Active Gas Collection System - Flora and Fauna Assessment

Penrith Waste Services

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DOCUMENT TRACKING

Project Name	Active Gas Collection System - Flora and Fauna Assessment
Project Number	14398
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Status	**Draft**
Version Number	**V1**
Last saved on	**17 February 2020**

This report should be cited as 'Eco Logical Australia 2020. *Active Gas Collection System- Flora and Fauna Assessment*. Prepared for Penrith Waste Services.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Harry Singh c/o Penrith Waste Services

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
DCP	Development Control Plan
DoEE	Commonwealth Department of Environment and Energy
DPI&E	NSW Department of Planning, Industry and Environment (formally OEH)
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
GIS	Geographic Information System
GPS	Global Positioning System
KTP	Key Threatening Processes
LGA	Local Government Area
LEP	Local Environmental Plan
OEH	NSW Office of Environment and Heritage (now DPI&E)
MNES	Matters of National Environmental Significance
PCC	Penrith City Council
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
WM Act	*Water Management Act 2000*

Executive Summary

Eco Logical Australia Pty Ltd was commissioned by Penrith Waste Services to undertake a Flora and Fauna Assessment at the request of Penrith City Council for a proposed active gas collection system at 842 Mulgoa Road, Mulgoa (Lot 201 DP804405) (the 'study area').

Penrith Waste Services submitted a pre-lodgement application with Penrith City Council in March 2019. Penrith City Council have requested an assessment of impacts of the flares on bats, birds and also indirect impacts on adjacent watercourse and Cumberland Plain Priority Conservation Lands.

This document reports on the ecological values identified within the study area and considers both the direct and indirect impacts from the proposed active gas collection system in relation to current environmental planning legislation. This report also addresses to address Penrith City Council pre-lodgement comments.

The lot is adjacent to an area mapped as high biodiversity under the Biodiversity Values Map. Therefore, Eco Logical Australia Pty Ltd was commissioned to provide an ecological assessment to consider the direct and indirect impacts of the proposed active gas release trial on biodiversity.

The study area is largely cleared of vegetation and consists of landscaped gardens, opportunistic weed species and some native regrowth. One native vegetation community was identified in the lot. No threatened flora or threatened flora habitat was identified in the subject site. No threatened fauna foraging, or roosting habitat was identified in the subject site.

Two threatened ecological communities, Shale Hills Woodland and River-flat Eucalypt Forest was identified within the study area. River-flat Eucalypt Forest is listed as an endangered ecological community under the NSW *Biodiversity Conservation Act 2016*. Shale Hills Woodland is listed as a critically endangered ecological community under the BC Act and as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

No vegetation removal is proposed as a result of the proposed works. A small amount (0.7 ha) of exotic vegetation removal will be required as part of the proposed works.

The proposal will not have an impact on any areas shown on the BSW Government Biodiversity Value Map (accessed 15 January 2020).

No threatened flora or fauna species were recorded during the field survey within the study area. However, the land surrounding the study area contains vegetation mapped as having high biodiversity values which may support a number of threatened mobile fauna species which are likely to use the study area intermittently to forage. Tests of Significance (5-part test) under Section 7.3 of the BC Act were undertaken for the following species:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Freetail-bat)
- *Miniopterus australis* (Little Bent-winged bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Myotis macropus* (Southern Myotis)

- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

Artamus cyanopterus cyanopterus (Dusky Woodswallow)

Stagonopleura guttata (Diamond Firetail).

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Tyto novaehollandiae (*Masked Owl).
- *Hieraaetus morphnoides* (Little Eagle) and
- *Lophoictinia isura* (Square-tailed Kite)

EPBC Act Significant Impact Criteria were applied to the following species:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Pteropus poliocephalus* (Grey-headed Flying-fox) (Vulnerable)
- *Apus pacificus* (Fork-tailed Swift)
- *Hirundapus caudacutus* (White-throated Needletail)

The 5-part tests and significant impact criteria concluded that the proposed development is unlikely to result in a significant impact for these species.

- the proposed impact is small; (0.7ha)
- an additional 25.1 ha of similar open habitat will be retained and
- 14.4 ha of native vegetation will be retained in the locality.

Therefore, a Biodiversity Development Assessment Report or referral to the Commonwealth is not required.

Mitigation measures are provided to reduce impacts to threatened species and have been provided in Section 6.

1. Introduction

Eco Logical Australia Pty Ltd (ELA) was contracted by Penrith Waste Services Pty Ltd to undertake a Flora and Fauna Assessment (FFA) at 842 Mulgoa Road, Mulgoa (referred to as the 'site') (Figure 1) to address any direct and/or indirect impacts from the proposed active gas collection system on bat and bird species, as requested Penrith City Council (PCC). ELA understands that this FFA will form part of a development application to Penrith City Council and will be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This report provides a description of the attributes of the study area, identifies the condition and extent of vegetation, and an assessment of the likelihood of occurrence of threatened species and their habitat listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This report is based on information gathered from the literature review, data searches and field investigations.

1.1 Study area

For the purpose of this assessment, the "study area" includes the Lot boundary 842 Mulgoa Road, Mulgoa (Lot 201 DP 804405) (also referred to as 'the site') and adjacent lands surveyed as part of the ecological assessment as shown in (Figure 1).

The study area is approximately 60 km west of the Sydney CBD and is within the Penrith City Council local government area. The site operates as a landfill depot and is surrounded by the Nepean Christian School to the north-west and surrounded by the Cumberland Land Conservancy to the north, east, south and south-west of the site. (Figure 1).

1.2 Background

The site operated as a landfill site for over 40 years. The site has been clear of majority of remnant vegetation and where operations have ceased, the land has been progressively capped and revegetated (Consulting Earth Scientists 2007). ELA conducted an ecological assessment of the site in 2009 after the closure of the landfill site. The site was described in ELA's 2009 report:

"*The landfill site is adjacent to some large patches of remnant Cumberland Plain Woodland and River-flat Eucalypt Forest. These patches of remnant vegetation may provide potential habitat for a number of threatened flora and fauna species. However, this remnant vegetation occurs along the boundaries*."

1.3 Scope of works

The proposed works involves the installation of an active gas collection system release. Penrith Waste Services propose to install wells into the capped landfill site to release the build-up of gases which will be released through a controlled flare.

ELA understands that future extensions to the gas collection system may be provided in additional development applications.

1.4 Key terms

- The site or Lot boundary – both terms refers to the cadastre lot boundary of Lot 201 DP804405 (842 Mulgoa Road, Mulgoa) (Figure 1).
- Subject site - means the area directly affected by the proposal, specifically the area proposed for the active gas collective system (Figure 1) as per the definition of the Threatened Species Test of Significance Guidelines (OEH 2018).
- Study area - means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. This includes the lot boundary of the site and adjacent lands and displayed in (Figure 1)
- Locality - the same meaning as ascribed to local population of a species or local occurrence of an ecological community.
- Local occurrence - the ecological community that occurs within the study area. However, the local occurrence may include adjacent areas if the ecological community within the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.

2. Legislative context

Name	Relevance to the project	Section in this report
	Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified on or near the site. This report assesses impacts to MNES and concludes that the works is not likely to have a significant impact on MNES.	Section 5
	NSW	
Environmental Planning and Assessment Act 1979 (EP&A Act)	The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. The proposed active gas collection system program is to be assessed under Part 4 of the EP&A Act.	Section 5
Biodiversity Conservation Act 2016 (BC Act)	The *Biodiversity Conservation Act 2016* outlines the assessment requirements to determine whether proposed works (Part 4 of the EP&A Act) or activity (Part 5 of the EP&A Act) is likely to significantly affect threatened species or ecological communities, or their habitats under section 7.3, and whether the Biodiversity Offsets Scheme (BOS) will be triggered. Works that exceed the BOS thresholds as set out in Part 7 of the Act and Part 7 of the *Biodiversity Conservation Regulation 2017* (BC Regulation) are required to undertake an assessment in accordance with the Biodiversity Assessment Method (BAM), including the preparation of a Biodiversity Development Assessment Report (BDAR). No vegetation removal is expected under the proposal. Therefore, the BOS would not be triggered and a Biodiversity Development Assessment Report (BDAR) would not need to be prepared. Tests of significance for the impact to threatened species in accordance with s7.3 of the Act have been undertaken for the proposed works. A significant impact is not likely to result and an assessment under the BAM is not required.	Section 5.2
Biodiversity Conservation Regulation 2017	The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. The study area contains land identified on the BV Map (accessed 15 January 2020). However, the subject site does not contain land mapped on the BV Map. Therefore, the proposed works do not require the preparation of a BDAR.	Section 4.1.5
Fisheries Management Act 1994	The works does not involve harm to mangroves or other protected marine vegetation (or dredging and reclamation or blocking of fish passage) within a Key Fish Habitat identified creek. Therefore, a permit under the FM Act is not required.	N/A
NSW *Biosecurity Act 2015*	Under the *Biosecurity Act 2015*, Priority weeds have been identified for local government areas and assigned strategies to contain, remove or manage. Occupiers of land (this includes owners of land) have responsibility for taking appropriate action for priority weeds on the land they occupy. The site contains weeds listed under the *Biosecurity Act 2015*.	Section 4.2.4
Water Management Act 2000 (WM Act)	The object of the WM Act is to provide for the sustainable and integrated management of water sources of the State for the benefit of both present and future generations. Among the objects relating to biodiversity are: • to apply the principles of ecologically sustainable works, and	NA

