	Impact (ha)	Species credits
Meridolum corneovirens (Cumberland Plain Land Snail)	Not listed	Endangered	0.36 – PCT 3448	10

Residual impacts to biodiversity values will be mitigated using Guides 1-6, 8-10 (Transport, 2024) as well as the CFFMP and Standard Precautions and Mitigation Measures of the Policy and Guidelines for Fish Habitat Conservation and Management (DPI (Fisheries NSW), 2013).

In the approved project boundary, detailed searches will be conducted in all areas of suitable habitat for Cumberland Plain Land Snail and Dural Land Snail. Any live animals will be captured and relocated to areas of suitable habitat outside of the construction footprint. A description of the process for undertaking these surveys will be detailed in the CFFMP with suitable relocation sites identified.

9 REFERENCES

Arcadis (2018) Pitt Town Bypass Review of Environmental Factors, Roads and Maritime Services Volume 1 of 3 - Main report and Appendix A to Appendix C

Arcadis (2018a) Pitt Town Bypass Biodiversity Assessment, Roads and Maritime Services

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Threatened Species Scientific Committee (TSSC) (2009) Commonwealth Listing Advice on Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest

Department of Environment and Conservation (DEC) (2003) Threatened Biodiversity Survey and *Assessment*: Guidelines for Developments and Activities (Working Draft)

Sustain Joint Venture (Sustain JV) (2024) Pitt Town Bypass – Detailed Design: Surface and Groundwater Assessment working paper

APPENDIX A– FAUNA SPECIES RECORDED

Fauna Group	Scientific Name	Common Name	Identification Type	BC Act	EPBC Act
Amphibian	*Crinia signifera*	Common eastern froglet	Aural	-	-
Ave	*Acridotheres tristis*	Common myna	Visual		
Ave	*Anas superciliosa*	Pacific black duck	Visual		
Ave	*Ardea alba*	Greater egret	Visual		
Ave	*Columba livia*	Rock dove	Visual		
Ave	*Coracina novaehollandiae*	Back-faced cuckoo shrike	Visual		
Ave	*Corvus coronoides*	Australian Raven	Visual		
Ave	*Cracticus torquatus*	Grey butcherbird	Visual		
Ave	*Dacelo novaeguineae*	Laughing Kookaburra	Visual		
Ave	*Egretta novaehollandiae*	White-faced heron	Visual		
Ave	*Elanus caeruleus*	Black shouldered kite	Visual		
Ave	*Eolophus roseicapilla*	Galahas	Visual		
Ave	*Falco berigora*	Brown falcon	Visual		
Ave	*Grallina cyanoleuca*	Magpie lark	Visual		
Ave	*Manorina melanocephala*	Noisy miner	Visual		
Ave	*Manorina melanophrys*	Bell miner	Visual		
Ave	*Myiagra inquieta*	Restless flycatcher	Visual		
Ave	*Ocyphaps lophotes*	Crested pigeon	Visual		
Ave	*Pelecanus conspicillatus*	Australian Pelican	Visual		
Ave	*Phalacrocorax varius*	Australian Pied Cormorant	Visual		
Ave	*Platalea regia*	Royal Spoonbill	Visual		
Ave	*Platycercus eximius*	Eastern rosella	Visual		
Ave	*Porphyrio melanotus*	Australasian Swamphen	Visual		
Ave	*Psephotus haematonotus*	Red Rumped parrot	Visual		
Ave	*Ptilotula penicillata,*	White-plumed honey eater	Visual		
Ave	*Rhipidura albiscapa*	Grey fantail	Visual		
Ave	*Rhipidura leucophrys,*	Willie wagtail	Visual		
Ave	*Streptopelia turtur*	European turtle Dove	Visual		
Ave	*Threskiornis molucca*	Australian white Ibis	Visual		
Ave	*Threskiornis spinicollis*	Straw-necked ibis	Visual		
Ave	*Trichoglossus moluccanus*	Rainbow Lorikeet	Visual		
Ave	*Vanellus miles*	Masked lapwing	Visual		
Ave	*Zosterops lateralis*	Silver eye	Visual		
Gastropod	*Meridolum corneovirens*	Cumberland plain land snail	Dead specimen	E	-
Gastropod	*Pommerhelix duralensis*	Dural land snail	Live	E	E
Reptile	*Ctenotus taeniolatus*	Copper tailed skink	Live		
Reptile	*Chelodina longicollis*	Eastern long necked turtle	Dead specimen		

APPENDIX B - FLORA PLOT DATA

Family	Scientific name	Common name	Status		Cover (%) in each plot*				
			BC Act	EPBC Act	1	2	3	4	5
Polygonaceae	*Acetosa sagittata*	Rambling Dock							
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed			0.1		0.2	0.1	
Amaranthaceae	*Alternanthera pungens*	Khaki Weed			0.1		0.1		
Primulaceae	*Anagallis arvensis*	Scarlet Pimpernel							0.1
Apocynaceae	*Araujia sericiflora*	Moth Vine						0.1	
Poaceae	*Aristida spp.*				2		5	2	
Asparagaceae	*Asparagus asparagoides*	Bridal Creeper			0.1	1	0.1	0.2	
Asteraceae	*Bidens pilosa*	Cobbler's Pegs				0.1			0.1
Poaceae	*Bothriochloa macra*	Red Grass			0.1				
Brassicaceae	*Brassica fruticulosa*	Twiggy Turnip						0.2	
Poaceae	*Bromus catharticus*	Praire Grass							0.1
Goodeniaceae	*Brunonia australis*	Blue Pincushion					0.1		
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn			0.1		1	0.5	
Cyperaceae	*Carex spp.*							0.1	
Apiaceae	*Centella asiatica*	Indian Pennywort			0.1		0.1		0.1
Pteridaceae	*Cheilanthes sieberi*	Rock Fern					0.1		
Poaceae	*Chloris truncata*	Windmill Grass			0.1			0.1	
Asteraceae	*Cirsium vulgare*	Spear Thistle					0.1		
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane				0.2			
Poaceae	*Cynodon dactylon*	Common Couch			5		0.1	20	

Family	Scientific name	Common name	Status		Cover (%) in each plot*				
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge						0.1	15
Cyperaceae	*Cyperus spp.*				0.2		0.1		
Convolvulaceae	*Dichondra repens*	Kidney Weed			0.2		0.1	0.5	
Poaceae	*Ehrharta erecta*	Panic Veldtgrass						0.2	
Chenopodiaceae	*Einadia hastata*	Berry Saltbush				0.1			0.1
Poaceae	*Eragrostis brownii*	Brown's Lovegrass			2				
Poaceae	*Eragrostis curvula*	African Lovegrass			0.1		10	20	
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass					1		
Fabaceae (Faboideae)	*Erythrina crista-galli*	Cockspur Coral Tree				2			
Myrtaceae	*Eucalyptus fibrosa*	Red Ironbark						20	
Myrtaceae	*Eucalyptus moluccana*	Grey Box			30	0.1	40	10	
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge							0.1
Fumariaceae	*Fumaria spp.*	Fumitory						0.1	
Rubiaceae	*Galium aparine*	Goosegrass							0.1
Rubiaceae	*Galium propinquum*	Maori Bedstraw					0.1		
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine					0.1		0.1
Fabaceae (Faboideae)	*Glycine spp.*				0.1		0.1	0.1	
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush							0.1
Goodeniaceae	*Goodenia hederacea*	Ivy Goodenia			0.1				
Asteraceae	*Hypochoeris radicata*	Catsear			0.2		0.1		
Convolvulaceae	*Ipomoea spp.*							0.1	
Juncaceae	*Juncus spp.*							0.1	
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet							0.1

Family	Scientific name	Common name	Status		Cover (%) in each plot*				
Oleaceae	*Ligustrum sinense*	Small-leaved Privet				0.5			
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle				40			30
Lamiaceae	*Lycopus australis*	Australian Gipsywort							0.1
Myrtaceae	*Melaleuca decora*						1	0.2	
Poaceae	*Microlaena stipoides*	Weeping Grass			35		2	2	
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow						0.2	0.2
Haloragaceae	*Myriophyllum spp.*								1
Cactaceae	*Opuntia stricta*	Common Prickly Pear						0.1	
Oxalidaceae	*Oxalis perennans*				0.1		0.1	0.1	
Poaceae	*Paspalidium distans*				10		0.5	1	
Poaceae	*Paspalum dilatatum*	Paspalum			2		0.2	0.2	
Poaceae	*Pennisetum clandestinum*	Kikuyu Grass							1
Polygonaceae	*Persicaria decipiens*	Slender Knotweed							20
Poaceae	*Phragmites australis*	Common Reed				75			15
Phyllanthaceae	*Phyllanthus spp.*				0.1		0.1		
Phytolaccaceae	*Phytolacca octandra*	Inkweed						0.1	
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues			0.2		0.1	0.1	0.2
Fabaceae (Faboideae)	*Robinia spp.*								0.1
Rosaceae	*Rubus fruticosus*	Blackberry complex				0.2			20
Polygonaceae	*Rumex brownii*	Swamp Dock						0.1	
Polygonaceae	*Rumex crispus*	Curled Dock				0.5			0.5
Salicaceae	*Salix spp.*								0.1
Asteraceae	*Senecio madagascariensis*	Fireweed				0.1	0.1		

Family	Scientific name	Common name	Status	Cover (%) in each plot*				
Asteraceae	*Senecio spp.*	Groundsel, Fireweed				0.1		
Poaceae	*Setaria parviflora*			0.1		0.1	0.1	
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne		0.1		0.1	0.1	0.2
Solanaceae	*Solanum americanum*	Glossy Nightshade						0.2
Solanaceae	*Solanum seaforthianum*	Climbing Nightshade					0.1	
Solanaceae	*Solanum spp.*			0.1			0.1	0.1
Asteraceae	*Soliva sessilis*	Bindyi		0.1				
Asteraceae	*Sonchus oleraceus*	Common Sowthistle		0.1			0.1	0.1
Poaceae	*Sorghum halepense*	Johnson Grass						1
Poaceae	*Sporobolus africanus*	Parramatta Grass					0.5	
Asteraceae	*Tagetes minuta*	Stinking Roger						0.2
Asteraceae	*Taraxacum officinale*	Dandelion					0.1	
Fabaceae (Faboideae)	*Trifolium arvense*	Haresfoot Clover					0.1	
Fabaceae (Faboideae)	*Trifolium repens*	White Clover						0.2
Fabaceae (Faboideae)	*Trifolium spp.*					1		
Verbenaceae	*Verbena bonariensis*	Purpletop			0.2		0.1	0.1
Verbenaceae	*Verbena rigida*	Veined Verbena				0.1		
Fabaceae (Faboideae)	*Vicia sativa*	Common vetch						0.2

APPENDIX C- FLORA LIKELIHOOD OF OCCURRENCE

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Acacia bynoeana Bynoe's Wattle, Tiny Wattle	BCT Act: E EPBC Act: V	Bynoe's wattle is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. The species is currently known from about 30 locations, with the size of the populations at most locations being very small (1-5 plants) It has recently been found in the Colymea and Parma Creek areas west of Nowra.	Habitat present in mapped PCTs:3448 Occurs in heath or dry sclerophyll forest on sandy soils.;1|Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.;2|Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	PMST	Moderate	Habitat present in PCT 3448. However, there are no records within the Locality.	Low
Acacia gordonii	BCT Act: E EPBC Act: E	Restricted to the north-west of Sydney, it has a disjunct distribution occurring in the lower Blue Mountains in the west, and in the Maroota/Glenorie area in the east. This species is known from only a few locations and current information suggests the total number of individuals may be less than 2000, with only one population supporting greater than 400 individuals. A relatively large proportion of individuals (approximately 850) occur on conservation reserve within Blue Mountains National Park. This species is found within the Hawkesbury, Blue Mountains and Baulkham Hills local government areas.	Grows in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops.;1|Flowers August to September and produces fruit October to February. The fruit is a pod containing hard-coated seed. The seed ultimately forms a persistent soil stored seedbank.;2|Is identified in Benson and McDougall (1996) as a resprouter, however it is likely that the species' ability to resprout following fire varies as anecdotal observations suggest (at least in one instance) few adults resprouted following a fire (Ross Doig pers. comm. 2002). Such variation in fire response is not unusual forAcacia.;3|Fire promotes germination of the soil stored seedbank and seed germination will not occur in the absence of fire as the hard-coated seed requires heat to break seed dormancy, as is typical of species within Fabaceae.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Acacia pubescens Downy Wattle	BCT Act: V EPBC Act: V	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon.	Habitat present in mapped PCTs:3320, 3448 Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone.;1|Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.;2|Longevity is unknown, but clonal species have been known to survive for many decades.;3|Flowers from August to October. Pollination of Acacia flowers is usually by insects and birds. The pods mature in October to December.	47, PMST 13/07/2023	High	Habitat ground-truthed in PCTs:3320 and 3448.	Known
Allocasuarina glareicola	BCT Act: E EPBC Act: E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	Habitat present in mapped PCTs:3448 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 andXanthorrhoea minor.*;1|Not killed outright by fire but resprouts from the rootstock.;2|Spreads by vegetative means, such that clumps of up to 100s of stems may be a single individual.	PMST	Moderate	Habitat present in ground-truthed PCT 3448. However, there are no records within the Locality and this species was not identified on site.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Cynanchum elegans White-flowered Wax Plant	BCT Act: E EPBC Act: E	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley.	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree *Leptospermum laevigatum* – Coastal Banksia *Banksia integrifolia subsp.integrifolia* coastal scrub; Forest Red Gum *Eucalyptus tereticornis* aligned open forest and woodland; Spotted Gum *Corymbia maculata* aligned open forest and woodland; and Bracelet Honeymyrtle *Melaleuca armillaris* scrub to open scrub.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Dillwynia tenuifolia	BCT Act: V	The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities outside the Cumberland Plain include the Bulga Mountains at Yengo in the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains.	Habitat present in mapped PCTs:3320, 3448 In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone.;1| I *Eucalyptus fibrosais* usually the dominant canopy species. *Eucalyptus globoidea E. longifolia E. parramattensis E. sclerophyllaand E. sideroxylonmay* also be present or codominant, with *Melaleuca decora* frequently forming a secondary canopy layer.	100 21/07/2023	High	Habitat ground-truthed in PCTs:3320 and 3448. 100 records within the Locality as recent as 2023.	High
Eucalyptus cryptica	BC Act: CE EPBC Act: CE	Eucalyptus sp. Cattai is only known from north-western Sydney between Castle Hill and Cattai.	Eucalyptus sp. Cattai grows as isolated trees or small groups of trees in scrub, heath and low woodland, on sandstone-derived soils.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Kunzea rupestris	BCT Act: V EPBC Act: V	Restricted, with most locations in the Maroota - Sackville - Glenorie area and one outlier in Ku-ring-gai Chase National Park, all within the Central Coast botanical subdivision of NSW. Currently known to exist in 20 populations, 6 of which are reserved.	Grows in shallow depressions on large flat sandstone rock outcrops.;1|Characteristically found in short to tall shrubland or heathland.;2|Flowering occurs in spring. It has indehiscent fruits which resist soil entrapment and so may disperse many metres per week.;3|Resprouts from the base after fire or mechanical damage. Seedlings have also been observed after fire.	PMST	Low	None	Low
Lasiopetalum joyceae	BCT Act: V EPBC Act: V	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved.	Grows in heath on sandstone.	PMST	Low	None	Low
Macadamia integrifolia Macadamia Nut	EPBC: V	Not known to occur naturally in the wild in NSW.		1 30/06/2015	Low	None	Low
Micromyrtus blakelyi	BCT Act: V EPBC Act: V	Restricted to areas near the Hawkesbury River, north of Sydney. Distribution extends from north of Maroota in the north, to Cowan in the south. All known populations occur within the Baulkham Hills and Hornsby local government areas.	Habitat present in mapped PCTs:3448 Typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms.;1|Flowers in Spring from September to November and produces fruit (an indehiscent nut) October to November.;2|Fire sensitive, with adults killed by fire and recruitment occurring from a soil seed bank.t is not known whether germination occurs in the absence of disturbance.;3|	PMST	Moderate	PCT 3448 ground truthed. 4025 does not occur on site. No records in the Locality.	Low
Micromyrtus minutiflora	BC Act: V EPBC Act: E	Restricted to the general area between Richmond and Penrith.	Habitat present in mapped PCTs 3320, 3448. Growing in Castlereagh Scribby Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest,	-	Moderate	PCT 3320 and 3448 ground truthed.	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
			open forest on tertiary alluvium and consolidated river sediments.				
Olearia cordata	BCT Act: V EPBC Act: V	A NSW endemic with a scattered distribution generally restricted to the south-western Hunter Plateau, eastern Colo Plateau, and the far north-west of the Hornsby Plateau near Wisemans Ferry east of Maroota. Most known populations occur within conservation reserves (Wollemi National Park, Yengo National Park and Wisemans Ferry Historic Site).	Populations are typically small and scattered.;1|Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges.;2|Flowers November to May, with seed released from February to May, depending on environmental factors. Seed is wind dispersed and may adhere to the fur of browsers such as wallabies.;3|Adults are capable of resprouting following fire. Abundant seedlings have been observed following fire, but seeds are also capable of germinating in the absence of fire as there is no seed dormancy with this species and germination should occur with any significant rains soon after seed release.	PMST	Low	None	Low
Persicaria elatior Knotweed, Tall Knotweed	BCT Act: V EPBC Act: V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland.	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Persoonia hirsuta Hairy Geebung, Hairy Persoonia	BCT Act: E EPBC Act: E	Persoonia hirsuta has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Hilltop in the south west, Dombarton in the south east and the Blue Mountains to the west.Persoonia hirsuta has a large area of occurrence, but occurs in small populations or isolated individuals, increasing the species' fragmentation in the landscape.	Habitat present in mapped PCTs:4025. The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone.;1|It is usually present as isolated individuals or very small populations.;2|Plants are generally killed by all but the lowest intensity fire or partial burning. Fire may promote germination of soil-stored seed, although it may also kill some of the seedbank if it is of high severity. ;3|Extreme wet-dry weather cycles may also promote germination of soil-stored seed.;4|	PMST	Moderate	PCT 4025 ground-truthed to not be present on site. None.	Low
Persoonia nutans Nodding Geebung	BCT Act: E EPBC Act: E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. The species has a disjunct distribution, with the majority of populations (and 99% of individuals) occurring in the north of the species range in the Agnes Banks, Londonderry, Castlereagh, Berkshire Park and Windsor Downs areas. Core distribution occurs within the Penrith, and to a lesser extent Hawkesbury, local government areas, with isolated and relatively small populations also occurring in the Liverpool, Campbelltown, Bankstown and Blacktown local government areas. The southern and northern populations have distinct habitat differences.	Habitat present in mapped PCTs:3320, 3448 Northern populations are confined to aeolian and alluvial sediments and occur 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 and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest.;1|Peak flowering is from November to March with sporadic flowering all year round.;2|An obligate seed regenerator. Seed germination is promoted by fire and also by physical disturbance. Although listed as a short-lived species much of the ecology is poorly known. Maturity is expected in about 10 years.	PMST	Moderate	Habitat ground-truthed in PCTs:3320 and 3448. However, there are no records within the Locality.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Pimelea curviflora var. curviflora	BCT Act: V EPBC Act: V	Confined to the coastal area of the Sydney and Illawarra regions. Populations are known between northern Sydney and Maroota in the north-west. New population discovered at Croom Reserve near Albion Park in Shellharbour LGA in August 2011. Formerly recorded around the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly.	Habitat present in mapped PCTs:3320, 3448 Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowalnd Grassy Woodland habitat at Albion Park on the Illawaraa coastal plain.;1|Flowers October to May.;2|Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots.	PMST	Moderate	Habitat ground-truthed in PCTs:3320 and 3448. However, there are no records within the Locality	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Pimelea spicata Spiked Rice-flower	BCT Act: E EPBC Act: E	Once widespread on the Cumberland Plain, the Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama).	Habitat present in mapped PCTs:3320, 4025 In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils.;1|On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark.;2|The co-occurring species in the Cumberland Plain sites are grey box (*Eucalyptus moluccana*), forest red gum *(E. tereticornis)* and narrow-leaved ironbark (*E. crebra*). Blackthorn (*Bursaria spinosa*) is often present at sites (and may be important in protection from grazing) and kangaroo grass *(Themeda australis*) is usually present in the groundcover (also indicative of a less intense grazing history).	PMST	Moderate	Habitat ground-truthed in PCT 3320. PCT 4025 not present.	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris	BCT Act: E EPBC Act: V	Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria.	Habitat present in mapped PCTs:3320, 3448, 4025 Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.;1|Flowers appear in September and October.;2|The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years.;3|*The species has been found in association with Eucalyptus amplifolia,Angophora floribunda,Acacia parramattensis,Bursaria spinosa andKunzea ambigua.*	PMST	Moderate	Habitat ground-truthed in PCTs:3320 and 3448. PCT 4025 not present on site. There are no records in the Locality.	Low
Pterostylis saxicola Sydney Plains Greenhood	BCT Act: E EPBC Act: E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Two populations occur within a conservation reserve (Georges River National Park; Scheyville NP).	Habitat present in mapped PCTs:3320, 3448 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 *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. ;1|All species of *Pterostylis* are deciduous and die back to fleshy, rounded underground tuberoids.	1, PMST 10/09/2013	Moderate	Habitat ground-truthed in PCTs:3320 and 3448. However, the habitat is unsuitable as they reside on soil depressions within sandstone rock, which is absent from our site.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
Pultenaea parviflora	BCT Act: E EPBC Act: V	Endemic to the Cumberland Plain. Core distribution is from Windsor to Penrith and east to Dean Park. Outlier populations are recorded from Kemps Creek and Wilberforce.	Habitat present in mapped PCTs:3320, 3448 May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays.;1|May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.;2| I Eucalyptus fibrosais usually the dominant canopy species. Eucalyptus globoidea E. longifolia E. parramattensis ,I E. sclerophyllaandI E. sideroxylonmay also be present or co-dominant, with Melaleuca decorafrequently forming a secondary canopy layer.;	85, PMST 06/01/2005	Moderate	Habitat ground-truthed in PCTs:3320 & 3448. However, not detected during site survey.	Low
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood	BCT Act: CE EPBC Act: 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 span style="font-style: italic;" R. rubescens /span typically occur in coastal regions and occasionally extend	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.;1|This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.;2|	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
		inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm.					
Thesium australe Austral Toadflax, Toadflax	BCT Act: V EPBC Act: V	Austral Toad-flax is found 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. Although originally described from material collected in the SW Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region.	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast.;1|Often found in association with Kangaroo Grass (Themeda australis).;2|A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.;3|	PMST	Low	None	Low
Zieria involucrata	BCT Act: E EPBC Act: V	Has a disjunct distribution north and west of Sydney, in the Baulkham Hills, Hawkesbury, Hornsby and Blue Mountains local government areas. Recent records for the species come from 22 populations in the catchments of the Macdonald, Colo and Hawkesbury Rivers between Melon Creek and Mogo Creek in the north to Little Cattai Creek (Hillside) and Wheeny Creek (Colo) in the south and from a single population in the upper Blue Mountains north of Katoomba. In addition, historical records exist for at least two other	Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium.;1|Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation. Also known from at least two atypical ridgetop locations. The canopy typically includes *Syncarpia glomulifera subsp.glomulifera* (Turpentine),*Angophora costata* (Smooth-barked Apple),*Eucalyptus agglomerata* (Blue-leaved Stringybark) and *Allocasuarina torulosa* (Forest Oak). ;2|Ecological knowledge about this species is limited.;3|Flowering usually takes place in spring. Plants usually first flower and set seed 3 – 5 years	PMST	Low	PCT 3692 ground-truthed to occur which provides potential habitat. However, there are no records within the Locality.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed on proposal site	LoO (After site visit)
		localities in the eastern Blue Mountains: south of Springwood Valley Heights and north-west of Kurrajong.	after germination, but maximum seed production probably does not occur until 6 – 10 years of age.;				

APPENDIX D- FAUNA LIKELIHOOD OF OCCURENCE

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Anthochaera phrygia Regent Honeyeater	BCT Act: CE EPBC Act: CE	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. Once recorded between Adelaide and the central coast of Queensland, its range 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.	Habitat present in mapped PCTs:3320, 3448, 4025 The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.;1|Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast.Birds are occasionally seen on the south coast.;2| In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago.;3|	PMST	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site. Under the BAM this species has important area habitat mapping. The site is not mapped as containing important habitat for this species and therefore impacts to vegetation in this location is considered unlikely to impact the species.	Low
Ardenna grisea Sooty Shearwater	EPBC Act: V	Globally, the sooty shearwater is found in the southern hemisphere during summer, where the species breeds around New Zealand, southern Australia and southern South America. During non-breeding seasons, most birds move to the North Pacific Ocean, some to the North Atlantic Ocean, or remain in the southern hemisphere.	In Australian territory, the sooty shearwater breeds on offshore islands off New South Wales and Tasmania. Birds may occupy a wide range of oceanic habitat types. Therefore, all known breeding islands should be considered as habitat critical to the survival of the sooty shearwater.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Artamus cyanopterus cyanopterus Dusky Woodswallow	BCT Act: 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.	Habitat present in mapped PCTs:3320, 3448, 4025. 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. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.;1|Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Also occasionally take nectar, fruit and seed.	4 09/01/2005	Moderate	PCT 3320, 3448 and 3962 ground truthed. 4025 does not occur on site.	Moderate
Botaurus poiciloptilus Australasian Bittern	BCT Act: E EPBC Act: E	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west.	Habitat present in mapped PCTs:4025 Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.).;1|Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.;2|Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.;3|Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch.	PMST	Moderate	PCT 4025 does not occur. None.	Low
Calidris acuminata Sharp-tailed Sandpiper	EPBC Act: V	Sharp-tailed sandpipers occur within all states of Australia. They are found mostly in the south-east and are widespread in both inland and coastal locations. The species also occurs in both freshwater and saline habitats	Forages and roosts on rocky and sandy beaches, freshwater habitats, and inland saltwater habitats	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Calidris ferruginea Curlew Sandpiper	BCT Act: E EPBC Act: CE	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. br / The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April.	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.;1|It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.;2|It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.;3|It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.;4|Curlew Sandpipers are omnivorous, feeding on worms, molluscs, crustaceans, insects and some seeds.;5|Birds breed at 2 years of age and the oldest recorded bird is 19 years old. Most birds caught in Australia are between 3 and 5 years old.;6|	PMST	Low	None	Low
Callocephalon fimbriatum Gang-gang Cockatoo	BCT Act: V EPBC Act: E	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee.	Habitat present in mapped PCTs:3320, 3448, 4025 In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. ;1|In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas.;2|May also occur in sub-alpine Snow Gum (Eucalyptus pauciflora) woodland and occasionally in temperate rainforests.;3|Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger in eucalypts.;4|	1, PMST 08/04/2016	Moderate	PCT 3962, 3320 and 3448 ground truthed. 4025 does not occur on site	Moderate
Calyptorhynchus lathami lathami South-eastern	BCT Act: V	South-eastern glossy black cockatoos are uncommon but widespread. They can be found	South-eastern glossy black cockatoos rely on nine species of sheoaks (Allocasuarina spp. and Casuarina	2, PMST 09/03/2006	Low	PCT 3692 ground-truthed to occur which provides	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Glossy Black-Cockatoo	EPBC Act: V	from Mitchell, Queensland, through eastern New South Wales to East Gippsland, Victoria	spp.) for feeding. The majority of the nesting hollows are in narrow-leaved ironbark (*Eucalyptus crebra)*.			potential habitat. However, there are no feed trees on site.	
Chalinolobus dwyeri Large-eared Pied Bat	BCT Act: V EPBC Act: V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.	Habitat present in mapped PCTs:3320, 3448, 4025. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.;1|Found in well-timbered areas containing gullies.;2|The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy.;	4, PMST 12/01/2006	Moderate	PCT 3962, 3320 and 3448 ground truthed. 4025 does not occur on site. Although potential foraging habitat occurs in these PCTs there is no suitable roosting habitat nearby which would make the site unlikely to be used by this species due to their limited dispersal distance.	Low
Chthonicola sagittata Speckled Warbler	BCT Act: V	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive.	Habitat present in mapped PCTs:3320, 3448, 4025 The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies.;1|Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.;2|Large, relatively undisturbed remnants are required for the species to persist in an area.;3|The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.;4|Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding.;5|The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other	5 09/01/2005	Moderate	PCT 3962, 3320 and 3448 ground truthed. 4025 does not occur on site. Most recent record is almost 20 years old and habitat on site considered suboptimal, with a lack of native tussock grasses.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
			litter. A side entrance allows the bird to walk directly inside.;				
Circus assimilis Spotted Harrier	BCT Act: V	The Spotted Harrier occurs throughout the Australian mainland, except in densly forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population.	Habitat present in mapped PCTs:3320, 3448, 4025 Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.;1|Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.;2|Preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	3 17/02/2019	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site.	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Climacteris picumnus victoriae Brown Treecreeper (south-eastern)	BCT Act: V	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. p The western boundary of the range of Climacteris picumnus victoriae runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell and along this line the subspecies intergrades with the arid zone subspecies of Brown Treecreeper Climacteris picumnus picumnus which then occupies the remaining parts of the state.	Habitat present in mapped PCTs:3320, 3448, 4025. 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 (Eucalyptus camaldulensis) 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.;1|Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding.;	PMST	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. Although there is suitable habitat there are no records for the Locality.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Daphoenositta chrysoptera Varied Sittella	BCT Act: V	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades.	Habitat present in mapped PCTs:3320, 3448, 4025 Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.;1|Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.;2|Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years	6 19/12/2005	Moderate	PCT 3692, 3320 and 3448 ground truthed, although PCT 4025 does not occur on site. However, there have been no records of this species is 18 years.	Low
Dasyurus maculatus Spotted-tailed Quoll	BCT Act: V EPBC Act: E	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and& ;north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common.	Habitat present in mapped PCTs:3320, 3448, 4025 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.;1|Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites.;2|Mostly nocturnal, although will hunt during the day; spend most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds.;3|Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals.	1, PMST 30/08/2004	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. Although there is habitat present in the PCTs the site is heavily urbanised and the most recent record is 20 years old.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Diomedea antipodensis Antipodean Albatross	BCT Act: V EPBC Act: V	The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia.	The majority of birds breed on Antipodes Island, with a small number of pairs breeding on Campbell Island.;1|The Antipodean Albatross breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks.;2|Egg laying begins in January (Antipodes Island) and February (Campbell Island), and chicks usually fledge the following year in January and March.;3|The annual breeding population is relatively small and has been estimated at 5,154 pairs.;4|This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish.;5|Although representing a small proportion on its total foraging area, potential forage in NSW waters is nonetheless considered significant for the species.;6|Forage for the Antipodean Albatross is extremely patchy, both spatially and temporally, and individuals traverse great distances in search of food.;7|This species feeds pelagically on squid, fish and crustaceans.;8|	PMST	Low	None	Low
Diomedea exulans Wandering Albatross	BCT Act: E EPBC Act: E	The Wandering Albatross visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast. At other times birds roam the southern oceans and commonly follow fishing vessels for several days.	Wandering albatross spend the majority of their time in flight, soaring over the southern oceans.;1|They breed on a number of islands just north of the Antarctic Circle: South Georgia Island (belonging to the UK), Prince Edward and Marion Islands (South Africa), Crozet and Kerguelen Islands (French Southern Territories) and Macquarie Island (Australia).;2|Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation.;3|Wandering albatross pairs mate for life; these long-lived birds do not reach sexual maturity until 9-11 years of age.;4|Wandering Albatross breed biennially in small, loose colonies among grass tussocks, using a large mud nest.;	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Falco hypoleucos Grey Falcon	BCT Act: E	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 breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW.	Habitat present in mapped PCTs:4025 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.;1|Also occurs near wetlands where surface water attracts prey.;2|Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken.;3|Like other falcons it utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring; two or three eggs are laid.;4|	PMST	Moderate	None (PCT 4025 not present)	Low
Falco subniger Black Falcon	BCT Act: V	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchantamp; Higgins 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.	Habitat present in mapped PCTs:3320, 3448, 4025	2 16/05/2007	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site. Although the PCTs are suitable the records are likely to be a misidentification of the Brown Falcon.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Falsistrellus tasmaniensis Eastern False Pipistrelle	BCT Act: V	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.	Habitat present in mapped PCTs:3320, 3448, 4025 Prefers moist habitats, with trees taller than 20 m.;1|Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.;2|Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.;3|Hibernates in winter.;4|Females are pregnant in late spring to early summer.;5|	2 23/11/2012	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site.	Moderate
Glossopsitta pusilla Little Lorikeet	BCT Act: V	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.	Habitat present in mapped PCTs:3320, 3448, 4025. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.;1|Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.;2|Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards;3|Gregarious, travelling and feeding in small flocks (10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries.;4|Roosts in treetops, often distant from feeding areas.;5|Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m).	6 09/01/2005	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site.	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Grantiella picta Painted Honeyeater	BCT Act: V EPBC Act: 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.	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests.;1|A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema .;2|Insects and nectar from mistletoe or eucalypts are occasionally eaten.;3|Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.;4|	PMST	Low	PCT 3692 ground-truthed to occur which provides potential habitat. However, there are no records within the Locality.	Low
Haliaeetus leucogaster White-bellied Sea-Eagle	BCT Act: V	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling BasinIn New South Wales it is widespread along the east coast, and along all major inland rivers and waterways.	Habitat present in mapped PCTs:3320, 3448, 4025 Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.;1|Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. ;2|Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). ;3|Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large ergent eucalypts and often have ergent dead branches or large dead trees nearby which are used as 'guard roosts. Nests are large structures built from sticks and lined with leaves or grass.	46 23/01/2006	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. Although this species may be identified overhead, as there are no large waterbodies that would be preferred by this species for foraging and breeding the habitat is unsuitable for this species.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Heleioporus australiacus Giant Burrowing Frog	BCT Act: V EPBC Act: V	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria.	Habitat present in mapped PCTs:3448, 4025 Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.;1|Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size.;2|Individuals move into the breeding site either immediately before or following heavy rain and occupy these sites for up to 10 days. Most individuals will not attempt to breed every year.;3|The Giant Burrowing Frog has a generalist diet and studies to date indicate that they eat mainly invertebrates including ants, beetles, cockroaches, spiders, centipedes and scorpions.	PMST	Moderate	PCT 3692 and 3448 ground truthed. 4025 does not occur on site. However, there are no records for this species within the Locality.	Low
Hieraaetus morphnoides Little Eagle	BCT Act: V	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW.	Habitat present in mapped PCTs:3320, 3448, 4025 Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.;1|Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.;2|Lays two or three eggs during spring, and young fledge in early summer.;3|Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.;4|	1 26/02/2006	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. Despite potentially suitable PCTs there us only one records of this species which is almost 20 years old.	Low.
Hirundapus caudacutus White-throated Needletail	EPBC Act: V	Migratory and usually seen in eastern Australia from October to April. Breeds in forests in south-eastern Siberia, Mongolia, the Korean Penninsula and northern Japan June-August. Most often seen in eastern Australia before storms, low pressure troughs and	Habitat present in mapped PCTs:3320, 3448, 4025	3, PMST 24/01/2006	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. This species is an aerial forager, favouring wind drafts along cliff edges and escarpments, which	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
		approaching cold fronts and occasionally bushfire.				are absent from this site.	
Lathamus discolor Swift Parrot	BCT Act: EEPBC Act: CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Surveys are conducted twice a year and aim to cover the migratory winter range of this species.	Habitat present in mapped PCTs:3320, 3448, 4025. Migrates to the Australian south-east mainland between February and October.;1|On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.;2|Favoured feed trees include winter flowering species such as Swamp Mahogany, Eucalyptus robusta, Spotted Gum *Corymbia maculate Red Bloodwood C. gummifera, Forest Red Gum, E. tereticornis, , Mugga Ironbark, E. sideroxylon, and White Box, E. albens, 3*|Commonly used lerp infested trees include Inland Grey Box *E. macrocarpa, Grey Box E. moluccana, Blackbutt E. pilularis , and Yellow Box E. melliodora* .;4|Return to some foraging sites on a cyclic basis depending on food availability.	11, PMST 01/09/2013	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. Under the BAM this species has important area habitat mapping. The site is not mapped as containing important habitat for this species and therefore impacts to vegetation in this location is considered unlikely to impact the species.	Low
Litoria aurea Green and Golden Bell Frog	BCT Act: E EPBC Act: V	Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated.	Habitat present in mapped PCTs:3320, 3448, 4025 Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.).;1|Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available.;2|Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.;3|The species is active by day and usually breeds in summer when conditions are warm and wet.;4|Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation.;5|Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs.	PMST	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site. There are no records of this species within the Locality.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Lophoictinia isura Square-tailed Kite	BCT Act: V	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March.	Habitat present in mapped PCTs:3320, 3448, 4025 Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.;1|In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.;2|Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.;3|Appears to occupy large hunting ranges of more than 100 square km.;4|Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.;5|	3 05/03/2018	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site.	Moderate
Macronectes halli Northern Giant Petrel	BCT Act: V EPBC Act: V	The Northern Giant-Petrel has a circumpolar pelagic distribution, usually between 40-64ºS in open oceans. Their range extends into subtropical waters (to 28ºS) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn.	Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer.;1|Adults usually remain near the breeding colonies throughout the year (though some do travel widely) while immature birds make long and poorly known circumpolar and trans-oceanic movements. Hence most birds recorded in NSW coastal waters are immature birds.;2|Northern Giant-Petrels seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain.;3|A single chick is raised and although breeding occurs annually, approximately 30% of the potential breeding population do not nest.;4|There are marked differences in diet between the sexes. Females obtain most of their prey live from the sea, while males also scavenge from the carcases of penguins and seals on land.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern)	BCT Act: V	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 *cucullata*) is found from Brisbane to Adelaide and throughout much of inland NSW.	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.;1|Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.;2|Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey.;3|Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season.	PMST	Low	PCT 3692 ground-truthed to occur which provides potential habitat. However, there are no records within the Locality.	Low
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	BCT Act: V	The Black-chinned Honeyeater has two subspecies, with only the nominate (gularis) occurring in NSW. The other subspecies (laetior) was formerly considered a separate species (Golden-backed Honeyeater) and is found in northern Australia between central Queensland west to the Pilbara in Western Australia. The eastern subspecies extends south from central Queensland, through NSW, Victoria into south eastern South Australia, though it is very rare in the last state. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely	Habitat present in mapped PCTs:3320, 3448. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum *(E. blakelyi*) and Forest Red Gum *(E. tereticornis*).;1|Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.;2|A gregarious species usually seen in pairs and small groups of up to 12 birds.;3|Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares.;4|Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage.;5|Breeds solitarily or co-operatively, with up to five or six adults,	1 18/12/2005	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site. Despite the presence of some suitable PCTs feed trees do not occur and there is only 1 area in the Locality from almost 20 years ago.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
		recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter.	from June to December.;6|The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest.;7|Two or three eggs are laid and both parents and occasionally helpers feed the young.;8|				
Meridolum corneovirens Cumberland Plain Land Snail	BCT Act: E	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns.	Habitat present in mapped PCTs:3320, 3448, 4025 Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities.;1|Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.;2|Can dig several centimetres into soil to escape drought.;3|Is a fungus specialist. Unlike the Garden Snail, does not eat green plants. It is generally active at night.;4|Little is known of its biology, including breeding biology. It is known to be hermaphroditic, laying clutches of 20-25 small, round, white eggs in moist, dark areas (such as under logs), with the eggs taking 2-3 weeks to hatch. There is a suggestion that the species breeds throughout the year when conditions are suitable.;5|	18 18/12/2005	High	PCT 3320 and 3448 ground truthed. 4025 does not occur on site	Known
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	BCT Act: V	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW.	Habitat present in mapped PCTs:3320, 3448, 4025 Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.;1|Roost maily in tree hollows but will also roost under bark or in man-made structures.;2|Usually solitary but also recorded roosting communally, probably insectivorous.	33 04/01/2006	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Miniopterus australis Little Bent-winged Bat	BCT Act: V	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.	Habitat present in mapped PCTs:3320, 3448, 4025 Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas.;1|Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.;2|They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.;3|In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (Miniopterus orianae) and appears to depend on the large colony to provide the high temperatures needed to rear its young.;4|Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer.;5|Only five nursery sites /maternity colonies are known in Australia.;6|	3 22/01/2018	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site	Moderate
Miniopterus orianae oceanensis Large Bent-winged Bat	BCT Act: V	Large Bentwing-bats occur along the east and north-west coasts of Australia.	Habitat present in mapped PCTs:3320, 3448, 4025. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.;1|Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.;2|Maternity caves have very specific temperature and humidity regimes.;3|At other times of the year, populations disperse within about 300 km range of maternity caves.;4|Cold caves are used for hibernation in southern Australia.;5|Breeding or roosting colonies can number from 100 to 150,000 individuals.;6|Hunt in forested areas, catching moths and other flying insects above the tree tops.;7|	1909/01/2006	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Myotis macropus Southern Myotis	BCT Act: V	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.	Habitat present in mapped PCTs:3320, 3448, 4025 Generally roost in groups of 10 - 15 close to watern caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.;1|Forage over streams and pools catching insects and small fish by raking their feet across the water surface.;2|In NSW females have one young each year usually in November or December.	31 04/01/2006	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Ninox strenua Powerful Owl	BCT Act: V	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities; throughout most of its eastern range, rare along the Murray River and former inland populations may never recover.	Habitat present in mapped PCTs:3320, 3448, 4025 The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.;1|The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. Roosts by day in dense vegetation comprising species such as *Turpentine Syncarpia glomulifera* , Black She-oak *Allocasuarina littoralis* , Blackwood *Acacia melanoxylon* , Rough-barked Apple *Angophora floribunda* , Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species. ;2|The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider.	10 12/07/2021	Moderate	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site.	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Petaurus australis Yellow-bellied Glider	BCT Act: V	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	Habitat present in mapped PCTs:4025 Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.;1|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.;2|Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.;3|Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar.;4|Live in small family groups of two - six individuals and are nocturnal.;5|Den, often in family groups, in hollows of large trees.;6|Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	3, PMST 20/07/2005	Moderate	PCT 3692 was ground truthed to occur but is very poor quality. PCT 4025 does not occur on site. None	Low
Petaurus norfolcensis Squirrel Glider	BCT Act: V	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria.	Habitat present in mapped PCTs:3320, 3448, 4025 Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.;1|Prefers mixed species stands with a shrub or Acacia midstorey.;2|Live in family groups of a single adult male one or more adult females and offspring.;3|Require abundant tree hollows for refuge and nest sites.;4|Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.;5|	1 25/05/2007	Moderate	PCT 3320 and 3448 ground truthed. 4025 does not occur on site. Despite some suitable PCTs on site there is only one record of this species in the Locality recorded 17 years ago.	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Petroica boodang Scarlet Robin	BCT Act: V	The Scarlet Robin is found from south east ;Queensland to; south eas South Australia and also in Tasmania and& ;south west& ;Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter.	Habitat present in mapped PCTs:3320, 3448. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.;1|This species lives in both mature and regrowth vegetation.t occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps.;2|Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.;3|The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude.;4|The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.;	1 08/05/2006	Moderate	PCT 3692, 3320 and 3448 ground truthed. Despite some suitable PCTs on site there is only one record of this species in the Locality recorded 18 years ago.	Low
Phascolarctos cinereus Koala	BCT Act: V EPBC Act: E	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range.	Habitat present in mapped PCTs:3320, 3448, 4025 Inhabit eucalypt woodlands and forests.;1|Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.;2|Inactive for most of the day, feeding and moving mostly at night.;3|Spend most of their timen trees, but will descend and traverse open ground to move between trees.;4|Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.;5|Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.	2, PMST 20/10/2016	Moderate	PCT 3692, 3320 and 3448 ground truthed (4025 does not occur on site). Although habitat is present for this species on the site, no koalas or koala scats were recorded in the Study Area, with Koalas determined no longer present in Pitt Town or Scheyville Nature Reserves (NPWS 2000). Both records are geographically isolated from the Study Area by Cattai Creek and Hawkesbury River	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Pommerhelix duralensis Dural Land Snail	BCT Act: E EPBC Act: E	The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. There is currently a degree of uncertainty about the distribution and identity of the snails in this and related species. *Pommerhelix duralensis* in the strict sense is found in an area of north-western Sydney between Rouse Hill - Cattai and Wiseman's Ferry, west from Berowra Creek. North of the Hawkesbury and Wiseman's Ferry there is an entity with morphologically similar shells, but which have not had the DNA sequenced. The Blue Mountains records have been assigned 'Elizabeth', a genetically distinct species which has been sampled at Elizabeth Lookout in Glenbrook, and which extends along the eastern escarpment of the Blue Mountains The species is found within the Local Government Areas of The Hills Shire, Hawkesbury Shire and Hornsby Shire.	Habitat present in mapped PCTs:3448 The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.;1|It favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris.;2|Migration and dispersal is limited, with overnight straight-line distances of under 1 metre identified in the literature and studies. The species is active from approximately one hour after dusk until dawn and no confirmed diurnal activity is reported. It exhibits no roost-site behaviour.;3|The species is known to aestivate, and secretes an epiphragm to protect against dessication.;4|The main food sources are hyphae and fruiting bodies of native fungi. It is possible other detritus may be consumed.;5|Reproduction rates are very low, with few eggs (about 32) per season. Mortality is 90% in the first year, and 99.8% within four-five years.	PMST	Moderate	PCT 3448 ground truthed.	Known