Name	Relevance to the project	Section in this report
	• to protect, enhance and restore water resources, their associated ecosystems, ecological processes and biological diversity and their water quality. The nearest watercourse is the 2nd order Strahler Stream 45 m to the east of the subject site (Figure 1).	
	Planning Instruments	
State Environmental Plan (SEPP) Koala Habitat Protection 2019	SEPP Koala Habitat Protection does not apply to the local government area in which the proposed works are taking place. SEPP Koala Habitat Protection 2019 repeals and replaces *State Environmental Planning Policy No 44—Koala Habitat Protection* on 1 March 2010. Any DA lodged Prior to 1 March will be assessed under SEPP 44. Lodgement after 1 March will be assessed under the new SEPP.	NA
Sydney Regional Environmental Plan (SREP) No 30—St Marys	This plan applies to certain land in the region declared under the SERP that is known as the Sydney Region and is within the Blacktown City and Penrith City local government areas. This plan does not apply to the study area.	N/A
State Environmental Planning Policy (Western Sydney Employment Area) 2009	This Policy aims to protect and enhance the land to which this Policy applies (the Western Sydney Employment Area) for employment purposes. This SEPP does not apply to the study area.	N/A
State Environmental Planning Policy (Penrith Lakes Scheme) 1989	To provide a development control process that ensures that environmental and technical matters are considered in the implementation of the Penrith Lakes Scheme. This plan does not apply to the study area.	N/A
Penrith City Council Local Environmental Plan (LEP) 2010	The proposed subject site is currently zoned RU2: Rural Landscape under the Penrith City Council LEP. The subject site and study area is not mapped as Terrestrial Biodiversity, Environmentally Sensitive Land or on the Riparian Land and Watercourses Map under the Penrith Council LEP 2010.	Section 5.4
Penrith City Council Development Control Plan (DCP) 2014	The Penrith City Council DCP contains provisions relating to biodiversity. These are addressed in Table 5 of this report.	Section 5.5

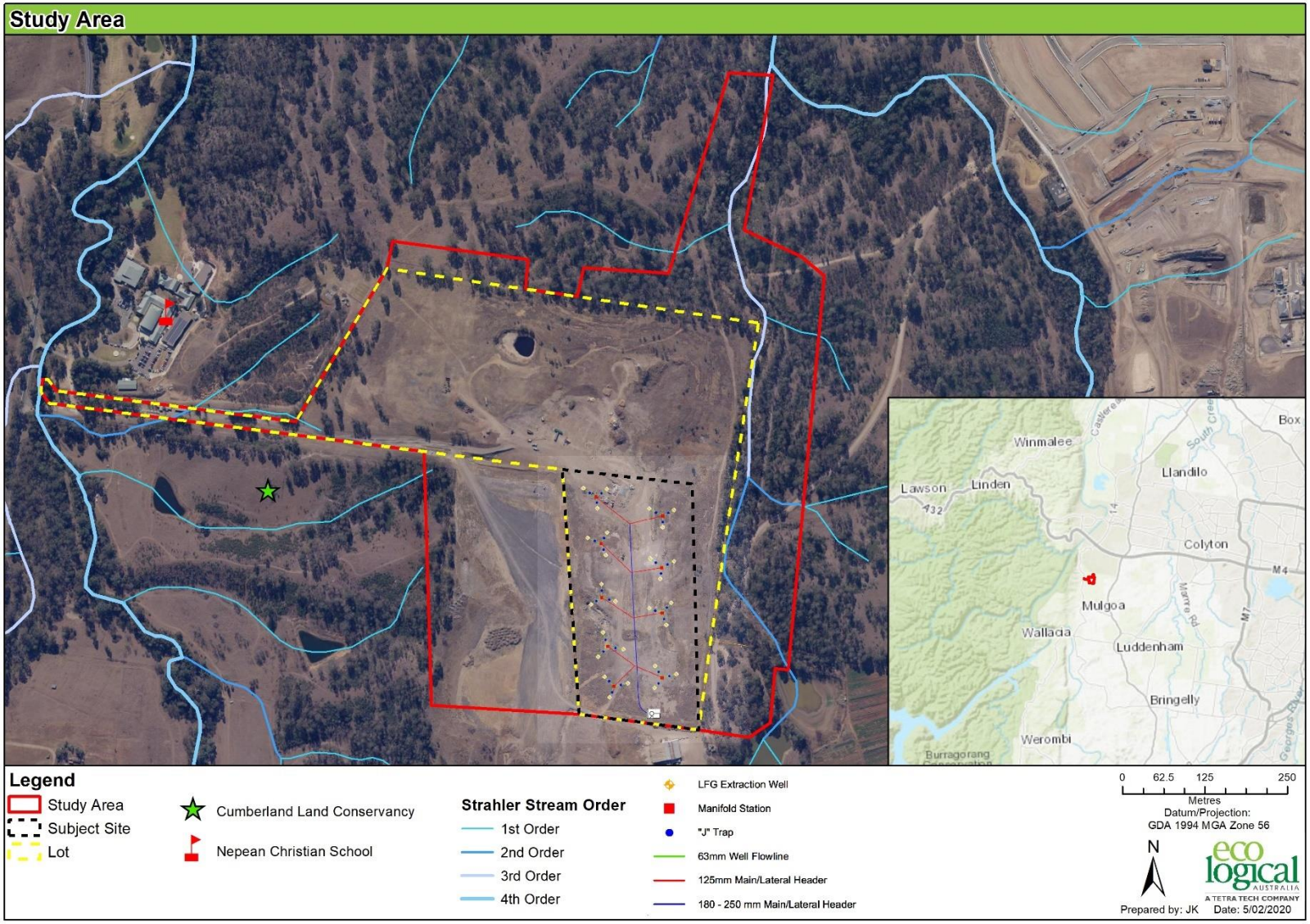

Figure 1: Study area and subject site

3. Methods

3.1 Data and literature review

Database records and relevant literature pertaining to the ecology of the study area and locality were reviewed. This included:

- Previous vegetation mapping (Office of Environment and Heritage (OEH), 2013)
- EPBC Act Protected Matters Search Tool (Department of the Environment and Energy (DotEE) 2020) (5 km)
- BioNet/Wildlife Atlas database (Department of Industry Planning and Environment (DPIE 2020)
- BioNet Vegetation Classification System
- Aerial photographs
- NSW Government Biodiversity Values Map (accessed 15 January 2020)

A search of BioNet (DPIE 2020) was performed on 15 January 2020 and a search of the EPBC Act Protected Matters Search Tool on 10 January 2020, using a radius of 5 km around the coordinates -33.80764 150.66127.

3.2 Field survey

A field survey was conducted over two hours by ELA ecologist Stacey Wilson on 20 January 2020. The purpose of the field survey was to validate the presence of vegetation communities, as well as to record habitat features, potential ecological constraints and record opportunistic fauna sightings within the study area. The survey included a random meander within the subject site (i.e. direct impact area) and within the adjacent lands (i.e. the study area) which includes the adjacent intact vegetation surrounding the site. The survey within the adjacent vegetation was conducted to determine potential habitat for threatened species which may be directly or indirectly impacted upon by the proposed works.

3.2.1 Survey limitations

This assessment was not intended to provide an inventory of all species present across the site but instead an overall assessment of the ecological values of the study area with a particular emphasis on threatened species, threatened ecological communities and key fauna habitat features. It is important to note that some species may not have been detected within the study area during the inspection as they may be cryptic or seasonal and only detectable during flowering or during breeding. In this case the likelihood of their occurrence has been assessed based on the presence of potential habitat.

The field survey was undertaken using hand-held GPS units. It should be noted that these units can have errors in accuracy of up to 20 m (subject to availability of satellites on the day).

4. Results

4.1 Literature and data review

4.1.1 Soils and geology

The majority of the study area is mapped as the Luddenham – Erosional soil profile with a small portion to the west of the study area mapped as South Creek – Alluvial soil profile (OEH, 2020). The Luddenham erosional soil landscape is characterised by undulating to rolling low hills on Wianamatta Group shales, often associated with Minchinbury Sandstone. The South Creek soil landscape is characterised by floodplains, valley flats and drainage depressions of channels on the Cumberland Plain. The land is usually flat with incised channels. This soil landscape has been extensively cleared for agricultural land use.

4.1.2 Watercourses

A 1st order and 2nd order Strahler stream which flow into Mulgoa Creek have been mapped within the western portion of the lot. A 3rd order stream has also been mapped near the eastern boundary of the lot. A small dam is also present to the north of the lot (Figure 1).

4.1.3 Previous vegetation mapping

The following vegetation communities have been previously mapped within the study area and are displayed in Figure 4:

- Shale Hills Woodland listed as a critically endangered ecological community under both the BC Act and EPBC Act
- Alluvial Woodland listed as an endangered ecological community under the BC Act.

4.1.4 Threatened flora and fauna

A review of the BioNet Atlas and EPBC Act protected matters search tools identified nine threatened ecological communities (TECs), 29 threatened flora and 75 threatened fauna species (including migratory) either known or considered likely to occur within 5 km of the study area (Figure 2 and Figure 3).

Many of the threatened flora and fauna species excluded from further consideration are purely marine (e.g. fish and marine mammals) or estuarine to shoreline (e.g. waders) species. The study area does not represent suitable habitat for these species and thus are not likely to be affected by the development. The likelihood of the remaining species to occur is provided in Appendix B.

One *Pteropus poliocephalus* (Grey-headed Flying-fox) camp was identified approximately 7.5 kilometres to the north of the site at Emu Plains (DPIE 2010).

4.1.5 Biodiversity Values Map

The study area contains areas identified on the NSW Government Biodiversity Values Map (BV Map), as verified on 15 January 2020. The works within the subject site do not contain areas mapped on the BV Map. These areas are shown in Figure 5.