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Pseudomys novaehollandiae New Holland Mouse, Pookila	EPBC Act: V	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Genetic evidence indicates that the New Holland Mouse once formed a single continuous population on mainland Australia and the distribution of recent subfossils further suggest that the species has undergone a large range contraction since European settlement. Total population size of mature individuals is now estimated to be less than 10,000 individuals although, given the number of sites from which the species is known to have disappeared between 1999 and 2009, it is likely that the species' distribution is actually smaller than current estimates.	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes ;1|It is a social animal, living predominantly in burrows shared with other individuals ;2|Distribution is patchy in time and space, with peaks in abundance during early to mid-stages of vegetation succession typically induced by fire;3|	PMST	Low	None	Low
Pteropus poliocephalus Grey-headed Flying-fox	BCT Act: V EPBC Act: V	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations.	Habitat present in mapped PCTs:3320, 3448, 4025. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.;1|Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water,n vegetation with a dense canopy.;2|Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.;3|Annual mating commences in January and conception occurs in April or May; a single young is born in October or November.;4|Site fidelity to camps is high; some camps have been used for over a century.	73, PMST09/01/ 2006	High	PCT 3692, 3320 and 3448 ground truthed. 4025 does not occur on site	High

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Rostratula australis Australian Painted Snipe	BCT Act: E EPBC Act: E	The Australian Painted Snipe is restricted to Australia. Most records& ;are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	Habitat present in mapped PCTs:4025 Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.;1|Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.;2|The nest consists of a scrape in the ground, lined with grasses and leaves.;3|Breeding is often in response to local conditions; generally occurs from September to December. Incubation and care of young is all undertaken by the male only.;4|Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.;5|	PMST	Moderate	PCT 4025 ground truthed not to occur on site. None.	Low
Scoteanax rueppellii Greater Broad-nosed Bat	BCT Act: V	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.	Habitat present in mapped PCTs:3320, 3448, 4025 Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.;1|Although this species usually roosts in tree hollows, it has also been found in buildings.;2|Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m.;3|Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.;4|Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	21 17/01/2006	Moderate	Habitat present in 3320 and 3448	Moderate

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Stagonopleura guttata Diamond Firetail	BCT Act: V	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Cental and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River.	Habitat present in mapped PCTs:3320, 3448, 4025 Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.;1|Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.;2|Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.;3|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).;4|Usually encountered in flocks of between 5 to 40 birds, occasionally more.;5|Groups separate into small colonies to breed, between August and January.;6|Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests.;7|Birds roost in dense shrubs or in smaller nests built especially for roosting.;8|Appears to be sedentary, though some populations move locally, especially those in the south.;9|Has been recorded in some towns and near farm houses.;10|	1, PMST 30/03/2012	Moderate	PCTs 3320 and 3448 provide habitat however there is only one records present.	Low
Stictonetta naevosa Freckled Duck	BCT Act: V	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina.	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.;1|Generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates.;2|Nesting usually occurs between October and December but can take place at other times when conditions are favourable.	1 21/04/2013	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Thalassarche melanophris Black-browed Albatross	BCT Act: V EPBC Act: V	The Black-browed Albatross has a circumpolar range over the southern oceans, and are seen off the southern Australian coast mainly during winter. This species migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. The species has also been recorded in Botany Bay National Park.	Inhabits antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents.;1|Can tolerate water temperatures between 0ºC and 24ºC.;2|Spends most of its time at sea, breeding on small isolated islands.;3|When at sea, individuals soar on strong winds and rest on the ocean, when calm, often in groups.;4|This species feeds on fish, crustaceans, offal and squid and often forages in flocks with other seabirds.;5|Individuals seize prey from the surface while swimming or landing, sometimes submerging their head and body to capture prey underwater, and they scavenge in large flocks behind fishing vessels.;6|This species nests annually on a mound of soil and vegetation, on the cliffs or steep slopes of vegetated antarctic and subantarctic islands.;	PMST	Low	None	Low
Thalassarche salvini Salvin's Albatross	EPBC Act: V	This species principally nests on the Bounty Islands, with small numbers on the Western Chain Islets in the Snares Islands and a few pairs nesting on Pyramid Rock and The Forty-Fours in the Chatham Islands of New Zealand. A small number of pairs also nest on Iles Crozet in the French Southern Territories. The total population is estimated between 350,000 and 380,000 individuals, with 99% nesting on the Bounty Islands. It ranges widely through the South Pacific Ocean, particularly in the Humboldt Current off western South America.	Occasional individuals are encountered both in inshore and offshore over the continental shelf and in pelagic waters off the shelf break.	PMST	Low	None	Low

Species	Listing status	Distribution	Habitat	Records (BioNet, PMST Date of most recent record)	LoO (Before site visit)	Habitat (associate PCT) ground-truthed	LoO (After site visit)
Tyto novaehollandiae Masked Owl	BCT Act: V	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution.	Habitat present in mapped PCTs:3320, 3448, 4025 Lives in dry eucalypt forests and woodlands from sea level to 1100 m.;1|A forest owl, but often hunts along the edges of forests, including roadsides.;2|The typical diet consists of tree-dwelling and ground mammals, especially rats.;3|Pairs have a large home-range of 500 to 1000 hectares.;4|Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	2 17/10/2014	Moderate	PCTs 3692, 3320 and 3448 provide suitable habitat however there are less than 5 records over the past 20 years of this species.	Low
Tyto tenebricosa Sooty Owl	BCT Act: V	Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently.	Habitat present in mapped PCTs:3320 Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.;1|Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (Pseudocheirus peregrinus) or Sugar Glider (Petaurus breviceps).;2|Nests in very large tree-hollows.;3|	1 25/11/2014	Moderate	PCT 3692, 3320 provides suitable habitat however there are less than 5 records over the past 20 years of this species.	Low
Vespadelus troughtoni Eastern Cave Bat	BCT Act: V	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT.	Very little is known about the biology of this uncommon species.;1|A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.;2|Occasionally found along cliff-lines in wet eucalypt forest and rainforest.;3|Little is understood of its feeding or breeding requirements or behaviour.;4|	4 24/01/2018	Low	None	Low

APPENDIX E- TEST OF SIGNIFICANCE (BC ACT)

Tests of significance have been prepared for all threatened species or ecological communities considered to have a moderate to high likelihood of occurrence in the proposal area. Tests have been prepared in accordance with the *Threatened Species Test of Significance Guidelines* (OEH, 2018) and address the following five factors as required by section 7.3 of the BC Act:

(a) 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,

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity

(i) 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

(ii) 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,

(c) in relation to the habitat of a threatened species or ecological community—

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) 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, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the try long-term survival of the species or ecological community in the Locality,

(d) 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),

(e) 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.

Table 9-1 Summary of Test of Significance assessments for threatened species or ecological communities

Scientific name	Common name	EPBC Act	Significant Impact
Threatened Ecological Community			
Cumberland Plain Woodland in the Sydney Basin Bioregion		Critically Endangered	Unlikely
Shale Gravel Transition Forest in the Sydney Basin Bioregion		Endangered	Unlikely
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions		Endangered	Unlikely
Flora			
Acacia pubescens	Downy Wattle	Vulnerable	Unlikely
Dillwynea tenuifolia		Vulnerable	Unlikely

Scientific name	Common name	EPBC Act	Significant Impact
Micromyrtus minutiflora		Vulnerable	Unlikely
Pimelea spicata	Spiked Rice-flower	Endangered	Unlikely
Fauna			
Pteropus policephalus	Grey-headed Flying Fox	Vulnerable	Unlikely
Meridoleum corneovirens	Cumberland Plain Land Snail	Endangered	Unlikely
Pommerhelix duralensis	Dural Land Snail	Endangered	Unlikely
Mormopterus norfolkensis *Falsistrellus tasmaniensis* *Myotis Macropus* *Scoteanax rueppellii*	**Hollow dependent Microbats:** Eastern Freetail-bat Eastern False Pipistrelle Southern Myotis and Greater Broad-nosed Bat	Vulnerable	Unlikely
Miniopterus australis *Miniopterus orianae oceanensis*	**Cave dependent Microbats:** Little Bent-winged Bat Large Bent-winged Bat	Vulnerable	Unlikely
Artamus cyanopterus cyanopterus *Callocephalon fimbriatum* *Glossopsitta pusilla*	**Woodland Birds:** Dusky Woodswallow Gang-gang Cockatoo Little Lorikeet	Vulnerable	Unlikely
Circus assimilis *Lophoictinia isura* *Ninox strenua*	**Raptors:** Spotted Harrier Square-tailed Kite Powerful Owl	Vulnerable	Unlikely

Threatened Ecological Community Tests of Significance

Cumberland Plain Woodland in the Sydney Basin Bioregion

Factor	Threatened Ecological Community
	***Cumberland Plain Woodland in the Sydney Basin Bioregion,* (BC Act: CRITICALLY ENDANGERED)**
Ecological community information	Cumberland Plain Woodland in the Sydney Basin Bioregion is listed as Critically Endangered under the BC Act. Cumberland Plain Woodland is the name given to the ecological community in the Sydney Basin bioregion associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates, on the Cumberland Plain, a rainshadow area to the west of Sydney's Central Business District. The mean annual rainfall of this area is typically in the range of 700-900 mm, and is generally lower than that received on more elevated terrain that partially surrounds the plain. The community typically occurs on flat to undulating or hilly terrain up to about 350 metres elevation but may also occur on locally steep sites and at slightly higher elevations. Cumberland Plain Woodland typically comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Based on the location and soil characteristics of the proposed modification, woodland vegetation in areas mapped as PCT 3320 meets the definition of the Cumberland Plain Woodland Critically Endangered Ecological Community (CEEC).
Proposed impacts	The proposal would remove up to 1.70 ha of woodland vegetation mapped as PCT 3320, which has been determined to meet the criteria for listing as Cumberland Plain Woodland as described under the BC Act.
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Not applicable.
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	According to the Threatened Species Test of Significance Guidelines (OEH 2018), the local occurrence of an ecological community is defined as the ecological community that occurs within the proposal site and may also include adjacent areas if the ecological community in the proposal site forms part of a larger contiguous area of that ecological community and functional connectivity across the boundary of the proposal site can be demonstrated. Additional surveys to those undertaken for this FFA were undertaken to determine the local occurrence of Cumberland Plain Woodland. Roadside vegetation surveys were undertaken to investigate whether the patch of Cumberland Plain Woodland (CPW) within the proposal site is contiguous (patches connected within 100m) to a larger expanse of the community in the locality; particularly the large area of CPW within Scheyville National Park. It was found that vegetation extending to the south and east of the proposal site is characteristic of CPW and is contiguous with the large patch of CPW within Scheyville National Park. Therefore, the local occurrence of CPW within the proposal site is taken to include adjoining areas of the CPW community in the locality which covers approximately 1953 hectares. A maximum of 1.70 hectares of CPW will be removed by the proposed modification. The removal of 1.70 hectares of Cumberland Plain Woodland will reduce the local occurrence of this Critically Endangered Ecological Community (CEEC) by 0.09%. The extent of CPW to be

Factor	Threatened Ecological Community
	***Cumberland Plain Woodland in the Sydney Basin Bioregion,* (BC Act: CRITICALLY ENDANGERED)**
	removed represents a small fraction of the estimated local occurrence of the community, and its removal is unlikely 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. The removal of 1.7 hectares of CPW from within the proposal site will create new edges within the broader patch. The composition of the broader patch has the potential to be adversely impacted through the creation of new edges by increased weed occurrence and human disturbance. However, the areas adjoining the proposal site are located within private property and already in a modified condition with weeds being present and is therefore unlikely to experience a significant change in composition as a result of the proposed modification. Therefore, it is unlikely that the removal of 1.70 hectares of CPW from the broader patch will significantly change the composition of the retained areas beyond the proposal site such that the local occurrence would be further reduced.
c. *In relation to habitat of a threatened species or community:* i. *extent to which habitat is likely to be removed or modified* ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* iii. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	(i) A maximum of 1.70 hectares of CPW will be removed by the proposed modification, which amounts to 0.09% of the broader, contiguous patch. (ii) The vegetation being removed by the proposal is located on the north-western edge of an existing, larger patch which extends into Scheyville National Park. While the size of the patch will be reduced the proposal will not split an existing patch into two or more isolated patches. The proposal has the potential to further fragment the patch of CPW from other non-contiguous patches of the community in the locality. (iii) The area of CPW to be removed is located on the edge of a much larger (1953 ha) contiguous patch. The CPW to be removed comprises vegetation ranging in condition, with approximately 1.61 hectares qualifying for listing as the national listed community Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CPWSGTF). Despite the area to be removed containing some high quality patches of the community, its removal is unlikely to cause the condition of adjoining areas of the community (which are likely to also constitute CPSWSGTF) to significantly change, nor will it result in the fragmentation of currently connected patches of the community or suitable habitat. For these reasons the patch of CPW to be removed is considered of low importance to the long-term survival of the ecological community in the locality.
d. *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Cumberland Plain Woodland.
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Schedule 4 of the BC Act provides a list of the 'key threatening processes' (KTPs). Of the KTPs listed in Part 4, Division 5 of the BC Act, several are applicable to the proposed modification. Of those, the following are relevant to Cumberland Plain Woodland: - Removal of native vegetation - Native vegetation which constitutes the CPW community would be cleared for the proposed modification, however the extent of CPW to be removed represents a small percentage (0.09%) of the local occurrence. - Invasion of native plant communities by exotic perennial grasses – exotic perennial grasses are present within the patch of CPW in the Study Area and on adjoining lands. The proposal is unlikely to exacerbate the KTP by introducing novel exotic perennial grasses or increasing the cover of present exotic grass species within retained areas of CPW adjoining the proposal site.
Conclusion	In consideration of the above five factors, the proposal is considered unlikely to have a significant impact on the critically endangered ecological community Cumberland Plain Woodland in the locality, because:

Factor	Threatened Ecological Community
	***Cumberland Plain Woodland in the Sydney Basin Bioregion,* (BC Act: CRITICALLY ENDANGERED)**
	- The removal of up to 1.70 ha represents a small fraction (0.09%) of the local occurrence of CPW and its removal is unlikely to place the broader patch at risk of extinction - The removal of the edge of a larger contiguous patch (1953 ha) is unlikely to fragment contiguous patches of the community or areas of suitable habitat - The composition of retained areas of CPW adjoining the Study Area are unlikely to significantly change such that the local occurrence would be further reduced. Consequently, preparation of a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) is not required for impacts to this TEC.