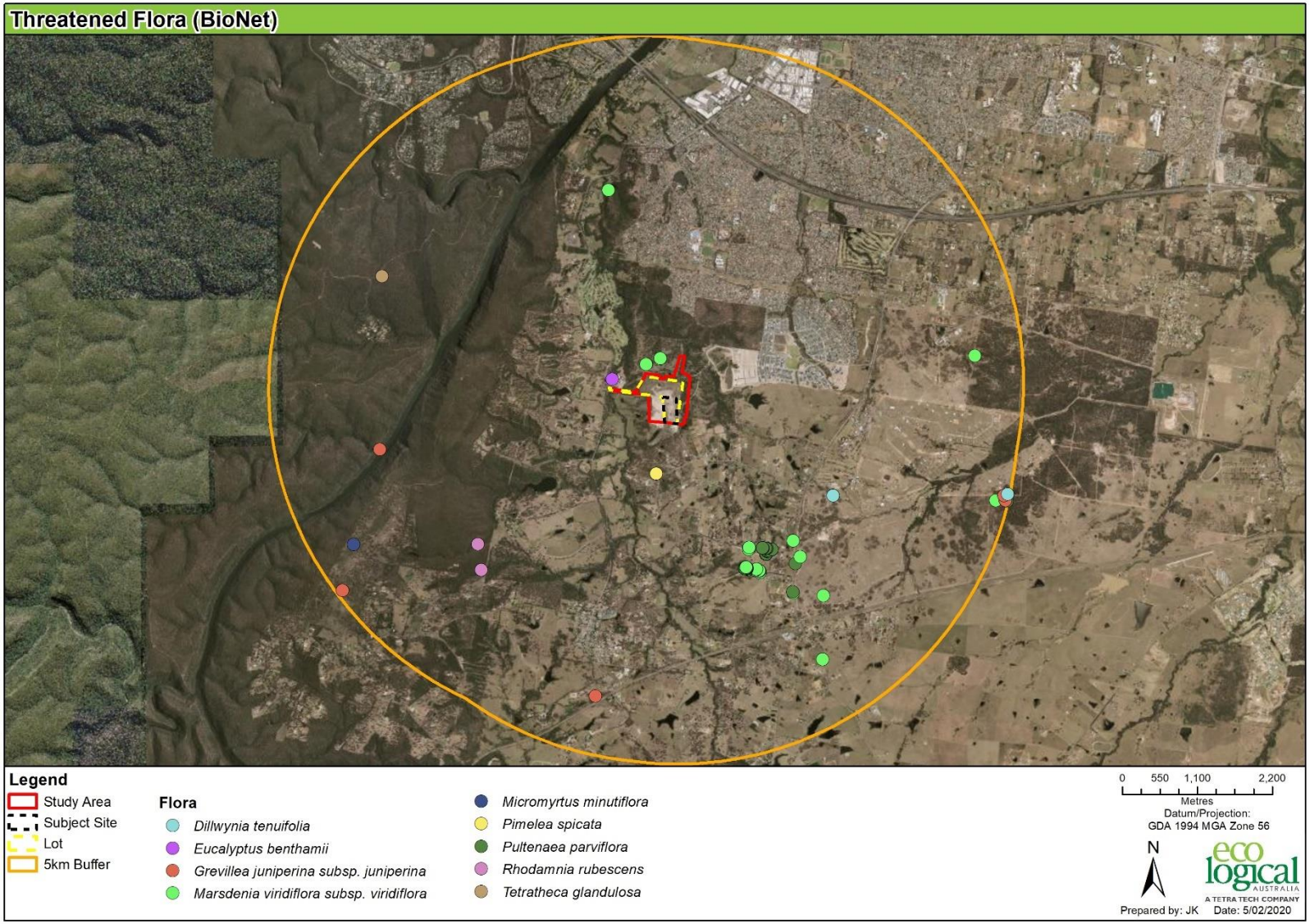

Figure 2: Threatened flora species recorded within 5 km of the study area

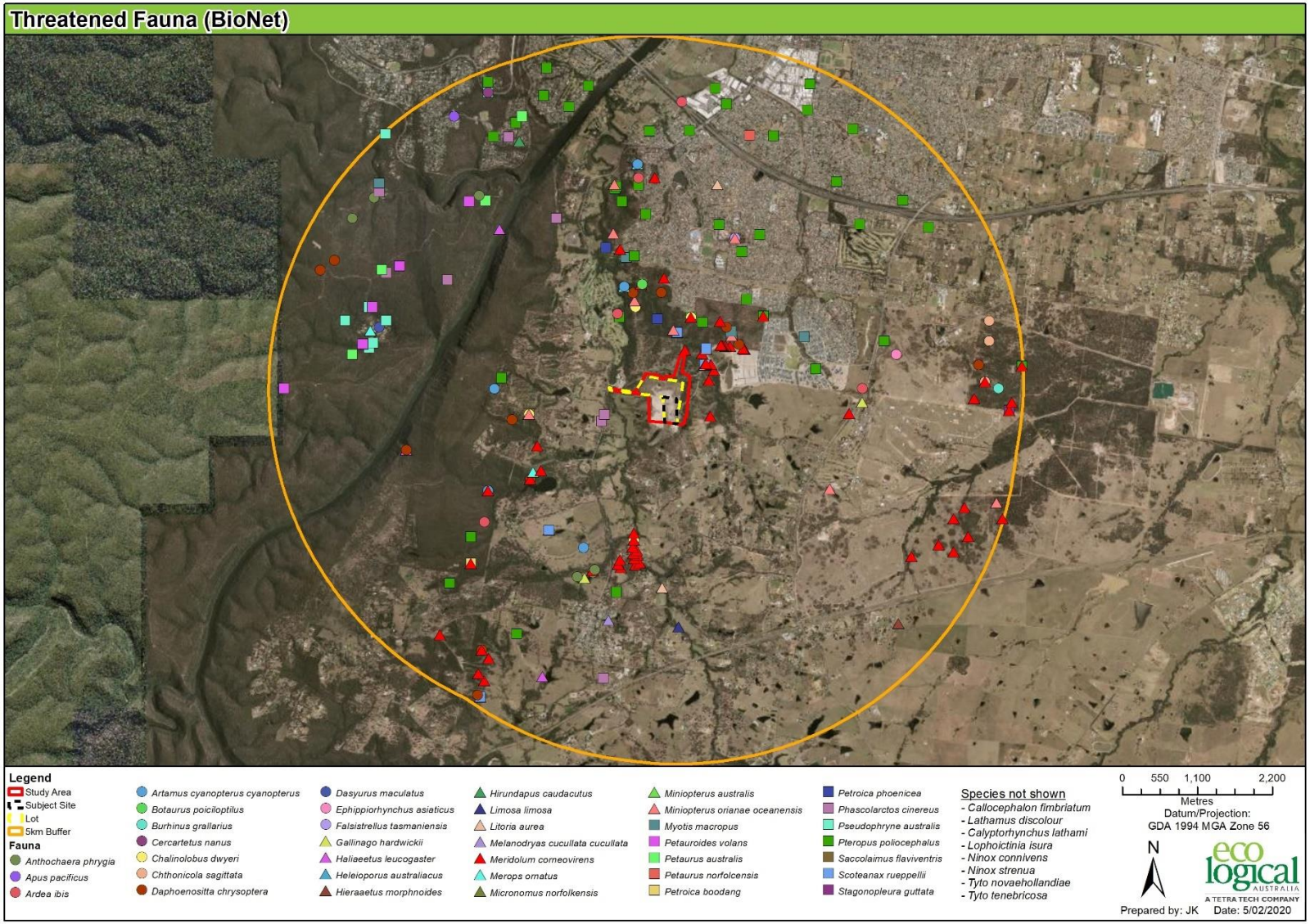

Figure 3: Threatened fauna species recorded within 5 km of the study area

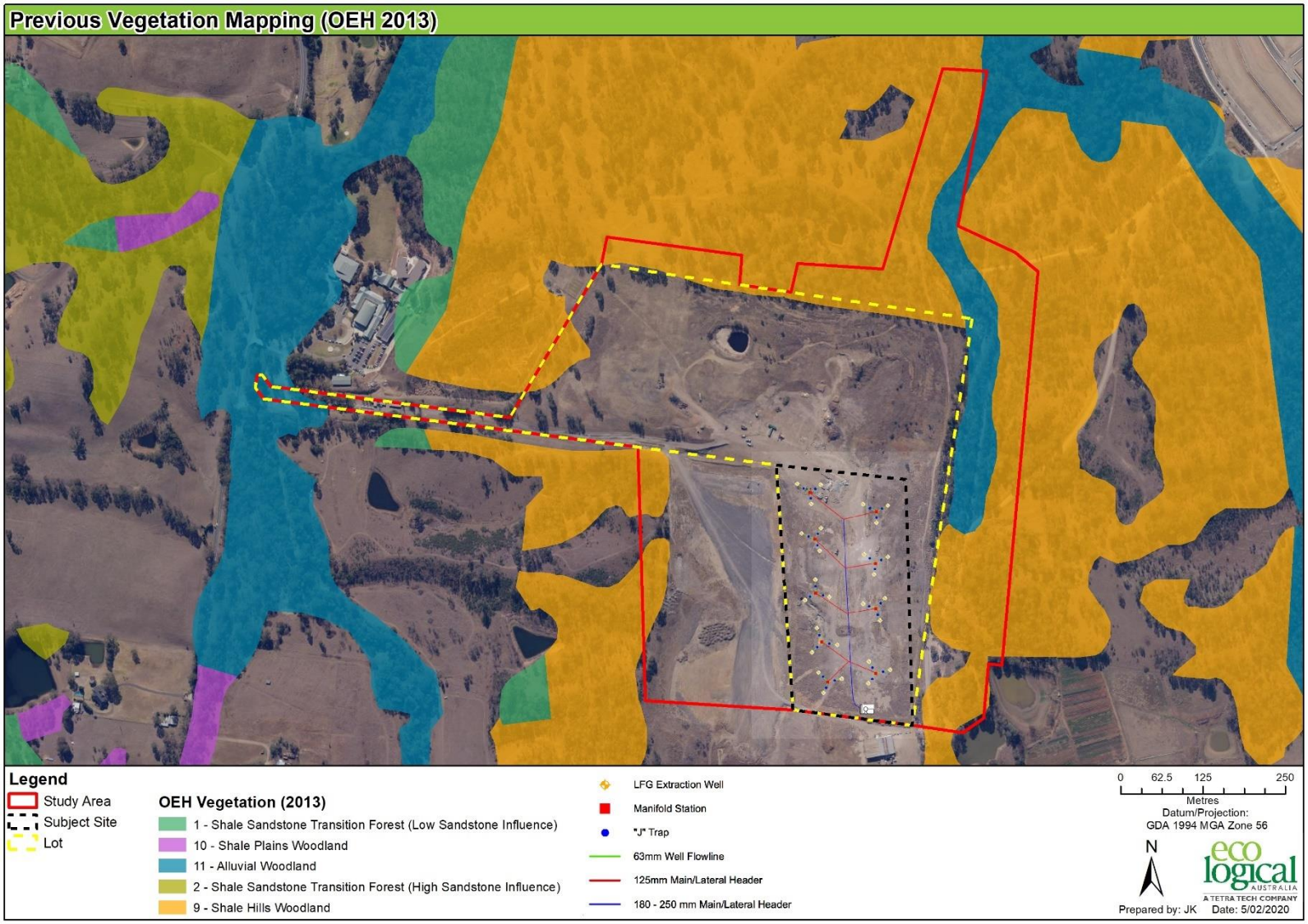

Figure 4: Previous vegetation mapping (OEH 2013)

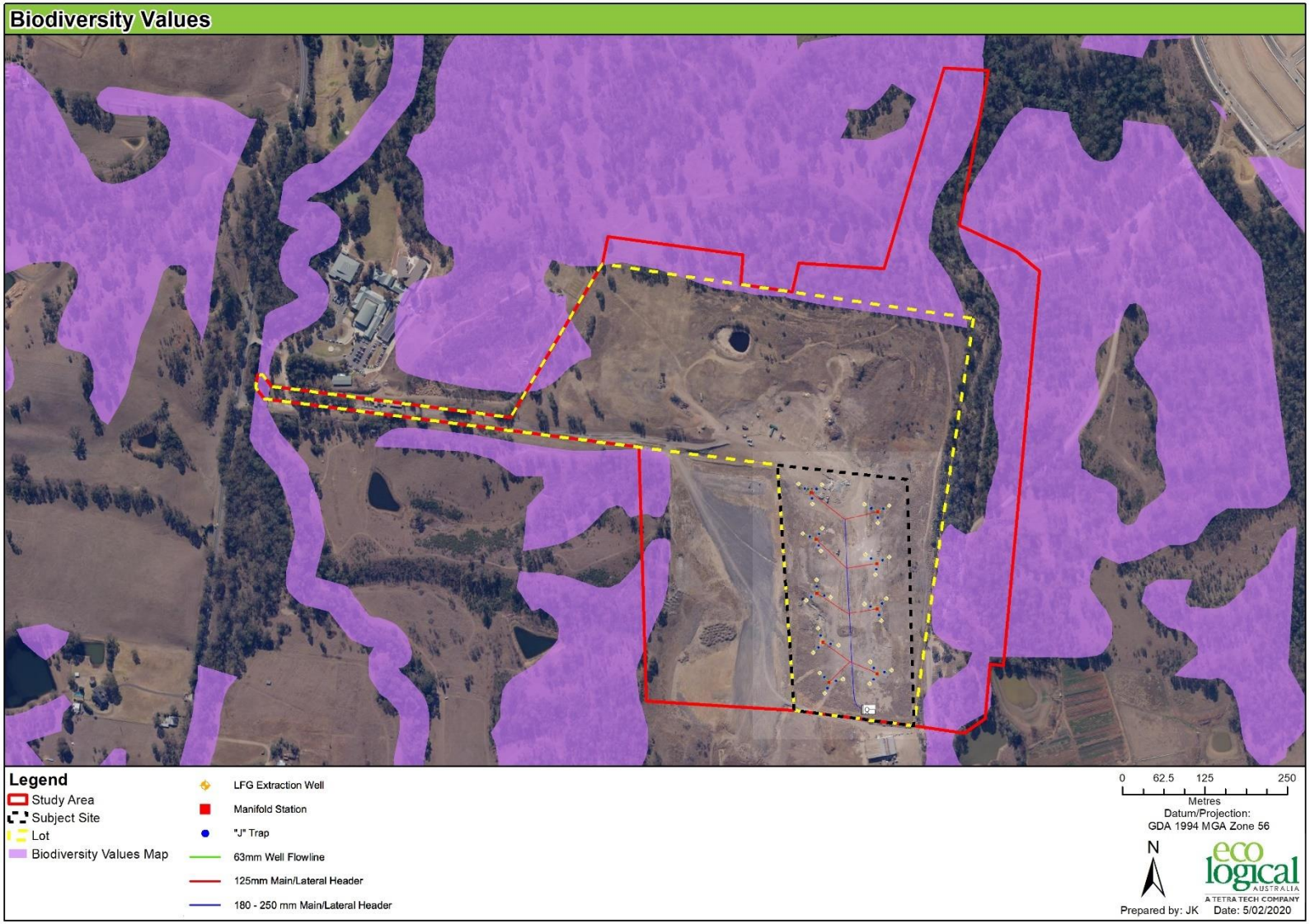

Figure 5: Biodiversity Land Values mapped within the study area

4.2 Field survey

4.2.1 Vegetation validation

A map of validated vegetation within both the subject site and study area is shown in Figure 4.

Due to previous land use (i.e. landfill site) the subject site was void of native remnant vegetation. Remnant vegetation was recorded adjacent to the lot boundary and has been described below. Two validated vegetation communities are described below and summarised in Table 1, including the associated Plant Community Types (PCTs) in accordance with the BioNet Vegetation Classification. Weeds and Exotics are not considered part of a PCT, however, a description of weeds has been provided below.

Table 1: Vegetation communities within the subject site and study area

Vegetation community	PCT ID	PCT Name	BC Act Status	EPBC Act Status	Location
Weeds and Exotics	N/A	N/A	N/A	N/A	Weeds were represented within the subject site
Cumberland Shale Hills Woodland	850	*Grey Box-Forest Red Gum Grassy Woodland on Shale of the Southern Cumberland Plain, Sydney Basin*	CEEC	CEEC	PCT 850 was represented in the vegetation adjacent to the subject site.
River-flat Eucalypt Forest	835	*Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion*	EEC	Not listed	PCT 835 was recorded along the riparian corridor to the east of the subject site.

CEEC = Critically Endangered Ecological Community
EEC = Endangered Ecological Community

WEEDS AND EXOTICS

The subject site consisted predominantly of exotic grasses and herbaceous weeds. Native vegetation has been previously cleared and filled as a result of previous land management practices. The vegetation was dominated by weed infestations and included exotic species such as *Verbena bonariensis* (Purple Tops), *Eragrostis curvula* (African Love Grass), *Cirsium vulgare* (Spear-thistle), *Chloris gayana* (Rhodes Grass), *Cenchrus clandestinus* (Kikuyu), *Gomphocarpus fruticosus* (Narrow-leaved Cotton Bush), *Bidens pilosa* (Cobblers Pegs) and *Sida rhombifolia* (Paddy's Lucerne).

PCT 850: CUMBERLAND SHALE HILLS WOODLAND – LOW CONDITION

The area of Cumberland Shale Hills Woodland mapped along the boundary of the study area and a small patch to the north-west of the study area consisted of scattered native canopy trees with no midstorey and an understorey of exotic grasses. A limited number of native ground cover species were also present, including *Cynodon dactylon* (Couch) and *Dichondra repens* (Kidney Weed).

The vegetation mapped in the study area also consisted of Cumberland Shale Hills Woodland. The dominant canopy consisted of *Eucalyptus moluccana* (Grey Box), *Corymbia maculata* (Spotted Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark), and *Eucalyptus amplifolia* (Cabbage Gum). The midstorey included *Bursaria spinosa* (Blackthorn), *Acacia implexa* (Hickory Wattle) *Allocasuarina littoralis* (Black

She-oak) and native groundcovers *Themeda triandra* (Kangaroo Grass), *Desmodium varians* (Slender Tick-trefoil), *Dichondra repens* (Kidney Weed), *Microlaena stipoides* (Weeping Grass) and *Glycine* spp.

Other exotic species noted within this area included *Olea europaea* subsp. *cuspidata* (African Olive), *Sida rhombifolia* (Paddy's Lucerne) and *Lantana camara*.

PCT 835: RIVER-FLAT EUCALPYT FOREST

River-flat Eucalypt Forest is present along the tributaries within the study area. The dominant canopy consists of *Angophora subvelutina* (Broad-leaved Apple), Eucalyptus *amplifolia. Eucalyptus moluccana* was also present but less dominant along the creekline. The midstorey included *Allocasuarina littoralis* (Black She-oak) and native groundcovers *Desmodium varians* (Slender Tick-trefoil), *Dichondra repens* (Kidney Weed), *Microlaena stipoides* (Weeping Grass) and *Glycine* spp. The creek line and channels were also heavily infested exotic *Juncus usitatus*.

4.2.2 Threatened ecological communities

No Threatened Ecological Communities (TECs) were represented within the subject site. Two TECs (PCT 850 and PCT 835) were recorded adjacent to the subject site within the study area Flora species

The field survey identified 25 flora species, comprising 14 native species and 11 exotic species. A full species list is provided in Appendix A.