Factor	Threatened Ecological Community
	***Shale Gravel Transition Forest in the Sydney Basin Bioregion,* (BC Act: ENDANGERED)**
Ecological community information	Shale Gravel Transition Forest in the Sydney Basin Bioregion is listed as Endangered under the BC Act. Shale Gravel Transition Forest is predominantly of open-forest structure, usually with trees of *Eucalyptus fibrosa* sometimes with *E. moluccana* and *Eucalyptus tereticornis*. *Melaleuca decora* is frequently present in a small tree stratum. A sparse shrub stratum is usually present with species such as *Bursaria spinosa*, *Daviesia ulicifolia* and *Lissanthe strigosa*. Ground-layer species include *Microlaena stipoides subsp. stipoides, Cheilanthes sieberi subsp. sieberi, Themeda australis, Opercularia diphylla, Lomandra multiflora subsp. multiflora, Aristida vagans, Pratia purpurascens and Wahlenbergia gracilis.* All patches of PCT 3448 within the proposal site meets the diagnostic characteristics to be considered as the Endangered Ecological Community (EEC).Shale Gravel Transition Forest.
Proposed impacts	The proposal would remove approximately 0.47 of PCT 3448, which meets the criteria to be listed as the EEC Shale Gravel Transition Forest (SGTF).
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Not applicable.
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	According to the Threatened Species Test of Significance Guidelines (OEH 2018), the local occurrence of an ecological community is defined as the ecological community that occurs within the proposal site and may also include adjacent areas if the ecological community in the proposal site forms part of a larger contiguous area of that ecological community and functional connectivity across the boundary of the proposal site can be demonstrated.

Factor	Threatened Ecological Community
	***Shale Gravel Transition Forest in the Sydney Basin Bioregion,* (BC Act: ENDANGERED)**
	The local occurrence of Shale Gravel Transition Forest (SGTF) has been taken to include all patches of PCT 3448 within the Study Area and all adjoining patches as mapped on the State Vegetation Type Map. The patch of PCT 3448 within the Study Area adjoins a broader patch of PCT 3448 which extends to the north of the site. The total area of the patch is approximately 184 hectares. The total patch has been taken to comprise the total local occurrence of SGTF for the purpose of this assessment. A maximum of 0.47 hectares of SGTF will be removed by the proposed modification. The removal of 0.47 hectares of SGTF will reduce the local occurrence of this EEC by 0.26%. The extent of SGTF to be removed represents a small fraction of the estimated local occurrence of the community, and its removal is considered unlikely to have an adverse effect on the extent of the ecological community such that it is likely to be placed at risk of extinction.
c. *In relation to habitat of a threatened species or community:* i. *extent to which habitat is likely to be removed or modified* ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* iii. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	(i) A maximum of 0.47 hectares of SGTF will be removed by the proposed modification, which amounts to approximately 0.26% of the broader, contiguous patch. (ii) The patch of SGTF to be removed comprises roadside vegetation, located on the edge of an existing patch. While the size of the patch will be minorly reduced, the proposal will not result in the fragmentation of a single patch into two smaller patches. The proposal is likely to further increase distance between already fragmented patches of SGTF, however this is unlikely to adversely impacts the local occurrence or persistence of the community in the locality. (iii) The patch of SGTF to be removed is considered low importance to the long-term survival of the EEC in the locality due to its small size and modified nature. The patch is degraded roadside vegetation with high covers of weeds including aggressive exotic grasses. Further being located on the edge of a larger patch its removal will not result in fragmentation of intact patches of the community, increasing the risk of weed intrusion to higher quality patches.
d. *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Shale Gravel Transition Forest.
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Schedule 4 of the BC Act provides a list of the 'key threatening processes' (KTPs). Of the KTPs listed in Part 4, Division 5 of the BC Act, several are applicable to the proposed modification. Of those, the following are relevant to Shale Gravel Transition Forest: - Removal of native vegetation - Native vegetation would be cleared for the proposed modification, however the extent of vegetation to be removed represents a small area (0.26%) of the local occurrence of the EEC. - Invasion of native plant communities by exotic perennial grasses – exotic perennial grasses are present throughout the proposal site, including within the patch of SGTF. The adjoining areas of SGTF, which will be retained, also support exotic perennial grasses. Therefore, it is unlikely that the proposal is going to increase the impacts of exotic perennial grasses on the community.
Conclusion	In light of the consideration of the above five factors, the proposal is considered unlikely to have a significant impact on the endangered ecological community Shale Gravel Transition Forest, as:

Factor	Threatened Ecological Community
	***Shale Gravel Transition Forest in the Sydney Basin Bioregion,* (BC Act: ENDANGERED)**
	- the removal of up to 0.47 hectares of SGTF from the edge of a broader patch (~184 hectares), represents a small fraction (0.26%) of the local occurrence of EEC and will not result in fragmentation of the broader patch into two smaller patches. - the patch of SGTF to be removed is road-side vegetation in a modified state, with a high composition of weeds. Consequently, preparation of a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) is not required for impacts to this TEC.

Factor	Threatened Ecological Community
	***Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions* (BC Act: ENDANGERED)**
Ecological community information	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions is listed as Endangered under the BC Act. This ecological community is associated with periodic or semi-permanent inundation by freshwater, although there may be minor saline influence in some wetlands. They typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less (adapted from Speight 1990). Freshwater Wetlands on Coastal Floodplains generally occur below 20 m elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from sedgelands and reedlands to herbfields, and woody species of plants are generally scarce. Typically these wetlands form mosaics with other floodplain communities, and often they include or are associated with ephemeral or semi-permanent standing water All patches of PCT 3962 within the proposal site meet the diagnostic characteristics to be considered as the Endangered Ecological Community (EEC) Freshwater Wetlands on Coastal Floodplains.
Proposed impacts	The proposal would remove up to 0.78 hectares of native wetland vegetation characteristic of PCT 3962, which has been determined to meet the criteria for listing Freshwater Wetlands on Coastal Floodplains as described under the BC Act.
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Not applicable.
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its*	According to the Threatened Species Test of Significance Guidelines (OEH 2018), the local occurrence of an ecological community is defined as the ecological community that occurs within the proposal site and may also include adjacent areas if the ecological community in the proposal site forms part of a larger contiguous area of that ecological community and functional connectivity across the boundary of the proposal site can be demonstrated.

Factor	Threatened Ecological Community
	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions **(BC Act: ENDANGERED)**
local occurrence is likely to be placed at risk of extinction	Regional vegetation mapping of the locality (Tozer et al 2003) identifies three substantial areas of Freshwater Wetlands on Coastal Floodplain (FWCF) nearby to the site, covering approximately 266 hectares. These areas are supported in Pitt Town Lagoon (to the west), Bushells Lagoon (to the north-west) and Longneck Lagoon (to the north east). Of these, Pitt Town Lagoon is directly connected to the Study Area by a minor watercourse. The watercourse that passes through the Study Area, flowing in a north to south direction entering the lagoon approximately 800 metres to the south-east. Patches of FWCF are also present in smaller watercourse and minor drainage lines linking these larger permanent expanses of this community across the locality. For these reasons the local occurrence of this EEC is taken to include the mapped occurrences nearby to the site, covering 266 hectares. A maximum of 0.78 hectares of FWCF will be removed by the proposed modification. The removal of 0.78 hectares of this EEC will reduce the local occurrence of this EEC by 0.29%. The extent of SGTF to be removed represents a small fraction of the estimated local occurrence of the community. The Freshwater Wetlands on Coastal Floodplains within the study area has been degraded by historical and ongoing land management practices. The species composition has been affected by a lack of habitat variability, leaving it as a dense stand of reeds and rushes. Nutrient runoff from surrounding farm land and modified pasture have also lead recruitment of exotic species, such as Blackberry, Privet and Japanese Honeysuckle. It is unlikely that the proposal would substantially modify the composition of surrounding vegetation to be retained. Based on the condition of the immediately surrounding Freshwater Wetlands on Coastal Floodplains that would be retained, plus the presence of larger areas of well protected Freshwater Wetlands on Coastal Floodplains within Pitt Town Lagoon, Bushells Lagoon and Longneck Lagoon, it is unlikely that the proposal would affect the extent or composition of the ecological community, such that it is placed at risk of extinction.
c. *In relation to habitat of a threatened species or community:* ii. *extent to which habitat is likely to be removed or modified* iii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* iv. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	(i) A maximum of 0.78 hectares of FWCF will be removed by the proposed modification, which amounts to approximately 0.29% of the community present in the locality. (ii) The Freshwater Wetlands on Coastal Floodplains within the study area occurs in a linear strip along an un-named tributary of Hortons Creek. The proposal would result in two new crossings of this un-named tributary and would fragment the existing patch into several smaller patches. Pitt Town Road and Old Pitt Town Road have both been constructed over the patch of Freshwater Wetlands on Coastal Floodplains therefore the proposal would further fragment an already fragmented patch. (iii) The condition of the Freshwater Wetlands on Coastal Floodplains within the study area is moderate due to a lack of native species diversity and recruitment of several exotic species. there is little in the way of habitat variability, with the majority of the Freshwater Wetlands on Coastal Floodplains within the study area being predominantly comprised of *Typha orientalis* (bullrush) and *Phragmites australis* (Common Reed). This vegetation provides little aquatic habitat and it would appear that water is only present for a short period following rain, and that it flows through the study area at a relatively high velocity. As such, the Freshwater Wetlands on Coastal Floodplains in the study area is considered to be of low importance to the long-term survival of the community.
d. *Likelihood of an adverse effect on any declared area of outstanding*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Freshwater Wetlands.

Factor	Threatened Ecological Community
	***Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions* (BC Act: ENDANGERED)**
biodiversity value (either directly or indirectly)	
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Schedule 4 of the BC Act provides a list of the 'key threatening processes' (KTPs). Of the KTPs listed in Part 4, Division 5 of the BC Act, several are applicable to the proposed modification. Of those, the following are relevant to Freshwater Wetlands: - Removal of native vegetation - Native vegetation would be cleared for the proposed modification, however the extent of vegetation to be removed represents a small area of the local occurrence of the EEC. - Invasion of native plant communities by exotic perennial grasses – Exotic grasses are abundant in the study area and the proposed action may exacerbate the KTP by facilitating the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of Freshwater Wetlands on Coastal Floodplains.
Conclusion	In light of the consideration of the above five factors, the proposal is considered unlikely to have a significant impact on the endangered ecological community Freshwater Wetlands on Coastal Floodplains, as: - The patch in the study area is in moderate condition due to the lack of complexity and low native species diversity and is unlikely to be considered of high importance to the survival of the community in the locality. - The removal of up to 0.78 hectares of this community represents a small fraction (0.29%) of the local occurrence of FWCF and its removal is unlikely to place the broader expanses of the community present in the locality (Pitt Town Lagoon, Bushells Lagoon, Longneck Lagoon) at risk of extinction. Consequently, preparation of a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) is not required for impacts to this TEC.

Threatened Flora Tests of Significance

Impacts of the proposal on this threatened species have been assessed using tests of significance (Section 7.3 of the *Biodiversity Conservation Act 2016*) and are presented below. Areas of habitat loss for each species have been calculated based on associated PCTs.

Factor	Species
	Downy Wattle *Acacia pubescens* (BC Act: V) (Moderate likelihood)
Species information	*Acacia pubescens* is listed as vulnerable under the BC and has a concentrated distribution around the Bankstown-Fairfield-Rockdale area and the Pitt Town area. It typically occurs on alluviums, shales, and at the intergrade between shales and sandstones, in association with open woodland and forest communities including Cooks River Castlereagh Ironbark Forest, Shale/Sandstone Transition Forest and Cumberland Plain Woodland. *Acacia pubescens* commonly reproduces via vegetative reproduction rather than seedlings, resulting in dense patches of the species formed from one individual. The species also need a minimum fire free period of 5-7 years for an adequate seedbank to develop. A spreading shrub, 1 - 5 m high with brilliant yellow flowers, bipinnate leaves (divided twice pinnately) and conspicuously hairy branchlets. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.
Proposed impacts	The removal of 0.21 hectares of occupied habitat containing three stems (previously five stems when surveyed by Arcadis in 2018) of Downy Wattle, and a further 2.06 ha of potential habitat will be removed by the proposal.
• *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Three clusters of Downy Wattle (sub-populations) were identified by Arcadis during detailed targeted surveys undertaken in 2018. One of the clusters occurs within areas proposed to be impacted and the other two clusters were found in areas beyond the impact footprint, in locations which will remain undisturbed from the proposal. The National Recover Plan for *Acacia pubescens* (Downy Wattle) (NPWS 2003) identifies that the breeding system of Downy Wattle can included out-crossing and self-compatibility. Known to be highly clonal, reproducing vegetatively and through suckering, and studies have shown that numerous plants over a large area (eg one hectare) may all be the same individual (NPWS 2003). Pollination from insects and birds facilitates outbreeding across sub-populations of Downy Wattle, where more than one sub-population is present proximal to one another. Therefore, the area of occupancy of a single population should be considered broader than a cluster of stems. NSW National Parks and Wildlife Services (NPWS) assume that any Downy Wattle individuals within 300 metres of each other are part of the same population. Based on this, the cluster of three stems of Downy Wattle proposed to be removed by the project, are considered to be part of the broader population (at least two other clusters) which extends beyond the Study Area. For the purpose of this assessment the broader population of Downy Wattle is considered to represent the local occurrence of the species. The proposed action would remove one sub-population of *Acacia pubescens*, containing three stems, and consequently have an adverse impact on the life cycle of that sub-population. By removing the plants as well as the nearby soil, the seed bank is

Factor	Species
	Downy Wattle *Acacia pubescens* (BC Act: V) (Moderate likelihood)
	cleared resulting in the disruption of the species life cycle. About 0.21 hectares of occupied habitat which includes the three stems and areas presumed to support seed of this species will be removed. At least two other clusters or sub-population of the species have been recorded nearby to the Study Area which will not be impacted by the proposed modification. Therefore, while the life cycle of the species within the Study Area will be adversely impacted, the local population of *Acacia pubescens* is considered unlikely to be placed at risk of extinction due to the population extending beyond the project site, comprising other sub-populations and individuals.
• *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not Applicable.
• *In relation to habitat of a threatened species or community:* *(i) extent to which habitat is likely to be removed or modified* *(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* *(iii) importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	i. The proposal would remove 0.21 hectares of occupied habitat containing three stems of Downy Wattle, and a further 2.06 ha of potential habitat for this species in PCT 3320 and 3448. ii. The suitable habitat in the Study Area is already heavily modified and isolated from other areas of habitat. The Study Area forms a small fragment of habitat within a highly developed and urbanised context and therefore any further fragmentation as a result of the proposal is not deemed significant. iii. Downy Wattle is associated with a variety of vegetation types and has large numbers of recordings in the locality and therefore, it is unlikely that the habitat is important to the species such that its removal impacts its long-term survival
• *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Downy Wattle.
• *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, the following are relevant to the potential impacts of the proposal on Downy Wattle*:* - Clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains occupied and potential habitat would be cleared. This does not represent a significant area of this species' habitat in the locality. Invasion of native plant communities by exotic perennial grasses – Exotic grasses are abundant in the Study Area and the proposed action may exacerbate the KTP by facilitating the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of potential habitat for the species.
Conclusion	The proposal will result in the removal of one cluster (sub-population) of Downy Wattle containing approximately 3 stems and 0.21 ha of occupied habitat. There are a large number of individuals near the site which will not be impacted by the proposal which are considered to be part of the same population; and therefore the local population will unlikely be put at risk of extinction. Potential habitat in 2.06 hectares of native vegetation to be cleared is not deemed to be a significant area of habitat or of importance to the long-term survival of the species due to the extensive areas of similar or higher quality habitat

Factor	Species
	Downy Wattle *Acacia pubescens* (BC Act: V) (Moderate likelihood)
	in the locality including within the nearby Scheyville National Park. As a result, it is considered unlikely that the proposal represents a significant impact to this threatened species. A species impact statement is not required for this species.

Factor	Species
	***Dillwynia tenuifolia* (BC Act: V) (High likelihood)**
Species information	*Dillwynia tenuifolia* is listed as vulnerable under the BC Act. Its core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. However other populations are present in the Liverpool and Penrith LGA and Baulkham Hills Shire as well as in disjunct localities in the lower Blue Mountains and Bulga Mountains. *Dillwynia tenuifolia* is commonly associated with scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. It can also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.
Proposed impacts	The removal of 0.31 hectares of occupied habitat and 1.96 ha of associated habitat (PCT 3320, PCT 3448) of this species is proposed to be removed. No individuals were detected during the current assessment, however viable seed is considered to be present in locations where 4 individuals were recorded duirng invetsigations for the BAR (Arcdis 2016).
• *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	The population detected in the 2018 BAR were within a patch of Cumberland Plain Woodland that is mown on and ongoing basis. It is zoned SP2 Road Infrastructure in the Hawkesbury Local Environment Plan (Hawkesbury Shire Council 2012) and surrounded by residential development, which is not conducive for conservation. Based on the very small population size (this species can be locally dominant in preferred habitat), the insecurity of the land on which it occurs (from a conservation perspective) and the partially disturbed nature of this habitat, this population identified in 2018 is not considered viable. A large population of *Dillwynia tenuifolia* exists approximately one kilometre to the east of the Study Area within Scheyville National Park. This is the closest known viable population. The proposed action would no impact on the nearby viable population and it would not be placed at risk of extinction.
• *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not Applicable.
• *In relation to habitat of a threatened species or community:* *(iv) extent to which habitat is likely to be removed or modified*	The proposal will result in the of 0.31 hectares of occupied habitat and 1.96 ha of associated habitat (PCT 3320, PCT 3448) of suitable *Dillwynia tenuifolia*.

Factor	Species
	***Dillwynia tenuifolia* (BC Act: V) (High likelihood)**
(v) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat *(vi) importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	The suitable habitat in the Study Area is already heavily modified and isolated from other areas of habitat. The Study Area forms a small fragment of habitat within a highly developed and urbanised context and therefore any further fragmentation as a result of the proposal is not deemed significant. *Dillwynia tenuifolia* has large numbers of recordings in the locality and therefore, it is unlikely that the habitat is important to the species such that its removal impacts its long-term survival. The Study Area forms a small fragment of habitat within a highly developed and urbanised context and therefore any further fragmentation as a result of the proposal is not deemed significant. As the suitable habitat on site is already heavily modified, the 2.27 ha to be cleared is a negligible area. It is therefore unlikely that the habitat is important to the species such that its removal impacts its long-term survival
• *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for *Dillwynia tenuifolia.*
• *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, the following are relevant to the potential impacts of the proposal on *Dillwynia tenuifolia.*: Clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains occupied and potential habitat would be cleared. This does not represent a significant area of this species' habitat in the locality. Invasion of native plant communities by exotic perennial grasses – Exotic grasses are abundant in the Study Area and the proposed action may exacerbate the KTP by facilitating the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of potential habitat for the species.
Conclusion	The proposal will result in the removal of 0.31 hectares of occupied habitat and 1.96 ha of associated habitat (PCT 3320, PCT 3448). There are a large number of individuals near the site which will not be impacted by the proposal and therefore the local population will unlikely be put at risk of extinction. This vegetation to be cleared is heavily modified and is not deemed to be a significant area of habitat or of importance to the long-term survival of the species. As a result, it is considered unlikely that the proposal represents a significant impact to this threatened species. A species impact statement is not required for this species.

Factor	Species
	***Micromyrtus minutiflora* (BC Act: V) (Moderate likelihood)**
Species information	*Micromyrtus minutiflora* is Endangered under the BC Act. It is a slender spreading shrub to two metres high and is restricted to the general area between Richmond and Penrith in Western Sydney.

Factor	Species
	***Micromyrtus minutiflora* (BC Act: V) (Moderate likelihood)**
	Suitable habitat for *Micromyrtus minutiflora* includes Castlereagh Ironbark Forest/Shale Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments. No sightings of *Micromyrtus minutiflora* were recorded in the Study Area and there are no records of the species in the area immediately adjacent to the Study Area. 2.27 ha of suitable habitat for *Micromyrtus minutiflora* will be removed during construction of the proposed action.
Proposed impacts	The removal of up to 2.27 ha of vegetation, which could impact species habitat.
• *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Little is known about the life cycle of *Micromyrtus minutiflora* and its response to fire and disturbance. Regeneration may be due to resprouting or germination of soil-stored seed. No individuals of *Micromyrtus minutiflora* will be removed as a result of the proposed action and no individuals have been recorded adjacent to the Study Area. Therefore, impacts to the life cycle of *Micromyrtus minutiflora* are considered unlikely due to the absence of a population of the species in the Study Area. As such, the proposal is unlikely to affect a local viable population such that it is placed at risk of extinction.
• *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not Applicable.
• *In relation to habitat of a threatened species or community:* *(vii) extent to which habitat is likely to be removed or modified* *(viii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* *(ix) importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	2.27 ha of suitable *Micromyrtus minutiflora* habitat will be removed as a result of the proposed modification. This suitable habitat consists of Shale Gravel Transition Forest in the Sydney Basin Bioregion. The habitat in the Study Area is already heavily modified and isolated from other areas of habitat. The Study Area forms a small fragment of habitat within a highly developed and urbanised context and therefore any further fragmentation as a result of the proposal is not deemed significant. As the suitable habitat on site is already heavily modified, the 2.27 ha to be cleared is a negligible area. It is therefore unlikely that the habitat is important to the species such that its removal impacts its long-term survival
• *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for *Micromyrtus minutiflora.*
• *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, the following are relevant to the potential impacts of the proposal on *Micromyrtus minutiflora*: Clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains potential habitat would be cleared. This does not represent a significant area of this species' habitat in the Locality. Invasion of native plant communities by exotic perennial grasses – Exotic grasses are abundant in the Study Area and the proposed action may exacerbate the KTP by facilitating the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of potential habitat for the species.

Factor	Species
	***Micromyrtus minutiflora* (BC Act: V) (Moderate likelihood)**
Conclusion	The Impact Area is not considered to be a significant area of habitat or of importance to the long-term survival of the *Micromyrtus minutiflora* in the Locality. As a result, it is considered unlikely that the proposal represents a significant impact to this vulnerable species. A Species Impact Statement is not required for this species. Mitigation measures such as preclearance surveys will prevent *Micromyrtus minutiflora* being cleared by works.

Factor	Species
	***Pimelea spicata* Spiked Rice-flower (BC Act: E) (Moderate likelihood)**
Species information	*Pimelea spicata* is a slender decumbent or erect shrub to 50 cm high (RBG&DT February 2012). This species is endemic to NSW and is known from two disjunct areas, the Cumberland Plain west of Sydney and coastal Illawarra south of Sydney. In western Sydney, the species is restricted to areas supporting the Cumberland Plain Woodland vegetation community (DEC 2005). The species is cryptic and difficult to detect, particularly when not in flower, so surveys should not be relied upon unless undertaken whilst the species is flowering (NPWS 2004). Various flowering times for the species have been noted, as the species is known to flower in response to rain, and peak flowering time may vary from year to year. Benson and McDougall (2001) stated the peak flowering period as March to April, however it has also been observed flowering in May–January and in June-September in response to rain (NPWS 2004). The species was not recorded, however potential habitat was identified in the Cumberland Plain Woodland in the Study Area.
Proposed impacts	The removal of up to 1.80 ha of vegetation deemed suitable habitat for this species.
a) Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction	Flowering occurs sporadically throughout the year and is likely to be dependent on climatic conditions, particularly rain; Pimelea spicata is not capable of vegetative spread, and hence is dependent on seed production for recruitment. The pollinator has not been identified; native bees have been observed visiting flowers, and it has been suggested that moths contribute to pollination. The species may be capable of self-pollination. Fruit production is highly variable within and between populations, and between years, and is likely to be associated with environmental conditions. Seed viability has been recorded as relatively high. Dispersal mechanisms for the species are unknown, but seed dispersal is likely to be very low, with most seedlings observed in proximity to adult plants.

Factor	Species
	***Pimelea spicata* Spiked Rice-flower (BC Act: E) (Moderate likelihood)**
	P. spicata is capable of maintaining a long-lived, persistent soil seed bank and germination may occur following fire, slashing and mowing, grazing and soil disturbance. Germination is significantly increased by smoke application. 1.80 ha of suitable habitat for *Pimelea spicata* will be removed from the Study Area during construction. While no individuals will be removed, it is possible that the species occurs in the seedbank. However, as no individuals have been recorded in close proximity to the Study Area this is unlikely as Pimelea spicata have a low seed dispersal range. Therefore, it is unlikely that the species would be impacted by the proposed action such that a viable local population is placed at risk of extinction.
b) Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction	Not Applicable.
c) In relation to habitat of a threatened species or community: *i. extent to which habitat is likely to be removed or modified* *ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* *iii. importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	The proposed action will result in the clearing of 1.80 ha of suitable habitat in the form of Cumberland Plain Woodland. This habitat is currently heavily modified and fragmented by existing roads and rural development. It is also isolated from other areas of suitable habitat. The proposed action will further fragment the vegetation however due to its current extensive modification; any further fragmentation is negligible. Therefore, it is unlikely that the habitat is important to the species such that its removal impacts its long-term survival.
d) Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Spiked Rice-flower.
e) Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process	Of the key threatening processes listed in Schedule 4 of the BC Act, the following are relevant to the potential impacts of the proposal on *Pimelea spicata*: Clearing of native vegetation – Approximately 1.80 ha of native vegetation that contains potential habitat would be cleared. This does not represent a significant area of this species' habitat in the Locality. Invasion of native plant communities by exotic perennial grasses – Exotic grasses are abundant in the Study Area and the proposed action may exacerbate the KTP by facilitating the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of potential habitat for the species.
Conclusion	The proposal are not considered to be a significant area of habitat or of importance to the long-term survival of the Spiked Rice-flower in the Locality.

Factor	Species
	Pimelea spicata **Spiked Rice-flower (BC Act: E) (Moderate likelihood)**
	As a result, it is considered unlikely that the proposal represents a significant impact to this vulnerable species. A Species Impact Statement is not required for this species. Mitigation measures such as preclearance surveys will prevent Spiked Rice-flower being cleared by works.

Threatened Fauna Tests of Significance

Habitat loss resulting from removal of vegetation is anticipated to be the primary impact of the proposal on threatened fauna.

This impact includes removal of 3.05 hectares of native vegetation (0.47 ha of PCT 3448, 0.78 ha of PCT 3692 and 1.80 ha of PCT 3320), which provide potential habitat resources for threatened fauna. Impacts of the proposal on these threatened species have been assessed using tests of significance (Section 7.3 of the *Biodiversity Conservation Act 2016*) and are presented below. Areas of habitat loss has been calculated based on associated PCTs.

Factor	Species
	Grey-headed Flying-fox *Pteropus poliocephalus* (BC Act: V)
Species information	The Grey-headed Flying-fox occurs from Bundaberg in Queensland in the north to Melbourne in Victoria to the south, typically between the coast and the western slopes of the Great Dividing Range. In NSW, it occurs along the east coast, eastern slopes of the Great Dividing Range and the tablelands. The species may be found in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps, while additional foraging is provided by urban gardens and cultivated fruit crops. The Grey-Headed Flying-Fox is a highly mobile species with a nightly feeding range from a roosting camp of 20 to 50 km. Diet typically comprises a wide variety of flowering and fruiting plants (Tidemann 1995, Churchill 2008); in summer, diet mainly comprises fruits of rainforest trees and vines in addition to the nectar and blossom of Eucalyptus, Melaleuca and Banksia. In winter, diet is dominated by nectar and blossom. Non-indigenous and exotic tree species introduced to the urban landscape provide additional foraging habitat for this species within the Locality; where previously existed a period of reduced availability of native food resource during the winter months, non-native species now supply food resources throughout the year (Parry-Jones Augee 2001, Williams et al 2006). Grey-headed Flying-foxes roost in large numbers, with up to tens of thousands of flying foxes using individual camps for mating, birth and rearing of young. Camps are typically located in gullies, close to water, in vegetation with a dense canopy, within 20km of a regular food source. Site fidelity to camps is high, with some camps being used for over 100 years (NPWS 2001). The closest known roosting camp to the Study Area is located at Yarramundi (Camp ID 97) approximately 16 km west of the site. Other camps are located further south at Emu Plains (Camp ID 237) and Paramatta Park (Camp ID 134), located 24 and 27 km from the Study Area, respectively. Habitat features of the Study Area which may support the Grey-Headed Flying-Fox include foraging habitat provided by a number of flowering exotic and native trees, predominantly eucalypts, located within the Study Area.
Proposed impacts	The removal of up to 2.27 ha of potential foraging habitat for Grey-headed Flying-fox. The proposal will not be impacting roosting or breeding sites for this species.
• *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	The proposal would remove up to 2.27 ha of potential foraging habitat to Grey-headed Flying-fox. No Grey-headed Flying-fox camps were identified in the Study Area during field investigation and the closest recorded camp (not identified as nationally important) (DCCEEW National Flying-fox monitoring viewer) is located approximately 4 km to the south-east in Windsor. The area of foraging habitat to be removed is considered minor given the extent of similar habitat in the locality including Scheyille National Park. It is unlikely that the removal of a proportionally small area of foraging habitat in the locality would have an impact on

Factor	Species
	Grey-headed Flying-fox *Pteropus poliocephalus* (BC Act: V)
	breeding females that may be present in the Windsor colony or more broadly. For these reasons it is considered unlikely that the proposal would affect the life cycle of a locally occurring population of Grey-headed Flying-fox such that it is placed at risk of extinction.
• *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not applicable.
• *In relation to habitat of a threatened species or community:* *(i) extent to which habitat is likely to be removed or modified* *(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* *(iii) importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	The proposal will remove 2.27 ha of vegetation which constitutes potential foraging habitat of Grey Headed Flying Fox, including non-native trees and native Plant Community Types. Preferred foraging habitat to be removed includes *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *Melia azedarach* (White Cedar). The loss of potential foraging habitat within the Study Area will cause areas of habitat for the species to become further fragmented, however Grey-headed Flying Fox area a mobile species and able to traverse fragmented patches of habitat to forage. The proposal will remove general foraging habitat. Extensive areas of similar habitat are present in the locality which would be used by the species, of which large areas are protected in Scheyille National Park. Therefore, the habitat to be removed by the proposal is not considered important to the long-term survival of Grey-headed Flying Fox.
• *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Grey-headed Flying-fox.
• *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, one is relevant to the potential impacts of the proposed action on Grey-Headed Flying-fox: Clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains foraging habitat would be cleared. This does not represent a significant area of foraging habitat for Grey-Headed Flying-Fox in the Locality.
Conclusion	The proposed action would require the removal of 2.27 ha potential foraging habitat for the Grey-headed Flying-fox. This is a negligible amount in comparison to the extensive amount of suitable foraging habitat in the wider locality. There are no roosting camps and the Study Area is unlikely to be used by this species for breeding. Therefore, the proposed action is unlikely to have an adverse impact on the life cycle of a local population or impact the species habitat such that it will affect its long-term survival. As a result, it is considered unlikely that the proposed action represents a significant impact to the Grey-headed Flying-fox. A Species Impact Statement is not required for this species.

Factor	Species
	Cumberland Plain Land Snail *(Meridolum corneovirens)* (BC Act: E)
Species information	The Cumberland Plain Land Snail is distributed from Richmond and Windsor in the north of the Cumberland Plain, from Cattai in the north to Picton in the south, and from Prospect Reservoir in the east to Yarramundi in the west. In this region, the Cumberland Plain Land Snail is known only from Cumberland Plain and Castlereagh Woodlands; grassy, open woodland with occasional dense patches of shrubs. The Cumberland Plain Land Snail is found under logs and debris, amongst accumulations of leaf and bark around bases of trees, and occasionally under grass clumps. It has also been recorded under debris such as building materials and car parts. Where possible it will burrow into loose soil. The Cumberland Plain Land Snail is a fungal feeder and is generally active at night. Very little is currently known about the biology and life history of the species. It is hermaphroditic and lays clutches of around 20-25 small round white eggs, in moist and dark areas such as under logs. The Cumberland Plain Woodland in the Study Area is characteristic of the preferred habitat of the Cumberland Plain Land Snail. The canopy of this community is dominated by *E. moluccana* and *E. tereticornis*. To the north of Old Pitt Town Road this community has a shrubby understory of *Bursaria spinosa* and regenerating eucalypts while to the south of Old Pitt Town Road the community is subject to ongoing mowing and so is lacking a shrub stratum. Shale gravel Transition Forest present in the northern extent of the Study Area also provides potential habitat to the species. As these potential habitats were identified, targeted snail surveys were performed in these areas and two Cumberland Plain Land Snails were recorded.
Proposed impacts	A total of 1.18 hectares of occupied habitat for CPLS, comprising of 0.82 hectares of PCT 3320 and 0.36 hectares of PCT 3448, will be removed by the project. Signs of occupation were observed at two locations within the Study Area; one on the north of Cattai Road and the other on the south of Cattai Road. The area of occupied habitat to be removed represents 4.79% of the estimated total area of occupied habitat (24.65 ha) adjoining the project site. Although occupied habitat for CPLS will be removed from by the project, sufficient habitat will be retained beyond the project site which can support a local population. Additionally, 1.09 hectares of potential habitat for CPLS in patches of PCT 3320 and 3448 will be removed. Potential habitat includes all associated PCT which are fragmented from areas of occupied habitat.
• *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Cumberland Plain Land Snails (CPLS) are a low mobility species that utilise localised areas and similar habitat resources for foraging, sheltering and breeding. No live individuals of CPLS were identified during field surveys, however evidence (i.e. shells) of their occurrence was found at two locations within the Study Area; one on the north of Cattai Road and the other on the south side of Cattai Road. The habitat features present in the Study Area are also present on lands adjoining the Study Area which may be occupied by the species, however was not confirmed during field surveys. It is likely that if a local population(s) of this species is present it would occupy habitat that extends beyond the Study Area. The proposal has the potential to impact the lifecycle of a local population of CPLS (if present) through habitat removal and potential impact to individuals. A total of 2.27 hectares (of which 1.18 hectares had signs of occupation and 1.09 is associated PCT without signs of occupancy) of vegetation that constitutes potential habitat for this species will be removed. More than 24 ha of habitat, similar to what occurs in the Study Area, is present on lands adjoining where the snail shells were found. These adjoining areas will not be impacted by the proposal and has potential to support individuals from the local population(s).

Factor	Species
	Cumberland Plain Land Snail *(Meridolum corneovirens)* (BC Act: E)
	As this species occupies a very small home range and can fulfil its lifecycle process and stages within a localised area of habitat any small populations are considered viable (NPWS, 2000). Populations of terrestrial snails are known to occupy patches of fragmented habitat, often less than 5 ha in area (DotE 2015). As more that 5 ha of suitable habitat will be retained beyond the Study Area, if a population(s) is present it is considered likely to persist following impacts from the proposed modification. However, the reduction in available habitat and potential loss of individuals has the potential to reduce the genetic diversity of the local population(s) through higher rates of inbreeding. Although the proposal may have an adverse impact on the life cycle of the species through habitat removal, it is unlikely that the removal of 2.27 ha of habitat (of which 1.18 hectares had signs of occupation and 1.09 are associated PCT) from larger area of adjoining habitat, will cause a local population to become unviable and be placed at risk of local extinction.
• *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not applicable.
• *In relation to habitat of a threatened species or community:* *(iv) extent to which habitat is likely to be removed or modified* *(v) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* *(vi) importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	Approximately 2.27 ha of habitat (of which 1.18 hectares had signs of occupation and 1.09 is associated PCT without signs of occupancy) will be removed because of the proposed modification. Of the habitat to be removed, 1.18 hectares had signs of occupation. Areas of habitat with signs of occupation are connected to larger patches of habitat (at least 24 ha) extending beyond the Study Area, which is considered suitable to the species and able to support a local population (if present). Habitat for CPLS in the locality and within the Study Area is fragmented by modified rural residence, existing roads and waterways. No large (>10 ha) intact areas of habitat will be impacted by the proposed modification. The proposal will result in further fragmentation of already fragmented areas of potential habitat for CPLS. Centrally within the Study Area the proposal transects a patch of PCT 3320 and 3448 which is considered potential habitat of the species, however this patch is already fragmented, divided by a road. As such, fragmentation of a local population (if present) is considered unlikely. The proposal will remove small areas of habitat from the edge of larger patches of habitat which extend beyond the Study Area. Where signs of occupation were observed, adjoining areas of habitat beyond the Study Area will be retained. Habitat within the Study Area that will be removed is considered of moderate importance as it has the potential to support individuals and provide habitat for a local population. However, the presence of larger areas of similar habitat adjoining the Study Area reduces the risk of impacting the long-term survival of a local population of CPLS, if one is present.
• *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for the Cumberland Plains Land Snail.
• *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, two are relevant to the proposed action on Cumberland Plain Land Snail:

Factor	Species
	Cumberland Plain Land Snail *(Meridolum corneovirens*) (BC Act: E)
	Clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains potential habitat would be cleared. This habitat is fragmented from large areas of suitable habitat (24 ha). Similar habitat beyond the proposed modifications impact area will be retained which could be used by a local population. Removal of dead wood and dead trees – While there are few dead trees and dead wood in the Study Area, the removal of them has the potential to affect any Cumberland Plain Land Snails that may be present in the Study Area as they represent a component of habitat for the species.
Conclusion	The proposal would require the removal of 2.27 ha of habitat (of which 1.18 hectares had signs of occupation and 1.09 is associated habitat without signs of occupancy) to CPLS. The area of habitat that will be removed by the proposal is a small portion of the habitat adjoining the Study Area, which provides similar habitat resources CPLS and would support a local population, if one is present. Reduction in available habitat and loss of individuals has the potential to reduce the genetic diversity of a local population(s) (if present) through higher rates of inbreeding, however this is considered unlikely to cause a local population to be placed at risk of extinction. The proposal will result in additional fragmentation of potential habitat, however no signs of CPLS was found in the habitat to be fragmented and therefore a local population is considered unlikely to be fragmented. Based on the above points, although the proposal may impact a population of CPLS (if present), it is unlikely that the scale of the impacts, when compared with the extent of similar habitat adjoining the Study Area, is likely to cause a local population to be placed at risk of extinction. Therefore, a Biodiversity Development Assessment Report or Species Impact Statements is not required.
References	Department of the Environment (DotE) (2015). Conservation Advice *Pommerhelix duralensis* DURAL LAND SNAIL. NSW National Parks and Wildlife Services (NPWS) (2000) Environmental Impact Assessment Guidelines Cumberland Plain Large Land Snail Meridolum corneovirens (Pfeiffer, 1851).