4.2.3 Threatened flora species

No threatened flora species were recorded within the subject site or study area. Additionally, no habitat was identified for threatened flora species within the subject site.

4.2.4 Priority Weeds

Four weeds of regional concern outlined in the Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022 (LLS 2017) were identified in the study area. The Priority Weeds present, their management class and whether they are a Weeds of National Significance (WoNS) is presented in Table 2.

Table 2: Priority weeds and WoNS present in the study area

Scientific Name	Common Name	Priority Weed Objective	WoNS
Eragrostis curvula	African Lovegrass	Regional – Environment	No
Chloris gayana	Rhodes Grass	Regional – Environment	No
Olea europaea subsp. *cuspidata*	African Olive	Regional – Containment	No
Lantana camara	Lantana	State – Asset Protection	Yes
Juncus acutus	Spiny rush	Regional – Environment	No

4.2.5 Fauna species and habitat

4.2.5.1 Subject site

No threatened fauna species were recorded within the subject site. No hollow-bearing trees or other habitat for threatened fauna was identified within the subject site.

4.2.5.2 Study area

An assessment of the habitat features was used to determine the suitability of the broader study area to support fauna species, including threatened species. The remnant vegetation within the study area contains relatively intact undisturbed native vegetation and is likely to provide suitable foraging, sheltering and roosting habitat for a range of native fauna species.

Hollow-bearing trees and stags were observed within the study area and have the potential to provide roosting and/or breeding habitat for hollow-dependant fauna.

Table 3 summarises the typical habitat features required for fauna species with particular emphasis on threatened species.

Table 3: Assessment of habitat features for fauna species within the subject site and study area

Habitat feature	Guilds	Subject site	Study area
Woodland and forest vegetation	Birds, microchiropteran bats (microbats), megachiropteran bats (fruit bats), arboreal mammals, reptiles	Absent	Abundant
Winter flowering species	Winter migratory birds, arboreal mammals and megachiropteran bats (fruit bats)	Absent	Present
Hollow-bearing trees	Microbats, birds	Absent	Present and varying in sizes
Stags	Birds, particularly birds of prey, reptiles, amphibians, bats	Absent	Present
Leaf litter	Reptiles, amphibians, invertebrates	Absent	Abundant
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	Absent	Present
Creek and drainage lines	Amphibians, reptiles, mammals and microbats	Absent	Present
Mistletoe	Birds	Absent	Present

4.2.5.3 Birds

The subject site does not contain any large hollows or stags and therefore does not provide roosting habitat for hollow-dependent bird species. However, a number of large hollow-bearing trees and stags were noted within the study area which are suitable roosting habitat for large forest owls including threatened species such as *Ninox connivens* (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl) and *Tyto tenebricosa* (Sooty Owl). Foraging habitat for these species is limited within the study area as a large portion of the study area is cleared with scattered trees and open exotic grassland. Therefore, of the forest owls, only the Masked Owl is likely to forage within the open areas of the subject site.

Raptors such as *Hieraaetus morphnoides* (Little Eagle) may intermittently forage within the open areas of the subject site and study area. Additionally, a high abundance of winter flowering eucalypts and mistletoe was recorded within the study area which may attract some bird species such as *Lathamus discolor* (Swift Parrot). Swift Parrot may traverse the open areas of the subject site and study area occasionally.

4.2.5.4 Bats

The subject site does not contain any hollow-bearing trees or stags and therefore does not provide roosting habitat for threatened microbat species within the subject site. Several stags were identified in the study area which have the potential to provide suitable roosting habitat for microchiropteran bat species (microbats). These species include: *Falsistrellus tasmaniensis* (Eastern False Pipistrelle), *Micronomus norfolkensis* (Eastern Freetail-bat), *Miniopterus australis* (Little Bentwing-bat) and *Miniopterus orianae oceanensis* (Eastern Bentwing-bat).

Trees located within the study area may also attract megachiropteran (fruit bats) such as the *Pteropus poliocephalus* (Grey-headed Flying-fox). The closest known Grey-headed Flying fox camp as identified on the National Flying-fox Monitoring viewer (DotE, 2020) is at Emu Plains, which is located approximately 7.5 km to the north of the study area.

4.2.6 Threatened fauna

No threatened fauna was observed during the site inspection. However suitable roosting and foraging habitat was identified within the study area. Threatened species considered known, likely or with the potential to occur in the subject site intermittently include:

<u>Microchiropteran bats</u>

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus orianae oceanensis* (Eastern Bentwing-bat)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

<u>Woodland birds</u>

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Stagonopleura guttata* (Diamond Firetail).

<u>Blossom nomads</u>

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

<u>Large Forest Owls and Raptors</u>

- *Tyto novaehollandiae* (Masked Owl)
- *Hieraaetus morphnoides* (Little Eagle)
- *Lophoictinia isura* (Square-tailed Kite).

4.2.7 Watercourses

During the field survey a dam to the north of the lot was inspected. The dam is small, with no native fringing vegetation and contains run-off and leachate and was not considered suitable habitat for fauna. The headwaters to a 1st order stream have been previously mapped to the west of the lot however following the field survey, it was confirmed that there are no other watercourses were mapped within the lot.

A large dam exists to the south-east of the study area (Figure 9) and is considered suitable foraging habitat for threatened microbat species. Other mapped streams were identified that could provide potential foraging habitat for species, these streams are dominated with exotic *Juncus usitatus* and had significantly eroded banks.

4.2.8 Connectivity

Local corridors provide connections between remnant patches of habitat and landscape features. Habitat links are evaluated in this report as links from habitat on-site directly to similar habitat on adjacent land. These would be used by fauna, which depend solely or at least partially on the site for all of their lifecycle requirements, and/or dispersal (Lindenmayer and Fisher 2006).

The study area is highly vegetated to the north, east and west (Figure 6). These vegetated areas are well connected and are likely to be the most likely route used by migrating fauna.

There is no vegetation within the subject site and no connectivity to the vegetation within the study area. Therefore, it is unlikely that most fauna would traverse open areas, given the presence of vegetative corridors located adjacent to the subject site. There are some fauna species which may opt to forage in open areas as discussed in the sections above.

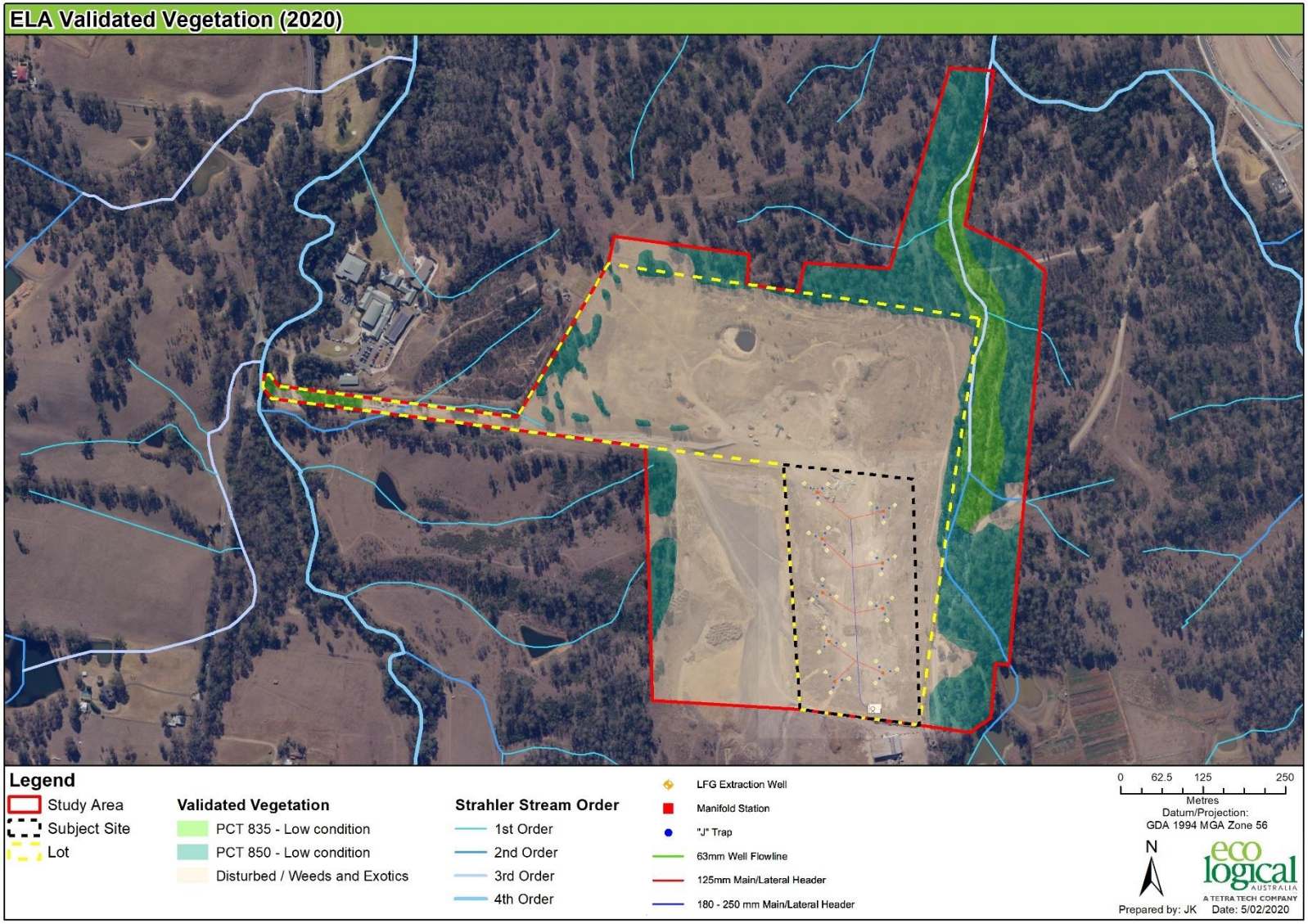

Figure 6: ELA validated Plant Community Type (PCT)

Figure 7: Cleared vegetation and weeds and exotics within the subject site

Figure 8: Vegetation within the study area

Figure 9: Dam located within the south east of the study area

Figure 10: Potential microbat habitat within the study area

Figure 11: Vegetation bordering the study area

Figure 12: Mistletoe present within the study area

5. Impacts

5.1 Summary of impacts

The potential impacts of the proposal to threatened species and communities listed under the BC Act and EPBC Act was assessed by undertaking an assessment of likelihood of occurrence for threatened and migratory species identified from the database search (Appendix B).