Factor	Species
	Dural Land Snail *(Pommerhelix duralensis*) (BC Act: E)
Species information	*Pommerhelix duralensis* (the Dural land snail), also commonly known as the Dural Land Snail (Stanisic, 2010), is a medium sized snail with a dark brown to black semi translucent subglobose (almost spherical shaped) shell. Adults grow approximately 10–23 mm in height and 14–23 mm in width. The Dural land snail superficially resembles the related species *Meridolum corneovirens* (Cumberland Plain land snail), with which the Dural Land Snail is parapatric (the species' ranges are immediately adjacent to each other but do not significantly overlap) (Clark, 2005).
Proposed impacts	A total of 0.90 hectares of occupied habitat for DLS, comprising of 0.82 hectares of PCT 3320 and 0.08 hectares of PCT 3448, will be removed by the project. Signs of occupation were observed within the Study Area on the southern side of Cattai Road through observation of a live specimen. The area of occupied habitat to be removed represents 12.76% of the estimated total area of

Factor	Species
	Dural Land Snail *(Pommerhelix duralensis)* (BC Act: E)
	occupied habitat (7.05 ha) adjoining the project site. Although occupied habitat for DLS will be removed from by the project, sufficient habitat will be retained beyond the project site which can support a local population. Additionally, 1.37 hectares of potential habitat for DLS in patches of PCT 3320 and 3448 will be removed. Potential habitat includes all associated PCT which are fragmented from areas of occupied habitat.
• *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Dural Land Snail (DLS) are a low mobility species that utilise localised areas and similar habitat resources for foraging, sheltering and breeding. One live individual of DLS was identified south of Cattai Road during field surveys in a patch of vegetation representative an integrate between PCT 3320 and PCT 3448. DLS is known to inhabit and preference PCT 3448 and is less commonly found/associated with PCT 3320 (NSW Govt. 2024). PCT 3448 and the habitat resources required for DLS identified in the Study Area are also present on lands adjoining the Study Area. It is likely that the local population of DLS within the Study Area occupies habitat that extends beyond the Study Area, however this was not confirmed during site survey. The proposal has the potential to impact the lifecycle of a local population of DLS through habitat removal and potential impact to individuals. A total of 2.27 ha (of which 0.90 ha has signs of occupation by DLS and the remaining 1.37 ha is associated PCT without signs of occupation) of vegetation that constitutes potential habitat for this species will be removed. More than 7 ha of habitat, similar to what occurs in the Study Area, is present on lands adjoining the location where the live snail was found. These adjoining areas will not be impacted by the proposal and has potential to support other individuals from the local population. As this species occupies a very small home range and can fulfil its lifecycle process and stages within a localised areas of habitat any small populations are considered to be viable (NPWS, 2000). Populations of terrestrial snails are known to occupy patches of fragmented habitat, often less than 5 ha in area (DotE 2015). As more that 5 ha of suitable habitat will be retained beyond the Study Area, a present population is considered likely to persist following impacts from the proposed modification. However, the reduction in available habitat and potential loss of individuals has the potential to reduce the genetic diversity of the local population through higher rates of inbreeding. Although the proposal may have an adverse impact on the life cycle of the species through habitat removal and impact to individuals, it is unlikely that the removal of 2.27 ha of habitat (which 0.90 hectares is considered to be occupied by DLS) from a larger area of adjoining habitat will cause a local population to become unviable and be placed at risk of local extinction.
• *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not applicable.
• *In relation to habitat of a threatened species or community:* *(vii) extent to which habitat is likely to be removed or modified*	Approximately 2.27 ha of habitat (of which 0.90 hectares are considered to be occupied by DLS) will be removed as a result of proposed modification. The patch of occupied habitat is connected to larger patches of habitat (at least 7 ha) extending beyond the Study Area, which is considered suitable to the species and able to support a local population.

Factor	Species
	Dural Land Snail *(Pommerhelix duralensis)* (BC Act: E)
(viii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat *(ix) importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	Habitat for DLS in the locality and within the Study Area is fragmented by modified rural residence, existing roads and waterways. No large (>10 ha) intact areas of habitat will be impacted by the proposed modification. The proposal is unlikely to cause further fragmentation of potential habitat for DLS, as all impacts will occur to the edge of existing patches of habitat. The proposal will remove small areas of habitat from the edge of larger patches of habitat which extend beyond the Study Area. Adjoining areas of habitat beyond the Study Area will be retained and will be able to support the local population. Habitat within the Study Area that will be removed is considered of moderate importance as it supports individuals from a local population and provides potential habitat for a local population. However, the presence of larger areas of similar habitat adjoining the Study Area reduces the risk of impacting the long-term survival of a local population of DLS.
• *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for the Dural Land Snail.
• *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, two are relevant to the proposed action on Dural Land Snail: Clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains habitat of Dural Land Snail would be cleared. This habitat is fragmented from large areas of suitable habitat (10 ha). Similar habitat beyond the Study Area will be retained which could be used by the local population. Removal of dead wood and dead trees – While there are few dead trees and dead wood in the Study Area, the removal of them has the potential to affect any Dura Land Snails that may be present in the Study Area as they represent a component of habitat for the species.
Conclusion	The proposal would require the removal of 2.27 ha of potential habitat, of which 0.90 hectares is considered to be occupied by DLS. The area of habitat that will be removed by the proposal is a small portion of the habitat adjoining the Study Area, which provides similar habitat resources to DLS and would offer habitat to the local population. Reduction in available habitat and loss of individuals has the potential to reduce the genetic diversity of the local population through higher rates of inbreeding, however this is considered unlikely to cause a local population to be placed at risk of extinction. The proposal is unlikely to cause further fragmentation of potential habitat for DLS, as all impacts will occur to the edge of existing habitat. Based on the above points, although the proposal may impact a population of DLS, it is unlikely that the scale of the impacts, when compared with the extent of similar habitat adjoining the Study Area, is likely to cause a local population to be placed at risk of extinction. Therefore, a Biodiversity Development Assessment Report or Species Impact Statements is not required.
References	Department of the Environment (DotE) (2015). Conservation Advice *Pommerhelix duralensis* DURAL LAND SNAIL NSW Government (NSW Govt.) (2024) Threatened Biodiversity Data Collection. Threatened Biodiversity: Dural Land Snail NSW National Parks and Wildlife Services (NPWS) (2000) Environmental Impact Assessment Guidelines Cumberland Plain Large Land Snail Meridolum corneovirens (Pfeiffer, 1851).

Factor	Species
	Eastern False Pipistrelle *Falsistrellus tasmaniensis* (BC Act: V) **Eastern Free-tailed Bat *Micronomus norfolkensis* (BC Act: V)** **Southern Myotis *Myotis macropus* (BC Act: V)** **Greater Broad-nosed Bat *Scoteanax rueppellii* (BC Act: V)**
Species information	**Impacts to the above microbat species have been assessed in one test of significance due to the similarity in habitat requirements and potential impacts**. Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 metres and generally roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings (Churchill 1998, OEH 2024a). Eastern Coastal Free-tailed Bat occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range (OEH 2024b). They roost primarily in tree hollows but will also roost under bark or in man-made structures. The species is usually solitary but also recorded roosting communally. They are most likely insectivorous. The Greater Broad-nosed Bat forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 to 6 metres. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species (OEH 2024f.) Southern Myotis has most recently been recorded within 10 kilometres of the Study Area in 2022. The species is found in vegetated habitats associated with streams and permanent waterways, most commonly at low elevations in flat or undulating terrain (Churchill 1998). Habitats include riparian vegetation and in mangroves, paperbark swamps, rainforest, wet and dry sclerophyll forest and open woodland (OEH, 2024d). Southern Myotis roosts near water in caves, mine shafts, tree hollows, under bridges and in buildings, stormwater drains, culverts and amongst dense vegetation fringing watercourses (Churchill 1998).
Proposed impacts	The proposed action will involve the removal of 3.05 ha of suitable foraging habitat and 19 hollow bearing trees.
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	There has been no evidence of roosting sites within the study area. However, 19 hollow-bearing trees/stags containing hollows have been recorded in the study area of which 19 hollow-bearing trees/stags will be removed. These hollow-bearing trees provide potential roosting sites for all these species of hollow-dependant microbats. While the Eastern Freetail-bat and Greater Broad-nosed Bat were recorded in the study area in 2018, it is likely they use the site for foraging rather than for roosting due to the limited number of hollow-bearing trees and lack of evidence of their use as roosting sites. However, if any of the microbat species do use the hollow bearing trees as roosting sites, potential impacts to the breeding cycle of the microbats could include displacement of females with young or pregnant females. Whether these impacts occur is dependent on the timing of vegetation removal. Microbats area highly mobile species and any local populations would extend beyond the study area to include the greater locality. The study area and vegetation to be removed represents a very small amount of potential foraging habitat in comparison to the foraging habitat in the greater locality. Therefore, while potential roosting habitat for the five species of microbats will be removed in the form of 19 hollow-bearing trees/stags, this does not represent a significant amount of suitable habitat. Consequently, the proposed action is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of any of the species is likely to be placed at risk of extinction.

Factor	Species
	Eastern False Pipistrelle *Falsistrellus tasmaniensis* (BC Act: V) **Eastern Free-tailed Bat *Micronomus norfolkensis* (BC Act: V)** **Southern Myotis *Myotis macropus* (BC Act: V)** **Greater Broad-nosed Bat *Scoteanax rueppellii* (BC Act: V)**
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its local occurrence is likely to be placed at risk of extinction*	Not applicable.
c. *In relation to habitat of a threatened species or community:* i. *extent to which habitat is likely to be removed or modified* ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* iii. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	The proposed action will involve the removal of 3.05 ha of suitable foraging habitat for the Eastern Freetail-bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, and the Southern myotis. This is in the form of Cumberland Plain Woodland and Shale-gravel Transition Forest. The Southern Myotis forages over open water and as such there is no suitable foraging habitat for this species in the study area. Its foraging habitat will therefore not be impacted. Potential roosting habitat for all 4 microbat species will be impacted with the removal of 19 hollow-bearing trees/ stags. While roosting and foraging habitat will be affected this does not represent a large proportion of the 3.05 ha of suitable habitat which will be removed in the study area. Furthermore, as the foraging habitat of the microbats is expansive and nonspecific, this foraging and roosting habitat does not comprise a significant area of habitat within the locality. The loss of potential foraging and roosting habitat within the study area is not likely to be significant to the species, and is already heavily modified and fragmented from other areas of suitable habitat by rural residential development. As the species are highly mobile, these developments, and the proposed action, do not pose as barriers for the dispersal of the species. Therefore, any further fragmentation caused by the proposed action is negligible. The long-term survival of any of the five microbat species is unlikely to be affected by the removal of native vegetation.
d. *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for any of these threatened microbat species.
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Part 4, Division 5 of the BC Act, one is relevant to the potential impacts of the proposal on the above microbat species. • Clearing of native vegetation – Up to 3.05 hectares of native vegetation including 19 hollow bearing trees, containing potential foraging and dispersal habitat for threatened microbats would be cleared by the proposed modification. This does not represent a significant area of habitat in the Locality.
Conclusion	The proposal would require the removal of 3.05 hectares of potential habitat, including 19 hollow bearing trees. While the proposal may impact roosting and foraging habitat for Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Southern Myotis, and Greater Broad-nosed Bat, the removal of this habitat is unlikely to significantly impact the species as it would not fragment the local population, affect critical habitat, or interfere with the recovery of the species. The potential habitat to be cleared is not considered to be a significant area of habitat or of importance to the long-term survival of threatened microbats in the Locality. As a result, it is considered unlikely that the proposal represents a significant impact to these species. Species Impact Statements for these species are not therefore required.
References	Churchill, S. 2008. *Australian Bats*. Reed New Holland, Frenchs Forest. Office of Environment and Heritage [OEH] 2018. *Threatened Species Assessment Guidelines: The Assessment of Significance*. Office of Environment and Heritage, NSW. Office of Environment and Heritage [OEH] 2024a. *Eastern False Pipistrelle Threatened Species Profile.* Available from: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10331

Factor	Species
	Eastern False Pipistrelle *Falsistrellus tasmaniensis* (BC Act: V) **Eastern Free-tailed Bat *Micronomus norfolkensis* (BC Act: V)** **Southern Myotis *Myotis macropus* (BC Act: V)** **Greater Broad-nosed Bat *Scoteanax rueppellii* (BC Act: V)**
	Office of Environment and Heritage [OEH] 2024b. *Eastern Coastal Free-tailed Bat Threatened Species Profile.* Available from: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10544 Office of Environment and Heritage [OEH] 2024d. *Southern Myotis Threatened Species Profile.* Available from: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10549 Office of Environment and Heritage [OEH] 2024f. *Greater Broad-nosed Bat Threatened Species Profile*. Available from: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10748

Factor	Species
	Large Bent-winged Bat *Miniopterus orianae oceanensis* (BC Act: V) **Little Bent-winged Bat *Miniopterus australis* (BC Act: V)**
Species information	Large Bent-winged Bat (Miniopterus orianae oceanensis) is listed as Vulnerable under the BC Act. It occurs along the east coast of Australia. The species primarily roosts in caves, but will also use a range of man-made structures. They hunt in forested areas, catching moths and other flying insects above the tree tops (OEH 2018). While there is no suitable roosting habitat in the study area, potential foraging habitat is present. This species was recorded in the study area during 2018 BAR surveys. The Little Bentwing-bat is listed as Vulnerable under the BC Act and occurs along the east coast of NSW and ranges from the northern border south to Wollongong. The species is found in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub (OEH 2018). Little Bentwing-bats roost in caves, tunnels, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. While there is no suitable roosting habitat in the study area, potential foraging habitat is present. This species was not recorded in the study area during surveys.
Proposed impacts	Up to 3.05 ha of potential foraging habitat will be removed by this proposed modification.
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	The study area contains no caves, bridges, stormwater drains or culverts which would be suitable roosting sites for the Eastern Bentwing-bat or Little Bentwing-bat. Therefore, the proposed action will not directly impact the breeding of the microbat species. The study area provides suitable foraging habitat for both the Little Bentwing-bat and Eastern Bentwing-bat in the form of the Cumberland Plain Woodland, Shale-gravel Transition Forest and Coastal Floodplain Phragmites Reedland of which 3.05 ha will be removed. However, this is not a considerable amount in comparison to the larger areas of suitable habitat in the locality. While it is possible that breeding individuals may utilise this site for foraging, the high mobility of these species and the abundance of foraging habitat in the locality results in the proposed action being unlikely to have an adverse impact on their life cycle such that a viable local population is likely to be placed at risk of extinction.
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its*	Not applicable.

Factor	Species Large Bent-winged Bat *Miniopterus orianae oceanensis* (BC Act: V) Little Bent-winged Bat *Miniopterus australis* (BC Act: V)
local occurrence is likely to be placed at risk of extinction	
c. *In relation to habitat of a threatened species or community:* i. *extent to which habitat is likely to be removed or modified* ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* ii. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	3.05 ha of suitable foraging habitat will be removed because of the proposed action. This does not represent a large proportion of the of suitable habitat which will be retained in the study area and the locality. Furthermore, as the foraging habitat of the microbats is expansive and nonspecific, this foraging habitat does not comprise a significant area of habitat within the locality. The loss of potential foraging habitat within the study area is not likely to be significant to the species and is already heavily modified and fragmented from other areas of suitable habitat by rural residential development. As the species are highly mobile, these developments, and the proposed action, do not pose as barriers for the dispersal of the species. Therefore, any further fragmentation caused by the proposed action is negligible. The long-term survival of any of the Little Bentwing-bat and Large Bentwing-bat is unlikely to be affected by the removal of native vegetation.
d. *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for the large Bent-winged Bat or little Bent-winged bat
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Schedule 4 of the BC Act, one is relevant to the potential impacts of the proposed action on the two microbat species: Clearing of native vegetation – Approximately 3.05 ha of native vegetation that contains foraging habitat would be cleared. This does not represent a significant area of foraging habitat for the two microbat species in the locality
Conclusion	In consideration of the above five factors, the proposed action is unlikely to have a significant impact on any of the two cave dependent microbats in the study area or wider locality as a result of the current proposed action, as: As the study area contains no suitable roosting sites for the species, the proposed action is unlikely to adversely affect the lifecycle of any of the species such that a viable local population is likely to be placed at risk of extinction. The proposed action would remove foraging habitat for the species. However, this is a small and unimportant area in comparison to the large areas of foraging habitat in the locality. The proposed action would not substantially fragment habitat for the species. Consequently, a Species Impact Statement is not required to be prepared.

Factor	Species
	Gang-gang Cockatoo *Callocephalon fimbriatum* (BC Act: V) **Little Lorikeet *Glossopsitta pusilla* (BC Act: V)** **Dusky Woodswallow *Artamus cyanopterus cyanopterus* (BC Act: V)**
Species information	**Impacts to the above Woodland bird species have been assessed in one test of significance due to the similarity in habitat requirements and potential impacts.** The Gang-gang Cockatoo is listed as Vulnerable under the BC Act. The Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes of NSW. The species favours old growth forest and woodland for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts (OEH 2024a). The Little Lorikeet is listed as Vulnerable under the BC Act. The species is distributed widely from Cape York to South Australia and NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs. Little Lorikeet is hollow dependent, nesting in hollows with an approximate diameter of 3cm (OEH 2024b). The Dusky Woodswallow is listed as Vulnerable under the BC Act. The species 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. Nest are cup-shaped and made of twigs, nets sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow Remnant vegetation throughout the fragmented landscape within the Study Area may provide foraging habitat for the Little Lorikeet, Dusky Woodswallow and Gang-gang Cockatoo. Additionally there are tree hollows that could potential form nesting habitat.
Proposed impacts	Up to 2.27 hectares of potential foraging and breeding habitat for the Gang-gang Cockatoo, Dusky Woodswallow and Little Lorikeet will be removed within the proposal site, including 19 hollow-bearing trees.
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	The, Gang-gang Cockatoo and Little Lorikeet are hollow-dependent species for breeding. The proposal will require the removal of 19 hollow-bearing trees that contain several tree hollows of suitable size for both species to breed. However, no signs of hollow usage by these species were observed during site inspections. As such, it is unlikely that the impacts to a minimal extent of potential foraging and breeding habitat (2.27 hectares) would affect the lifecycle of these species such that a viable local population is placed at risk of extinction. Dusky Woodswallow are not hollow dependent but do often nest in hollows.
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community*	Not applicable.

Factor	Species
	Gang-gang Cockatoo *Callocephalon fimbriatum* (BC Act: V) **Little Lorikeet *Glossopsitta pusilla* (BC Act: V)** **Dusky Woodswallow *Artamus cyanopterus cyanopterus* (BC Act: V)**
such that its local occurrence is likely to be placed at risk of extinction	
c. *In relation to habitat of a threatened species or community:* i. *extent to which habitat is likely to be removed or modified* ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* iii. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	i. The proposal will be removing up to 2.27 hectares of native vegetation comprising PCTs 3320 and 3448. This vegetation represents potential foraging and breeding habitat for these bird species. Up to 19 hollow-bearing trees will also be removed that could provide potential roosting habitat for the Gang-gang Cockatoo, and Little Lorikeet, although no individuals were sighted, nor were there any signs of hollow usage for nesting. ii. The landscape surrounding the Study Area is of higher quality than the vegetation proposed to be removed by the works. As such the removal of vegetation exposed to a high level of edge effects with high weed incursions is unlikely to further isolate habitat as there is higher quality contiguous habitat surrounding the Study Area. iii. The extent of habitat to be removed (2.27 hectares) is of low importance given the already modified and fragmented habitat within the proposal site. Furthermore, the extent of potential foraging habitat to be removed represents a minimal proportion of the overall available habitat within the greater surrounds. It is therefore unlikely that the removal of habitat for the proposal is likely to affect the long-term survival of the species.
d. *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for the Gang Gang-cockatoo, Dusky Woodswallow or Little Lorikeet.
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in part 4, Division 5 of the BC Act, two are relevant to the potential impacts of the proposal on the three bird species: • Clearing of native vegetation – Up to 2.27 hectares of native vegetation that contains potential foraging and nesting habitat would be cleared. This does not represent a significant area of habitat for either species in the Locality. • Loss of hollow-bearing trees – the proposal will require the removal of 19 hollow-bearing trees which could provide nesting habitat. However, no signs of hollow usage by either species were observed during the site inspection. Mitigation measures will ensure that pre-clearance surveys would identify any breeding or nesting activities by these species and as far as practical no breeding sites would be disrupted.
Conclusion	The proposal would not remove, modify or further fragment or isolate a significant area of habitat for the Little Lorikeet, Dusky Woodswallow and Gang-gang Cockatoo. It would not impact the life cycle of any viable populations of the species. Therefore, the proposal is unlikely to have a significant impact on either hollow dependent bird species. Consequently, a Species Impact Statement is not required to be prepared.
References	Office of Environment and Heritage [OEH] 2024a. *Gang Gang-cockatoo Threatened Species Profile*. Available from:https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10975 Office of Environment and Heritage [OEH] 2024b. *Little Lorikeet Threatened Species Profile*. Accessed from: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20111

Factor	Species
	Powerful Owl *Ninox strenua* (BC Act: V) **Square-tailed Kite *Lophoictinia isura* (BC Act: V)** **Spotted Harrier *Circus assimilis* (BC Act: V)**
Species information	**Impacts to the above raptor species have been assessed in one test of significance due to shared characteristics such diets, habitat requirements and potential impacts.** Powerful Owl is listed as Vulnerable under the BC Act. The species occurs along the east coast of Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. The species inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Powerful Owls require large tree hollows to nest. They will return to use the same nest hollow annually within a territory. Territories range in size depending on the quality the habitat, abundance of prey and nesting hollows from 400 hectares in high quality habitats to 4000 hectares in lesser quality habitats. During the day they will roost in densely foliaged trees often within gullies. The Powerful Owl preys on medium-sized arboreal gliders and possums. Birds and flying foxes also comprise an important part of their diet in different regions (OEH 2024a). The Square-tailed Kite is listed as Vulnerable under the BC Act. The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 square km. Nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. Spotted Harrier is listed as Vulnerable under the BC Act. The Spotted Harrier is a medium-sized, slender bird of prey having an owl-like facial ruff that creates the appearance of a short, broad head, and long bare yellow legs. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. They occur throughout the Australian mainland and preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion. The fragmented remnant vegetation throughout the Study Area may provide foraging habitat for these raptors. There are potentially suitable tree for nesting. The raptors were considered to have a moderate likelihood of occurrence within the Study Area.
Proposed impacts	Up to 3.05 hectares of potential foraging habitat (3320, 3448 and 3692) and native planted vegetation) will be removed within the proposal site, as well as 19 hollow-bearing trees that contain hollows large enough for breeding purposes.
a. *Likelihood of an adverse effect on the life cycle of a threatened species such that a viable local population is likely to be placed at risk of extinction*	Hollow-bearing trees with hollows of suitable size for these raptor species could potentially be removed for the proposed modification. These raptor species require large tree hollows or large trees to nest, often returning seasonally to the nest tree. During the site inspection these hollows were not observed to be inhabited. The mature trees that are to be removed occur in disturbed areas, which may reduce their suitability for nesting sites. Furthermore, mitigation measures will ensure that clearing activities would avoid breeding periods for these raptor species, and that stag watches will be conducted on suitable hollow-bearing trees. As such, it is unlikely that the impacts to open forest and remnant forest habitat would impact the life cycle of these species such that a viable local population is placed at risk of extinction.
b. *Likelihood of an adverse effect on the extent or composition of an endangered or critically endangered ecological community such that its*	Not applicable.

Factor	Species
	Powerful Owl *Ninox strenua* (BC Act: V) **Square-tailed Kite *Lophoictinia isura* (BC Act: V)** **Spotted Harrier *Circus assimilis* (BC Act: V)**
local occurrence is likely to be placed at risk of extinction	
c. *In relation to habitat of a threatened species or community:* i. *extent to which habitat is likely to be removed or modified* ii. *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat* iii. *importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community*	i. The area of potential habitat to be removed is located within a highly fragmented landscape. These species are highly mobile, with expansive home ranges. Given the mobility of these species, their large home ranges and the limited suitability of the study site, it is highly unlikely that the proposal would result in the fragmentation or isolation of Raptor habitat. Within the Study Area these raptors may forage within remnants of open forest throughout the cleared landscape where prey species may nest, shelter or roost. The proposal would require the removal of some areas of open woodland habitat which provide potential breeding and foraging habitat for these prey species. ii. There are limited mature trees large enough to provide nesting habitat for these raptors. Hollow bearing trees and remnant vegetation are to be retained where possible. ii. As these raptors species are highly mobile, their habitat is not likely to become fragmented or isolated from other areas of habitat as a result of the proposed modification.
d. *Likelihood of an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*	A review of the Register of Declared Areas of Outstanding Biodiversity Value (AOBV) found that no AOBV have been declared for Powerful Owl, Square-tailed Kite or Spotted Harrier
e. *Whether the proposal is or is part of a key threatening process or is likely to increase the impact of a key threatening process*	Of the key threatening processes listed in Part 4, Division 5 of the BC Act, two are relevant to the potential impacts of the proposal on the above owl species. • Clearing of native vegetation – Up to 3.05 hectares of fragmented habitat would be cleared which provides potential habitat for the Powerful Owls, Square-tailed Kite and Spotted Harrier. This minimal extent represents a small area of available habitat within the vicinity, particularly when taking both species' large home ranges into consideration. • Removal of tree hollows – up to 19 hollow-bearing trees, potentially suitably sized for owl nest trees, are to be removed for the proposed modification. The removal of trees with suitable hollows will reduce the potential breeding habitat within the area. No clearing activities will be conducted during the breeding season.
Conclusion	The proposal will require the removal of up to 3.05 hectares of potential foraging habitat for these threatened raptor species. The minimal extent of native vegetation to be removed (3.05 hectares) is not considered to be a significant area of foraging habitat or of importance to the long-term survival of the species in the Locality considering their dispersal distance and home-ranges. Therefore, it is not anticipated that the proposal would impact a local viable population of the species such that they are placed at risk of extinction because of the minimal vegetation removal. Therefore, the proposal is unlikely to have a significant impact on either threatened raptor species. Consequently, Species Impact Statements are not required to be prepared for these species.
References	Office of Environment and Heritage [OEH] 2024a. *Powerful Owl Threatened Species Profile*. Available from: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10562 Office of Environment and Heritage [OEH] 2024a. *Spotted Harrier Threatened Species Profile*. Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=20134 Office of Environment and Heritage [OEH] 2024a. *Square-tailed Kite Threatened Species Profile*. Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10495

APPENDIX F SIGNIFICANT IMPACT ASSESSMENTS (EPBC ACT)

Significant Impact Criteria assessments have been prepared for all threatened species or ecological communities considered to have a moderate to high likelihood of occurrence in the Study Area. Assessments have been prepared in accordance with the *Matters of National Environmental Significance: Significant impact guidelines* (Commonwealth Department of the Environment, 2013). Assessment outcomes for threatened species or ecological communities are summarised in Table 9-2.

Table 9-2 Summary of Significant Impact Criteria assessments for threatened species or ecological communities

Scientific name	Common name	EPBC Act	Significant Impact
Threatened Ecological Community			
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest in the Sydney Basin Bioregion		Critically Endangered	Unlikely
Flora			
Acacia pubescens	Downy Wattle	Vulnerable	Unlikely
Micromyrtus minutiflora		Endangered	Unlikely
Pimelea spicata	Spiked Rice-flower	Endangered	Unlikely
Fauna			
Pteropus policephalus	Grey-headed Flying Fox	Vulnerable	Unlikely
Pommerhelix duralensis	Dural Land Snail	Endangered	Unlikely
Callocephalon fimbriatum	Gang-gang cockatoo	Endangered	Unlikely

Threatened Ecological Community Significant Impact Criteria

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest in the Sydney Basin Bioregion

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest listed as Critically Endangered under the EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of an important population of a species	A total of 1.61 ha of Cumberland Plain Woodland and Shale-Gravel Transition Forest would be impacted by the investigations. Within the regional context of the regional vegetation mapping the clearing of 1.61 ha represents 0.001 per cent of the remaining Cumberland Plain Woodland and Shale-Gravel Transition Forest in the Locality. This minor clearance in the broader context is unlikely to lead to a long-term decrease in the population.
• Reduce the area of occupancy of an important population	A total of 1.61 ha of Cumberland Plain Woodland and Shale-Gravel Transition Forest would be impacted by the investigations. Contiguous vegetation mapping of the Cumberland Plains Woodland present in the Study Area has identified 1953 hectares of contiguous vegetation (patches connected within 100m). The clearing of 1.61 ha represents 0.09 per cent of the contiguous vegetation. With even more Cumberland Plains Woodland present in the Locality. In 2009, the extent of the community was estimated at 12,300 ha. The removal or modification of up to 1.61 ha of Cumberland Plain Woodland and Shale-Gravel Transition Forest is not likely to have a significant impact on the community.
• Fragment an existing important population into two or more populations	The proposed investigations would result in linear impacts to an existing patch that would isolate and fragment the ecological community. The Cumberland Plain Woodland and Shale-Gravel Transition Forest in the broader landscape has been subject to clearing for residential, industrial and infrastructure purposes. As such it is an already fragmented condition. Although the proposal would further fragment this patch, it is not likely to result in a significant impact to the community because of the existing level of fragmentation.
• Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of an ecological community is defined as habitat required for: • The long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators), or • For the reintroduction of populations or recovery of the species or ecological community. The Cumberland Plain Woodland and Shale-Gravel Transition Forest within the Study Area would not be considered critical to the survival of the community. The reason for this is the condition of the vegetation present in addition to the land tenure and lack of protection that this vegetation is afforded. The Study Area is located on the interface of bushland and the residential centre of Pitt Town and has been modified by previous land management practices. To the east of the Study Area, Scheyville National Park provides a well-protected remnant that would be considered critical to the survival of the community. This land would not be affected by the proposed modification

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Disrupt the breeding cycle of an important population	Not applicable as not a species
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Not applicable as not a species
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Several exotic species were recorded in the Cumberland Plain Woodland and Shale-Gravel Transition Forest in the Study Area. Weed management protocols will be implanted as a part of the REF safeguards and exposed soil (such as batters) will be revegetated following construction. The clearing of native vegetation and movement of construction equipment will be strictly limited to the construction footprint. A number of non-native fauna species were also recorded within the Study Area. The proposal is unlikely to assist any of these invasive species.
• Introduce disease that may cause the species to decline	Not applicable as not as species
• Interfere substantially with the recovery of the community.	The proposed investigations would result in the loss or modification of up to 1.61 ha of Cumberland Plain Woodland and Shale-Gravel Transition Forest within the investigations area. This is not consistent with the recovery of the community. However, based on the small scale and existing condition of the vegetation to be impacted, it is unlikely that the proposed investigations would interfere with the recovery of the community.
Conclusion	It is unlikely that the proposed investigations would have a significant impact on Cumberland Plain Woodland and Shale-Gravel Transition Forest for the following reasons: • The area that would be removed or modified is small and comprised of already modified and partially disturbed vegetation • The investigations would further fragment or isolate the community, however the community is in an already fragmented and isolated condition. • The investigations would not have an adverse effect on habitat critical to the survival of the community • The investigations would not significantly modify the composition or any abiotic influences of the community. For this reason, referral of the action to the Commonwealth Department of the Environment and Energy is not required.

Threatened Flora Significant Impact Criteria

Downy Wattle *(Acacia pubescens)*

The Downy Wattle is listed as Vulnerable under the EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of an important population of a species	An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • Key source populations either for breeding or dispersal. • Populations that are necessary for maintaining genetic diversity and/or; • Populations that are near the limit of the species range. While the species has been recorded within the Study Area, there have been numerous other clusters of the species previously recorded in close proximity to the Study Area. The removal of one individual is negligible in comparison to the large number of individuals in the local area. Therefore, the proposed action would not lead to a long-term decrease in the size of an important population of a species.
• Reduce the area of occupancy of an important population	The proposal will involve the removal of 2.27 ha of suitable habitat for *Acacia pubescens* and one individual. However, this habitat is heavily modified and fragmented, having only tenuous links to other areas of suitable habitat and the local population. Therefore, the removal of this vegetation will not reduce the area of occupancy of an important population.
• Fragment an existing important population into two or more populations	The proposed action will occur in an area already heavily fragmented. Any fragmentation caused by the proposed action is therefore negligible. One individual of the species will be removed but other populations will not be impacted. Therefore, an existing important population will not be fragmented into two or more populations.
• Adversely affect habitat critical to the survival of a species	No critical habitat has been declared for the species.
• Disrupt the breeding cycle of an important population	By removing one individual *Acacia pubescens the* breeding cycle of these individuals will be impacted however the larger local population will not be impacted. Therefore, the breeding cycle of an important population will not be disrupted.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	2.27 ha of suitable habitat will be removed from the Study Area with additional areas of suitable habitat potentially impacted by indirect impacts and edge effects. However, in relation to the greater amount of habitat available in the area, particularly in Scheyville National Park, the habitat

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	impacted is comparatively low. Furthermore, the habitat is highly modified and fragmented. As such, the proposed action will not remove or modify the habitat of *Acacia pubescens* such that the species is likely to decline.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Exotic grasses are abundant in the Study Area and the proposed action may facilitate the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of potential habitat for the species. However, with the appropriate control measures enforced, the likelihood of this happening is significantly reduced
• Introduce disease that may cause the species to decline	The proposed action is unlikely to result in the introduction of disease to the population of *Acacia pubescens* in the Study Area
• Interfere substantially with the recovery of the species.	The proposal is broadly consistent with the identified local priority recovery and threat abatement actions and would not interfere substantially with the recovery of *Acacia pubescens.*
Conclusion	In consideration of the above factors, the proposed activity is unlikely to have "a significant effect "on *Acacia pubescens* in the Study Area or wider Locality as a result of the proposed action, as: • The reduction in the population size and habitat of the species is negligible in comparison to the greater local population size and habitat. • The proposed action would not fragment a population of the species, disrupt its breeding cycle or affect habitat critical to its survival; and • Whilst the proposed action may exacerbate invasive species spread, invasive species currently dominate in the ground layer of most of the Study Area, and the *Acacia pubescens* habitat is already heavily modified. Consequently, a referral to the commonwealth minister for the Environment is not required.

Micromyrtus minutiflora

Micromyrtus minutiflora listed as Vulnerable under the EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of an important population of a species	The proposed action will involve the clearing of 2.27 ha of habitat suitable to *Micromyrtus minutiflora* which is not known to currently contain any individuals of the species. The nearest record of the species will not be impacted by the proposed modification.
• Reduce the area of occupancy of an important population	2.27 ha of suitable *Micromyrtus minutiflora* habitat will be removed as a result of the proposed modification. This suitable habitat consists of Cumberland Plains Woodland (PCT 3320) and Castlereagh Ironbark Forest (PCT 3448). This habitat is heavily modified and fragmented by rural residential development in the area. It is also isolated from populations of *Micromyrtus minutiflora* and therefore it is unlikely that they would inhabit this area. Therefore, the proposed action will not reduce the area of occupancy for any nearby populations.
• Fragment an existing important population into two or more populations	As there are no populations in close proximity to the Study Area and the landscape is already modified and fragmented, the proposed action will not fragment an existing population into two or more populations.
• Adversely affect habitat critical to the survival of a species	The site is not critical to the survival of the species. While a small area of suitable habitat will be removed, *Micromyrtus minutiflora* does not currently inhabit this area. Therefore, the proposed action will not adversely affect habitat critical to the survival of a species.
• Disrupt the breeding cycle of an important population	As the closest population is over 5km away, they will not be impacted by the proposed action. Therefore, the breeding cycle of an important population will not be disrupted.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would result in the removal of a small area (2.27 ha) of potential habitat for *Micromyrtus minutiflora*. The area of impact does not support any above-ground occurrence of the species and it is unlikely that it occurs in the soil seed bank in this location either. The species habitat would not be impacted by the proposed action such that it is likely to decline
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Exotic grasses are abundant in the Study Area and the proposed action may facilitate the spread of seeds or fragments of plant to areas where these grasses are not present, via plant or contaminated topsoil. This could include areas of potential habitat for the species. However, with the appropriate control measures enforced, the likelihood of this happening is significantly reduced
• Introduce disease that may cause the species to decline	The proposed action is unlikely to result in the introduction of disease to an existing population of *Micromyrtus minutiflora* as they were not detected within the Study Area
• Interfere substantially with the recovery of the species.	The proposal would not interfere substantially with the recovery of *Micromyrtus minutiflora*

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Conclusion	In consideration of the above factors, the proposed activity is unlikely to have “a significant effect” on Micromyrtus minutiflora in the Study Area or wider Locality as a result of the proposed action, as: • The proposed action would not reduce the area of occupancy or population size of the species; • The proposed action would not fragment a population of the species, disrupt its breeding cycle or affect habitat critical to its survival; and • Whilst the proposed action may exacerbate invasive species spread, invasive species currently dominate in the ground layer of most of the Study Area, and the *Micromyrtus minutiflora* habitat is already heavily modified. Consequently, a referral to the commonwealth minister for the Environment is not required.