Assessments were conducted for those species listed under the BC Act and / or EPBC Act considered likely or known to use habitat within the subject site, after considering both the desktop review and results from the field survey. Some threatened species which are wide-ranging, mobile and breed in habitat not present within the subject site, may still utilise the subject site on occasion, e.g. some highly mobile birds or bats. The proposal has the potential to indirectly impact threatened species. Therefore, application of assessments under the BC Act and EPBC Act were applied.

5.1.1 Direct impacts

Direct impacts are those impacts that directly affect habitat and individuals. Direct impacts considered for this assessment include the removal/modification of 7.0 ha which contains weeds and exotics which may represent suitable foraging for some threatened microbat and bird species.

The direct impacts are considered minor in nature due to the absence of habitat features within the subject site. As such, the direct impacts associated with the proposed active gas collection system include:

- Potential loss or modification of foraging habitat for threatened birds and microbat species
- Mortality of threatened birds and microbats due to flare release.

5.1.2 Microchiropteran bats

The following microbat species have the potential to utilise open areas within the subject site and may be impacted by the proposed works:

- Little Bent-winged Bat
- Large Bent-winged Bat
- Eastern Freetail-bat
- Eastern False Pipistrelle
- Yellow-bellied Sheathtail-bat and
- Greater Broad-nosed Bat

A Test of Significance was carried out for these species under the BC Act. The combined Test of Significance for these species (Appendix C) concluded that a significant impact is not likely and that a BDAR is not required.

5.1.3 Aves

The following avifauna have the potential to utilise open areas within the subject site and may be impacted by the proposed works:

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) and
- *Stagonopleura guttata* (Diamond Firetail)

Similarly, species such as *Anthochaera phrygia* (Regent Honeyeater), *Lathamus discolor* (Swift Parrot) and *Pteropus poliocephalus* (Grey-headed Flying-fox) may also occasionally fly over the subject site to access the large intact vegetation in the surrounding study area to forage on winter flowering eucalypt species in the vicinity.

Large Forest Owls and raptors such as *Hieraaetus morphnoides* (Little Eagle), *Hirundapus caudacutus* (White-throated Needletail), *Lophoictinia isura* (Square-tailed Kite) and *Tyto novaehollandiae* (Masked Owl) were considered as having foraging habitat within the subject site in the form of grassed areas. These species are highly mobile and have a wide foraging range. They were not observed during the field survey.

Taking the precautionary approach, tests of significance were undertaken for the threatened avifauna. The combined Test of Significance for these species (Appendix C) concluded that a significant impact is not likely and that a BDAR is not required.

It is noted that some other threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, due to the highly mobile nature of these species and availability of foraging habitat in the adjacent landscape, no Test of Significance were considered necessary for these species.

5.1.4 Indirect impacts

The following indirect impacts have the potential to result from the proposed works:

- sediment laden runoff (due to soil disturbance) entering the adjacent streams within the study area
- spread of weeds from construction machinery into adjacent native vegetation
- noise and vibration (short-term impacts particularly during construction) that may affect fauna
- disruption to the flight path of mobile fauna species such as birds and bats.

Indirect impacts will be reduced through the implementation of mitigation measures listed in Section 6.

5.1.5 Avoidance of ecological values

The area to be disturbed is within previously degraded areas. No native vegetation or habitat features will be impacted for the proposed active gas collection system.

5.1.6 Key Threatening Processes

The following key threatening processes listed under the BC Act / EPBC Act are associated with the proposal:

- invasion of native plant communities by exotic perennial grasses.

5.2 Biodiversity Conservation Act 2016

5.2.1 Test of Significance

The BC Act came into effect in August 2017 replacing the *Threatened Species Conservation Act 1995*. Impacts to threatened species and threatened ecological communities listed under the BC Act are required to be assessed in accordance with Section 7.3 of the BC Act, known as 'tests(s) of significance'.

For a local development under Part 4 of the EPA & Act, the Biodiversity Offsets Scheme (BOS) and Biodiversity Assessment Method (BAM) may be triggered by the following means:

- area clearing threshold- exceeding the area clearing threshold associated with the minimum lot size for the property will trigger entry into the BOS (Table 6)
- whether the impacts occur on an area mapped on the Biodiversity Value Map
- 'tests of significance' for the threatened species for development that does not exceed the two thresholds listed above. If a 'test of significance' determines a significant impact on threatened species, the BOS will be triggered, and a BAM assessment must be undertaken.

5.2.2 Biodiversity Offsets Scheme – Area Clearing Threshold

The area clearing threshold is triggered when an area of native vegetation* to be cleared reaches the thresholds for the relevant lot size (Table 4).

No vegetation removal is expected under the proposal. Therefore, the BOS would not be triggered and a Biodiversity Development Assessment Report (BDAR) would not need to be prepared.

Table 4: Area clearing threshold

Minimum lot size associated with the property	Threshold for clearing native vegetation, above which the BAM and offsets scheme apply
Less than 1 ha	Less than 1 ha
0.25 ha or more 1 ha to less than 40 ha 0.5 ha or more	0.25 ha or more 1 ha to less than 40 ha 0.5 ha or more
40ha to less than 1000 ha	40ha to less than 1000 ha
1 ha or more 1000 ha or more 2 ha or more	1 ha or more 1000 ha or more 2 ha or more

* Note: native vegetation is defined in Section 1.6 of the BC Act (and has the same meaning as in Part 5A of the *Local Land Services Act 2013*); essentially encompasses any species native to NSW and does not necessarily conform to a Plant Community Type.

5.2.3 Offset Scheme Thresholds – Biodiversity Values Land Map

The BV Map identifies land considered to have high biodiversity value as defined by the *Biodiversity Conservation Regulation 2017.* The study area does contain an area of high biodiversity as mapped on the BV Map (Figure 5) However, the subject site (i.e. the area of the proposed works) will not impact on any area mapped as high biodiversity.

5.2.4 Test of Significance (BC Act)

A 'test of significance' (otherwise known as a 5-part test) is required for Part 4 development that does not exceed the area clearing and BV Map thresholds to trigger the BOS.

The 5-part test is used to determine if the development is likely to have a significant impact on any threatened species, population or ecological community. If a significant impact in indicated by the 5-part test, then the proposal would trigger the BOS and BAM assessment required.

A 5-part test was applied to the following species:

<u>Microchiropteran bats</u>

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus australis* (Little Bentwing-bat)

- *Miniopterus orianae oceanensis* (Eastern Bentwing-bat)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

Woodland birds

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Stagonopleura guttata* (Diamond Firetail).

Blossom nomads

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

Large Forest Owls and Raptors

- *Tyto novaehollandiae* (Masked Owl)
- *Hieraaetus morphnoides* (Little eagle)
- *Lophoictinia isura* (Square-tailed Kite)

These assessments concluded that it is unlikely that the proposal would significantly impact threatened species for the following reasons:

- no vegetation will be impacted under the proposal
- no critical habitat will be impacted for these species
- the proposal will not fragment or isolate any fauna habitat
- large amounts of similar habitat are available within the study area adjacent to the subject site
- the habitat is likely to be used in a transitory nature as no key breeding habitat or is likely to be present within the study area.

5.3 Significance Assessment EPBC Act

The EPBC Act establishes a process for assessing the environmental impact of activities and works where 'Matters of National Environmental Significance' (NES) may be affected. Under the Act any action which "has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance" is defined as a "controlled action", and requires approval from the Commonwealth Department of the Environment and Energy (DotEE) which is responsible for administering the EPBC Act.

The process includes the application of Significant Impact Criteria (SIC) for listed threatened species and ecological communities that represent a MNES that will be affected as a result of the proposed action. Impact assessment guidelines outline criteria to provide assistance in conducting the assessment and help decide whether or not a referral to the Commonwealth is recommended (DotEE 2017a). These guidelines were used in applying the Significant Impact Criteria.

The following threatened/migratory species listed under the EPBC Act have the potential to utilise the habitat within the subject site and study area:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Lathamus discolor* (Swift Parrot)
- *Anthochaera phrygia* (Regent Honeyeater)

The subject site and study area is also considered to provide potential habitat for one migratory species:

- *Hirundapus caudacutus* (White-throated Needletail)

The SIC was applied with respect to each of these species and concluded that the proposal is unlikely to have a significant impact on a threatened fauna species.

5.4 Penrith City Council Local Environmental Plan 2010

The proposed subject site is currently zoned RU2: Rural Landscape under the Penrith City Council LEP.

Within this zone, the proposed works is permissible with consent.

The proposed subject site is not mapped on the Natural Resources Sensitivity Land Map (Sheet NRL_007) therefore *Clause 7.3 Development of natural resources sensitive land* of the LEP does not apply to the subject site.

5.5 Penrith City Council Development Control Plan 2014

The lot is subject to the following Penrith City Council DCP biodiversity controls (Table 5)

Table 5: Penrith City Council DCP (Part C2 - Vegetation Management) requirements relating to biodiversity

The Hills DCP requirements	How the design has addressed the requirement
2.1. PRESERVATION OF TREES AND VEGETATION	
(a) The prescribed trees or other vegetation that are protected by Clause 5.9 of Penrith LEP 2010 and this section of the Plan include: (i) Any indigenous tree (both living and dead) or other vegetation that is on land zoned E2 Environmental Conservation in the Penrith LEP 2010 Land Zoning Map or natural resources sensitive land identified in the Penrith LEP 2010 Natural Resources Sensitivity Land Map.	The vegetation within the lot is not mapped on the Natural Resources Sensitivity Land Map and the Clause does not apply
2.2. BIODIVERSITY CORRIDORS AND AREAS OF REMNANT INDIGENOUS VEGETATION IN NON-URBAN AREAS	
(a) Biodiversity corridors and areas of remnant indigenous vegetation are shown as natural resources sensitive land on the Penrith LEP 2010 Natural Resources Sensitivity Land Map	The vegetation within the lot is not mapped on the Natural Resources Sensitivity Land Map and the Clause does not apply

6. Conclusions and recommendations

Eco Logical Australia conducted an assessment of the ecological values of 842 Mulgoa Road, Mulgoa and assessed the impacts of the proposed flare release. In accordance with the BC Act, the proposed gas release will not result in a significant impact and a BDAR will not be required.

No threatened flora species were recorded during the field survey or considered likely to occur within the subject site. As such, a Test of Significance under Section 7.3 of the BC Act was not conducted for threatened flora species.

Suitable foraging habitat for threatened fauna species was limited within the subject site due to the relatively small amount of native vegetation present, previous clearing and historical disturbances. Intact vegetation located adjacent to the subject site may provide habitat for threatened fauna species.

The removal of 7.0 ha of exotic weeds for the proposed development will not result in a long-term decline in the population of threatened fauna species as an additional 25.1 ha of similar open habitat will be retained, and 14.4 ha of native vegetation will be retained in the locality.

Taking the precautionary approach, tests of significance were undertaken for the threatened fauna species which may utilise the subject site intermittently. A Test of Significance under the BC Act was undertaken for these species. The EPBC Act Significant Impact Criteria were applied to serval species which may also utilise the subject site intermittently.

It was concluded that the proposed active gas collection system is unlikely to have a significant impact on these species.

Mitigation measures such as those listed below are recommended.

- Installation of appropriate measures (i.e. silt fences) around the subject site to limit the spread of sediment and weeds into adjacent vegetation.
- Temporary fencing around the subject site for the duration of the works to ameliorate potential impacts to biodiversity values outside of the impact area.

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Appendix A : Species Lists

Table 6: Species recorded within the study area.

Scientific name	Common name	Native (N) / Exotic (E)
FLORA		
Acacia implexa	Hickory Wattle	N
Angophora subvelutina	Broad-leaved Apple	N
Bidens pilosa	Cobblers Pegs	E
Bursaria spinosa	Blackthorn	N
Cenchrus clandestinus	Kikuyu	E
Chloris gayana	Rhodes Grass	E
Cirsium vulgare	Spear Thistle	E
Cynodon dactylon	Couch	N/E
Desmodium varians	Slender Tick-trefoil	N
Dichondra repens	Kidney Weed	N
Entolasia stricta		N
Eucalyptus amplifolia	Cabbage Gum	N
Eucalyptus crebra	Narrow-leaved Ironbark	N
Corymbia maculata	Spotted Gum	N
Eucalyptus moluccana	Grey Box	N
Glycine spp.	-	N
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	E
Juncus acutus	Spiny Rush	E (PW)
Microlaena stipoides	Weeping Grass	N
Olea europaea subsp. *cuspidata*	African Olive	E (PW)
Paspalum dilatatum	Paspalum	E
Plantago lanceolata	Lamb's Tongues	E
Sida rhombifolia	Paddy's Lucerne	E
Themeda triandra	Kangaroo Grass	N
Verbena bonariensis	Purpletop	E
FAUNA		
Acridotheres tristis	Common Myna	E
Colluricincla harmonica	Grey Shrike-thrush	N
Corvus coronoides	Australian Raven	N
Dacelo novaeguineae	Laughing Kookaburra	N
Grallina cyanoleuca	Magpie Lark	N

Scientific name	Common name	Native (N) / Exotic (E)
Gymnorhina tibicen	Australian Magpie	N
Malurus cyaneus	Superb Fairywren	N
Manorina melanophrys	Bell Miner	N
Pachycephala pectoralis	Golden Whistler	N
Porphyrio melanotus	Swamp Hen	N
Neochmia temporalis	Red-browed Finch	N
Trichoglossus haematodus	Rainbow Lorikeet	N

PW = PRIORITY WEED, WONS (WEED OF NATIONAL SIGNIFICANCE), ENVIRONMENT/AGRICULTURE/HUMAN HEALTH (OTHER WEEDS OF REGIONAL CONCERN)

Appendix B : Likelihood of occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- "known" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat within the study area and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species or ecological communities that were recorded within the study area or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the study area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, a test of significance in reference to State or Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 5 km of the study area, as provided by the Atlas of NSW Wildlife (BioNet) and Protected Matters Search Tool database search.

Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species Profiles.

Table 7: Likelihood of occurrence for threatened ecological communities

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	V / CEEC	EEC	Sydney Basin Bioregion, mostly in the Cumberland IBRA sub-region, with small occurrences in the Sydney Cataract, Wollemi and Burragorang sub-regions. It occurs primarily in the Castlereagh area in the north-west of the Cumberland Plain with other known occurrences near Holsworthy, Kemps Creek and Longneck Lagoon. Occurs primarily on Tertiary sands and gravels of the Hawkesbury-Nepean river system. At Agnes Banks it primarily occurs on aeolian (wind-blown) sands overlying Tertiary alluvium. Found on flat or gently undulating terrain in rain shadow areas typically receiving 700–900 mm annual rainfall. The ecological community occurs primarily at low elevations up to 80 m above sea level, including old ridges, dunes and terraces.	No – not identified during survey	No
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community	EEC	EEC	This ecological community associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes 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. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Typically, these forests, woodlands, scrubs and reedlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.	No – not identified during survey	No
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	EEC	CEEC	Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales.	No – not identified within the works area	No
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	**CEEC**	**CEEC**	**The minimum projected foliage cover of canopy trees is 10% or more and the tree canopy is typically dominated by *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and/or *E. fibrosa* (Red Ironbark). A sparse lower tree layer may be present, typically with young eucalypts of upper tree canopy species and species of *Acacia, Exocarpos* and *Melaleuca.* The understorey**	**Yes – identified within the study area as PCT850**	**No. No direct impacts to this vegetation community as part of the proposed works.**

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
			typically is dominated by the ground layer, typically comprising a variety of perennial native graminoids and forbs.		
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	**EEC**	**-**	**Found on the river flats of the coastal floodplains. Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.**	**Yes – identified within the study area as PCT835**	**No. No direct impacts to this vegetation community as part of the proposed works.**
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	CEEC	CEEC	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. It typically occurs in moderately wet sites, with an annual rainfall of 800-1100mm per year, and on clay soils derived from Wianamatta shale. The tree canopy is dominated by Turpentine and a variety of eucalypt species. Its distribution is mainly on the Cumberland Plain of the Sydney region. Was not recorded during the site inspection s.	No – not identified within the works area	No
Subtropical and Temperate Coastal Saltmarsh	-	V	Consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges, rushes and shrubs. Succulent herbs, shrubs and grasses generally dominate, and vegetation is generally of less than 0.5 m height (with the exception of some reeds and sedges). Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats. In New South Wales, the lower intertidal zone is often dominated by herbs and grasses (e.g. *Sarcocornia quinqueflora, Sporobolus virginicus, Samolus repens* and *Triglochin striata*) which give way to tall sedges and rushes in the landward sections of the intertidal zone.	No – not identified in the works area	No
Turpentine-Ironbark Forest of the Sydney Basin Bioregion	EEC	CEEC	A medium-height open forest with a lower tree layer, an open low shrub layer and a prominent ground layer. Western outliers of the community in wetter habitats may have a tall open forest structure. On the lowlands, the canopy is dominated by *Syncarpia glomulifera* (Turpentine), with *Eucalyptus paniculata* (Grey Ironbark) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. On the margin of the Cumberland Plain, the vegetation is dominated by *Eucalyptus punctata* (Grey Gum) and *Syncarpia glomulifera,* with species such as *Corymbia gummifera* (Red	No – not identified in the works area	No