Spiked Rice-flower *(Pimelea spicata)*

Pimelea spicata (Spiked Rice-flower) is listed as Endangered under the EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of an important population of a species	*Pimelea spicata* was not recorded in the Study Area during ecological surveys. The nearest known population of *P. spicata* is approximately 4 km to the east of the Study Area and will not be impacted by the proposed action. Furthermore, the species has a low seed dispersal range and therefore, as there are no recordings in or near the Study Area it is unlikely that P. spicata occurs in the seedbank. While the proposed action will result in the removal of 1.80 ha of potential habitat for *P. spicata*, as no individuals have been recorded in the area it is considered highly unlikely that it will result in a long-term decrease in the size of a population.
• Reduce the area of occupancy of an important population	The proposed action would result in the reduction of 1.80 ha of suitable habitat for *P. spicata* in the form of Cumberland Plain Woodland (PCT 3320). This habitat is currently heavily modified and fragmented by existing roads and rural development. It is also isolated from other areas of suitable habitat. Due to this, the habitat is considered sub-optimal and any reduction to the area of occupancy of the species would be negligible
• Fragment an existing important population into two or more populations	The potential habitat for P. spicata to be removed consists of patches of vegetation currently fragmented by roads and dwellings. In a larger context, the Study Area is situated within a mosaic of rural residential development with only patches of vegetation which have been heavily modified. Any further fragmentation caused by this proposed action would therefore be negligible. Furthermore, as the nearest record of the species is over 4 km away and the Study Area is not an important habitat corridor, the proposed action is unlikely to further isolate any individuals or groups of individuals. Therefore, the proposed action will not fragment an existing population of P. spicata into two or more populations.
• Adversely affect habitat critical to the survival of a species	There is no critical habitat listed for P. spicata. The 1.80 ha of fragmented potential habitat to be removed is not considered to be habitat critical to the survival of this species.
• Disrupt the breeding cycle of an important population	P. spicata is dependent on seed production for recruitment and while dispersal mechanisms for the species are unknown, seed dispersal is likely to be very low, with most seedlings observed in proximity to adult plants. Due to this, and because the species has not been recorded in close proximity to the Study Area, it is highly unlikely that the proposed action will disrupt the breeding cycle of a population.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will result in the clearing of 1.80 ha of suitable habitat in the form of Cumberland Plain Woodland. This habitat is currently heavily modified and fragmented by existing roads and rural development. It is also isolated from other areas of suitable habitat. The proposed action will further fragment the vegetation however, due to its current extensive modification, any further fragmentation is negligible. As the species is not known to inhabit this area, it is highly unlikely that its removal will lead to the decline of the species.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	While the proposed action may result in the spread of some exotic grasses, it is unlikely that the action will result in the establishment of an invasive species that is harmful to P. spicata.
• Introduce disease that may cause the species to decline	The proposed action is unlikely to result in the introduction of disease to an existing population of *P. spicata as* they were not detected within the Study Area
• Interfere substantially with the recovery of the species.	A recovery plan has been prepared for *Pimelea spicata*. The overall objective of the recovery plan is "to ensure the continued and long-term survival of P. spicata in the wild by promoting the in-situ conservation of the species across its natural range". This plan consists of six specific recovery objectives (DEC 2005 p18): 1. Conserve P. spicata using land-use and conservation planning mechanisms Actions associated with this recovery objective include ensuring that: all relevant Environmental Planning Instruments (prepared under Pt 3 of the EP&A Act) are prepared, or reviewed, with reference to this recovery plan and any future advice from the Department of Environment and Conservation regarding the species. All relevant consent and determining authorities (under Pt 4 & 5 of the EP&A Act) will assess developments and activities with reference to this recovery plan, environmental impact assessment guidelines... and any future advice from the Department of Environment and Conservation regarding the species. The proposal is being assessed with reference to the recovery plan, environmental impact assessment guidelines and all publicly available information regarding the species. 2. identify and minimise the operation of threats at sites where P. spicata occurs. This recovery objective is aimed at minimising threats operating at known P. spicata sites (in addition to land clearing), including weed invasion; mowing and slashing; spraying of herbicide; dumping of rubbish and garden waste; inappropriate disturbance regimes; and grazing and associated trampling. While there is a possibility that the proposed action may result in an increase in some of these threats, the Study Area is not a known P. spicata site and therefore this recovery objective is not applicable. 3. implement a survey and monitoring program that will provide information on the extent and viability of P. spicata. Not relevant to the current assessment. 4. Provide the community with information that assists in conserving the species. Not relevant to the current assessment. 5. Raise awareness of the species and involve the community in the recovery program. Not relevant to the current assessment. 6. Promote research questions that will assist future management decisions. Not relevant to the current assessment.
Conclusion	In consideration of the above factors, the proposed activity is unlikely to have "a significant effect" on P. spicata in the Study Area or wider Locality as a result of the proposed action, as: • The proposed action would not reduce the area of occupancy or population size of the species; • The proposed action would not fragment a population of the species, disrupt its breeding cycle or affect habitat critical to its survival; and

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	• Whilst the proposed action may exacerbate invasive species spread, invasive species currently dominate in the ground layer of most of the Study Area, and the P. spicata habitat is already heavily modified. Consequently, a referral to the commonwealth minister for the Environment is not required.

Threatened Fauna Significant Impact Criteria

Grey-headed Flying-fox *(Pteropus poliocephalus)*

The Grey-headed Flying-fox is listed as Vulnerable under both the BC and EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of an important population of a species	The closest known population of Grey-headed Flying-fox to the Study Area is at the roosting camp located at Yarramundi (Camp ID 97) approximately 16 km west of the site. Other camps are located further south at Emu Plains (Camp ID 237) and Paramatta Park (Camp ID 134), located 24 and 27 km from the Study Area, respectively. While these populations may utilise parts of the Study Area for foraging, this foraging resource does not comprise a significant area of foraging habitat within the Locality. As Grey-headed Flying-foxes forage on a large variety of both native and exotic vegetation, their foraging habitat is extensive. Therefore, the vegetation to be cleared is negligible in comparison to the vast amount of foraging habitat in the Locality. Furthermore, the species does not currently use the Study Area for permanent roosting or as a maternity camp. Therefore, the proposed action is highly unlikely to lead to a long-term decrease in the size of an important population of the species.
• Reduce the area of occupancy of an important population	There are three camps near the Study Area, are 16, 24 and 27 km away. Individuals from these camps may utilise foraging resources within the Study Area however the 1.8 ha of potential foraging habitat to be cleared does not represent a substantial amount of habitat in comparison to the amount of suitable foraging habitat in the greater local area. The removal of a relatively small portion of potential foraging habitat from the Study Area would not significantly reduce the area of occupancy of the species
• Fragment an existing important population into two or more populations	There are no roosting sites in or in close proximity to the Study Area. The nearest roosting camps will not be impacted by the proposed action. The removal of potential foraging habitat from the Study Area would not fragment the population of the Grey-Headed Flying-fox into two or more populations.
• Adversely affect habitat critical to the survival of a species	Whilst the proposal would result in the removal of potential foraging habitat, this habitat is not likely to be habitat critical to the survival of this species
• Disrupt the breeding cycle of an important population	There is no known maternity roosting camp of Grey-headed Flying-foxes within, or in close proximity to, the Study Area. The Study Area provides a potential foraging resource for a roosting camp 16 km to the west of the Study Area. Breeding individuals from nearby camps that utilise resources at the Study Area could be adversely impacted by the removal of foraging habitat. However, vegetation removal would be within a relatively small area (2.27 ha) in comparison to the vegetation that would be retained within the Study Area as well as in comparison to the local area. This amount of clearing would therefore not significantly diminish the foraging resources in the region that would support breeding females

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would result in the removal of 2.27 ha of potential foraging habitat for the Grey headed Flying-fox. This represents a small amount of the total suitable foraging habitat to be retained in the Study Area and the Locality. Furthermore, as the foraging habitat of Grey-headed Flying-foxes is expansive and nonspecific, this foraging resource does not comprise a significant area of foraging habitat within the Locality. The loss of potential foraging habitat within the Study Area is not likely to be significant to the species and is already heavily modified and fragmented from other areas of suitable habitat by rural residential development. Therefore, any further fragmentation caused by the proposed action is negligible. The proposed action is highly unlikely to impact the availability and quality of habitat to the extent that the species is likely to decline
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The action is unlikely to result in the establishment of an invasive species that is harmful to the Grey-Headed Flying-fox. Known predators of the species include native reptiles and birds; no invasive exotic fauna species are known to predate upon Grey-Headed Flying-foxes. The action is highly unlikely to result in the establishment of invasive flora species that are harmful to the Grey- Headed Flying-fox.
• Introduce disease that may cause the species to decline	The action is highly unlikely to introduce disease that may cause the Grey-Headed Flying-fox to decline
• Interfere substantially with the recovery of the species.	The Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*) (DAWE 2021) lists two recovery objectives for the species. These are: • To improve the Grey-headed flying-fox national population trend by reducing the impact of threatening processes on Grey-headed Flying-foxes through habitat identification, protection, restoration and monitoring, and; • To assist communities and Grey-headed flying-fox to coexist through better education, stakeholder engagement, research, policy and continued support to fruit growers. Other more specific actions are detailed in the plan that are not relevant to the proposed modification. While the proposal does not contribute to these actions, it does not substantially interfere with any recovery actions for this species, since removal is only of a small amount of potential foraging habitat. Therefore, the extent of impacts is not enough to interfere substantially with the recovery of the species.
Conclusion	Although the proposed action would result in the removal of potential foraging habitat, it is not likely to lead to a decline in the species or reduce the area of occupancy. Therefore, the proposal would not have a significant impact on Grey-headed Flying-fox and as such, Referral to the Minister is not required.

Gang-gang Cockatoo *(Callocephalon fimbriatum)*

The Gang-gang Cockatoo is listed as Endangered under both the BC and EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of a population	The proposal would be removing up to 2.27 hectares of potential foraging and dispersal habitat for Gang-gang Cockatoo (PCT 3320, and 3448). Gang-gang Cockatoo are highly mobile and able to move between patches of available habitat easily. The proposal is removing a small area habitat comprising a minute proportion of available habitat in the vicinity, including a small area of potential breeding habitat. It is unlikely the removal of this small area of habitat by the proposal would lead to a long-term decrease in the species population
• Reduce the area of occupancy of the species	The proposal are removing a small area habitat (2.27 hectares) comprising a minute proportion of available habitat in the vicinity, including a small area of potential breeding habitat. It is unlikely the removal of this small area of habitat would reduce the area of occupancy of the species.
• Fragment an existing population into two or more populations	The proposal is removing a small area habitat (2.27 hectares). It is unlikely that the proposal would fragment an existing population into two or more populations.
• Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of a species or ecological community' refers to areas that are necessary: • For activities such as foraging, breeding, roosting, or dispersal. • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators); • to maintain genetic diversity and long-term evolutionary development; or • for the reintroduction of populations or recovery of the species or ecological community The proposal would be removing up to 2.27 hectares of potential habitat for Gang-gang Cockatoo. While it is possible the species may use the Study Area on occasion, the species is highly mobile and unlikely to be dependent on the habitat. No habitat to be removed by the proposal is therefore considered critical habitat to the survival of the Gang-gang Cockatoo
• Disrupt the breeding cycle of a population	The proposal would be removing up to 2.27 hectares of potential habitat for Gang-gang Cockatoo, including up to 19 hollow bearing tree which may contain breeding habitat for the species. However, as no sightings of the species exist on the Study Area, nor were any of the species observed during surveys it is unlikely the habitat to be removed would be essential breeding habitat of the species.
• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of a small area of habitat for Gang-gang Cockatoo would not decrease availability or quality of habitat such that the species is likely to decline.
• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically	The proposal could result in further spread of invasive plant species, impacting foraging habitat for the species. However, the Study Area is already subject to a moderate level of disturbance due to exotic vegetation, and subsequently impacts by the proposal on the spread of invasive species are minimal.

endangered or endangered species' habitat	
• Introduce disease that may cause the species to decline	The proposal are highly unlikely to introduce disease that may cause a decline in Gang-gang Cockatoo.
• Interfere substantially with the recovery of the species.	While the proposal would be removing foraging habitat of the Gang-gang Cockatoo, the extent of impacts is not enough to interfere substantially with the recovery of the species
Conclusion	The proposed action would not impact on an important population of Gang-gang Cockatoo. Though the proposed action would result in the removal of potential habitat it is not likely to lead to a decline in the species or reduce the area of occupancy. Therefore, the proposal would not have a significant impact on Gang-gang Cockatoo and as such, Referral to the Minister is not required.

Dural Land Snail *(Pommerhelix duralensis)*

The Dural Land Snail is listed as Endangered under both the BC and EPBC Act.

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• Lead to a long-term decrease in the size of an important population of a species	An 'important population' is a population that is necessary for a species' long-term survival and recovery. Given the species occurs in a limited location and has a fragmented distribution the Committee considers all populations to be important. (DotE, 2015). Dural Land Snail (DLS) are a low mobility species that utilise localised areas and similar habitat resources for foraging, sheltering and breeding. One live individual of DLS was identified south of Cattai Road during field surveys in a patch of vegetation representative an integrate between PCT 3320 and PCT 3448. DLS is known to inhabit and preference PCT 3448 and is less commonly found/associated with PCT 3320 (NSW Govt. 2024). A total of 0.90 hectares of occupied habitat for DLS (comprising of 0.82 hectares of PCT 3320 and 0.08 hectares of PCT 3448), will be removed by the project. Signs of occupation were observed within the construction footprint on the southern side of Cattai Road through observation of a live specimen within PCT 3320. The area of occupied habitat to be removed represents 12.76% of the estimated total area of occupied habitat (7.05 ha) adjoining the project site. Although occupied habitat for DLS will be removed from by the project, sufficient habitat will be retained beyond the project site which can support a local population. Additionally, 1.37 hectares of potential habitat for DLS in patches of PCT 3320 and 3448 will be removed. Potential habitat includes all associated PCT which are fragmented from areas of occupied habitat. This totals 2.27 ha of potential and occupied habitat to be removed for the DLS. Considering that PCT 3448 and 3320, (the habitat resources required for DLS identified in the Study Area) are also present on lands adjoining the Study Area it is likely that the population of DLS within the Study Area occupies habitat that extends beyond the Study Area, however this was not confirmed during site survey. As there are comprehensive mitigation measures in place to safeguard the DLS that may occur within the

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	construction footprint, such as: relocating these individuals to adjacent habitat, it is unlikely that the proposal will lead to a long-term decrease in the size of an important population of the species. The size of the population detected is unknown however, the Dural Land Snail is known to only inhabit a density of 3 snails per hectare. The area to be removed is considered small in comparison to the suitable habitat in the wider Locality, with at least 7 ha of suitable habitat for the snails contiguous to the Study Area. Although the proposal may have an adverse short-term impact of snail relocation and habitat removal, it is unlikely that the removal of 2.27 ha of habitat associated with the DLS (of which 0.90 hectares is considered to be occupied by DLS and 1.37 ha are considered suitable) from a larger area of adjoining habitat will cause a long-term decrease to the species.
• Reduce the area of occupancy of an important population	Although, 0.90 ha of habitat considered occupied and 1.37 ha of habitat that is considered suitable, will be removed as a result of proposed modification, the patch of occupied habitat is connected to larger patches of habitat (at least 7 ha) extending beyond the Study Area, which is considered suitable to the species and able to support a population. As such, even though the area of occupancy would be reduced by the proposed modification, individuals of this species do not require a large home range/foraging area, so the slight reduction in area of occupancy would not be considered to significantly reduce the population size. Habitat for DLS in the locality and within the Study Area is fragmented by modified rural residence, existing roads and waterways. No large (>10 ha) intact areas of habitat will be impacted by the proposed modification. The proposal is unlikely to cause further fragmentation of potential habitat for DLS, as all impacts will occur to the edge of existing patches of habitat.
• Fragment an existing important population into two or more populations	Dural Land Snail (DLS) are a low mobility species that utilise localised areas and similar habitat resources for foraging, sheltering and breeding. One live individual of DLS was identified south of Cattai Road during field surveys in a patch of vegetation representative an integrate between PCT 3320 and PCT 3448. DLS is known to inhabit and preference PCT 3448 and is less commonly found/associated with PCT 3320 (NSW Govt. 2024), the plant community type within which it was identified. Of the 2.27 ha of suitable habitat (occupied and potential) within the Study Area the “preferred habitat” PCT 3448 is located across Cattai Road from where the snails were identified. As such, access to this habitat is considered already fragmented. No DLS were detected North of Cattai Road, however should they be identified during pre-clearance surveys DLS north of Cattai Road would be considered to form part of a separate population. The proposed works would not fragment the existing population into two or more subpopulations as there is habitat (approximately 7 ha) contiguous to the 0.90 ha of habitat determined occupied by DLS. It is likely that the DLS within the Study Area occupies habitat that extends beyond the Study Area, however this was not confirmed during site survey.
• Adversely affect habitat critical to the survival of a species	The proposal will remove small areas of habitat from the edge of larger patches of habitat which extend beyond the Study Area. Adjoining areas of habitat beyond the Study Area will be retained and will be able to support the identified population. Habitat within the Study Area that will be removed is considered of moderate importance as it supports individuals from a local population and provides potential habitat. However, the presence of larger areas of similar habitat adjoining the Study Area reduces the risk of impacting habitat critical to the survival of the species. For individuals within the Study Area, mitigation measures will ensure these individuals are relocated. Provided that relocation is adjacent to the

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	Study Area in suitable habitat, the removal of habitat within the Study Area is not considered critical to these individuals' survival or the survival of this species.
• Disrupt the breeding cycle of an important population	The proposal has the potential to impact the breeding cycle of a local population of DLS through habitat removal and potential impact to individuals. A total of 2.27 ha (of which 0.90 ha is considered to be occupied by DLS and 1.37 ha are considered associated habitat) of vegetation that constitutes potential habitat for this species will be removed. More than 7 ha of habitat, similar to what occurs in the Study Area, is present on lands adjoining the location where the live snail was found. These adjoining areas will not be impacted by the proposal and has potential to support other individuals from the population. As this species occupies a very small home range and can fulfil its breeding process within a localised areas of habitat any small populations are considered to be viable (NPWS, 2000). Populations of terrestrial snails are known to occupy patches of fragmented habitat, often less than 5 ha in area (DotE 2015). As more that 5 ha of suitable habitat will be retained beyond the Study Area, a present population is considered likely to persist following impacts from the proposed modification. However, the reduction in available habitat and potential loss of individuals has the potential to reduce the genetic diversity of the local population through higher rates of inbreeding. The proposal should not have a significantly adverse impact on the breeding cycle of the DLS.
• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Habitat for DLS in the locality and within the Study Area is fragmented by modified rural residence, existing roads and waterways. No large (>10 ha) intact areas of habitat will be impacted by the proposed modification. The proposal is unlikely to cause further fragmentation of potential habitat for DLS, as all impacts will occur to the edge of existing patches of habitat.
• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Impacts of invasive species is not well understood in the Dural Land Snail. Approximately 2.27 ha of suitable habitat for the species will be removed as a result of the proposed action. The removal of this habitat is unlikely to introduce invasive species that may cause the Dural Land Snail to decline.
• Introduce disease that may cause the species to decline	Impacts of disease is not well understood in the Dural Land Snail. Approximately 2.27 ha of suitable habitat for the species will be removed as a result of the proposed action. The removal of this habitat is unlikely to introduce disease that may cause the Dural Land Snail to decline.
• Interfere substantially with the recovery of the species.	A recovery plan for the species is *not* recommended as the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats (DotE, 2015). Key threats include: The clearing of native vegetation – Approximately 2.27 ha of native vegetation that contains habitat of Dural Land Snail would be cleared (0.90 ha of which is considered occupied). This habitat is fragmented from large areas of suitable habitat (10 ha). Similar habitat beyond the Study Area will be retained which could be used by this species. Removal of dead wood and dead trees – While there are few dead trees and dead wood in the Study Area, the removal of them has the

The action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	potential to affect any Dura Land Snails that may be present in the Study Area as they represent a component of habitat for the species. Despite key threats, the proposal is considered unlikely to interfere substantially with the recovery of the species considering the 7 ha of contiguous vegetation to the Study Area.
Conclusion	The proposal would require the removal of 2.27 ha of suitable habitat, of which 0.90 hectares is considered to be occupied by DLS. The area of habitat that will be removed by the proposal is a small portion of the habitat adjoining the Study Area, which provides similar habitat resources to DLS and would offer habitat to the local population. Reduction in available habitat and loss of individuals has the potential to reduce the genetic diversity of the local population through higher rates of inbreeding, however this is considered unlikely to cause the species to be placed at risk of extinction. The proposal is unlikely to cause further fragmentation of potential habitat for DLS, as all impacts will occur to the edge of existing habitat. Based on the above points, although the proposal may impact a population of DLS, however it is unlikely that the scale of the impacts, when compared with the extent of similar habitat adjoining the Study Area, is likely to cause the species to be placed at risk of extinction. Therefore, a Referral to the Minister is not required.
References	Department of the Environment (DotE) (2015). Conservation Advice *Pommerhelix duralensis* DURAL LAND SNAIL