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
			Bloodwood) and *Eucalyptus globoidea* (White Stringybark) occurring sporadically. The westernmost occurrences of the community are dominated by species such as *Syncarpia glomulifera, Eucalyptus globoidea*, *Eucalyptus cypellocarpa* (Monkey Gum), *E. notabilis* (Mountain Mahogany) and *E. paniculata* (Grey Ironbark) in southern areas. *Eucalyptus punctata* (Grey Gum) and/or *E. piperita* (Sydney Peppermint) are common in areas with sandstone influence.		
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	EEC	EEC	Confined to a small number of pockets in the central Southern Highlands region. The main occurrence is on Mount Gibraltar near Bowral and Mittagong. Minor occurrences of the community are known from Mount Misery, Mount Flora, Cockatoo Hill and Mount Jellore. Restricted to clay soils on microsyenite intrusions in the central parts of the Southern Highlands. Occurs on gentle to steep slopes with correspondingly deep and shallow soils respectively. Variable community, existing as either open forest, woodland or scrub. The dominant tree species are *Eucalyptus radiata* (Narrow-leaved Peppermint), *E. piperita* (Sydney Peppermint) and *E. smithii* (Gully Gum) on the upper slopes, and *E. radiata, E. piperita, E. fastigata* (Brown Barrel) and *E. viminalis* (Manna Gum) on deeper soils on southern aspects. A shrub or small tree layer dominated by species such as A*cacia melanoxylon, Hedycarya angustifolia, Notelaea venosa* and *Pittosporum undulatum* occurs in the more sheltered areas. Dominant ground layer species include *Stypandra glauca, Dianella caerulea, Dichondra repens* and *Themeda australis* in drier, more exposed sites. In more sheltered sites, fern species such as *Blechnum cartilagineum, Doodia aspera* and *Pteridium esculentum,* and vines such as *Eustrephus latifolius* and *Tylophora barbata* are dominant.	No – not identified in the works area	No
Western Sydney Dry Rainforest and Moist Woodland on Shale	EEC	CEEC	Typically, a low closed forest, slightly more open in the moist woodland form, with emergent trees up to 25 m high and a lower tree layer. In sheltered gullies and on lower slopes the canopy layer is typically dominated by *Melaleuca styphelioides* (prickly-leaved paperbark). Other diagnostic tree species include *Acacia implexa* (hickory wattle), *Alectryon subcinereus* (native quince), *Brachychiton populneus* (kurrajong), *Corymbia maculata* (spotted gum), *Melicope micrococca* (white euodia) and *Streblus pendulinus* (whalebone tree). Generally, on upper slopes to undulating terrain, or at more disturbed sites, the ecological community exhibits its moist woodland form with the canopy dominated by *E. moluccana*, *E. tereticornis*, *E. crebra* and/or *Corymbia maculata*. Characteristic shrub species include *Breynia oblongifolia* (false coffee bush), C*lerodendrum tomentosum* (hairy Clerodendrum) and *Notelaea longifolia f. longifolia* (large mock-olive). Vines and other climber	No – not identified in the works area	No

Scientific name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
			species are typically ground layer is variable and generally sparse with a diverse mix of forbs, ferns and shade-tolerant common. The grasses.		

CEEC = CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY, E = ENDANGERED ECOLOGICAL COMMUNITY, V = VULNERABLE.

Table 8: Likelihood of occurrence for threatened fauna species within a 5 km radius of the works area

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Acacia bynoeana	Bynoe's Wattle	E1	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	0	Unlikely. No suitable habitat for this species and no records within proximity to study area	No. Not identified during field survey
Acacia pubescens	Downy Wattle	V	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Allocasuarina glareicola	-	E1	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla* and *Melaleuca decora.*	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton. Coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Cynanchum elegans	White-flowered Wax Plant	E1	E	Dry rainforest; littoral rainforest; *Leptospermum laevigatum-Banksia integrifolia* subsp. *integrifolia* (Coastal Tea-tree– Coastal Banksia) coastal scrub; *Eucalyptus*	0	Unlikely.	No.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				tereticornis (Forest Red Gum) or *Corymbia maculata* (Spotted Gum) open forest and woodland; and *Melaleuca armillaris* (Bracelet Honey myrtle) scrub.		No suitable habitat for this species within the proposed subject site	Not identified during field survey
Dillwynia tenuifolia	-	V	-	Mainly on the Cumberland Plain. Scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest, transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland, and disturbed escarpment woodland on Narrabeen sandstone.	11	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Eucalyptus aggregata	Black Gum	E2, V	V	Alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Usually occurs in open woodland with a grassy ground layer. Population located in the Wingecarribee local government area, at Berrima, Medway and Sutton Forest.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Eucalyptus benthamii	Camden White Gum	V	V	Alluvial flats of the Nepean River and its tributaries. Mainly Kedumba Valley of the Blue Mountains National Park and Bents Basin State Recreation Area. Also, along the Nepean River around Camden and Cobbitty, at Werriberri (Monkey) Creek in The Oaks, and on the Nattai River in Nattai National Park. Occurs in open forest. Requires a combination of deep alluvial sands and a flooding regime.	24	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Genoplesium baueri	Yellow Gnat-orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone. Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	V	-	Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and	7	Unlikely.	No.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				Shale/Gravel Transition Forest, on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium.		No suitable habitat for this species within the proposed subject site	Not identified during field survey
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	Protected and shaded damp situations in riparian habitats.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Hibbertia puberula		E1	-	Wollemi National Park south to Morton National Park and the south coast near Nowra. Low heath, dry sclerophyll woodland, upland swamps, on sandy soils or clay.	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Isotoma fluviatilis subsp. *fluviatilis*		E1	X	Damp places on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland, and alluvial woodland/shale plains woodland. Currently known from only one property at Erskine Park in the Penrith LGA. Previously sighted at Homebush and at Agnes Banks.	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey and subject site not within suitable habitat for this species
Marsdenia viridiflora subsp. *viridiflora*	*Marsdenia viridiflora* R. Br. *subsp. viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown,	E2	-	Razorback Range, also recorded at Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Vine thickets and open shale woodland.	224	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
	Fairfield, Holroyd, Liverpool and Penrith local government areas						
Melaleuca deanei	Deane's Melaleuca	V	V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Found in heath on sandstone	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Micromyrtus minutiflora	-	E1	V	Restricted to the general area between Richmond and Penrith, western Sydney. Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	2	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Persicaria elatior	Knotweed	V	V	Beside streams and lakes, swamp forest or disturbed areas.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Persoonia hirsuta	Hairy Geebung	E1	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	7	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Persoonia nutans	Nodding Geebung	E1	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly	1	Unlikely. No suitable habitat for this species	No. Not identified during field survey

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.		within the proposed subject site	
Pimelea spicata	Spiked Rice-flower	E1	E	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). Well-structured clay soils. Eucalyptus moluccana (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	2	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Pomaderris brunnea	Brown Pomaderris	E1	V	In NSW, found around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands. Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Pterostylis chaetophora	-	V	-	In NSW, currently known from 18 scattered locations between Taree and Kurri Kurri, extending to the south-east towards Tea Gardens and west into the Upper Hunter, with additional records near Denman and Wingen. There are also a few records from the Sydney region, but it is unclear if any of these populations still exist. Seasonally moist dry sclerophyll forest.	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Pterostylis saxicola	Sydney Plains Greenhood	E1	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Pultenaea glabra	Smooth Bush-pea	V	V	Restricted to the higher Blue Mountains and has been recorded from the Katoomba-Hazelbrook and Mount Victoria areas, with unconfirmed sightings in the Mount Wilson and Mount Irvine areas. Swamp margins, hillslopes, gullies and creekbanks, within dry sclerophyll forest and tall damp heath on sandstone.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Pultenaea parviflora	-	E1	V	Endemic to the Cumberland Plain. Mainly from Windsor to Penrith and east to Dean Park, with outlier populations at Kemps Creek and Wilberforce. Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	46	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Rhodamnia rubescens	Scrub Turpentine	E4A	-	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 *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	3	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Syzygium paniculatum	Magenta Lilly Pilly	E1	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	1	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey
Thelymitra kangaloonica	Kangaloon Sun Orchid	E4A	CE	Only known to occur on the southern tablelands of NSW in the Moss Vale / Kangaloon / Fitzroy Falls area at 550-700 m	0	Unlikely. No suitable habitat for this species	No.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				above sea level. Swamps in sedgelands over grey silty grey loam soils.		within the proposed subject site	Not identified during field survey
Thesium australe	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	0	Unlikely. No suitable habitat for this species within the proposed subject site	No. Not identified during field survey

BC ACT STATUS:X – EXTINCT, CE = CRITICALLY ENDANGERED; E = ENDANGERED; E1 = ENDANGERED; E2 = ENDANGERED POPULATION; E4A = CRITICALLY ENDANNGERED; V = VULNERABLE; EPBC ACT STATUS: CE = CRITICALLY ENDANGERED, E = ENDANGERED, V = VULNERABLE.

Table 9: Likelihood of occurrence for threatened fauna species within 5 km of the works area

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Actitis hypoleucos	Common Sandpiper	-	M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also, estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	1	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Anthochaera phrygia	**Regent Honeyeater**	**E4A**	**CE**	**Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).**	**6**	**Potential – marginal suitable habitat recorded within the study areas.**	**Yes (See Appendix C and Appendix D)**
Apus pacificus	Fork-tailed Swift	-	M	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	2	Potential – habitat available within the airspace over the study area, however, unlikely to utilise habitat resources within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Ardea ibis	Cattle Egret	-	Ma	Widespread and common across NSW. Grasslands, wooded lands and terrestrial wetlands.	17	Unlikely – marginal suitable habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Artamus cyanopterus cyanopterus	**Dusky Woodswallow**	**V**	**-**	**Woodlands and dry open sclerophyll forest, usually eucalypts and mallee associations. Also have recordings in**	**11**	**Potential – marginal suitable habitat**	**Yes (See Appendix C)**

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				shrub and heathlands and various modified habitats, including regenerating forests. In western NSW, this species is primarily associated with River Red Gum/Black Box/Coolabah open forest/woodland and associated with larger river/creek systems.		**recorded within the study areas.**	
Botaurus poiciloptilus	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly Typha spp. (bullrushes) and Eleocharis spp. (spikerushes).	1	Unlikely – marginal suitable habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Burhinus grallarius	Bush Stone-curlew	E1	-	In NSW, found sporadically in coastal areas, and west of the divide throughout the sheep-wheat belt. In NSW, it occurs in lowland grassy woodland and open forest.	2	Unlikely – marginal suitable habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Calidris acuminata	Sharp-tailed Sandpiper	-	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	0	Unlikely – marginal suitable habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Calidris ferruginea	Curlew Sandpiper	E1	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	Unlikely – marginal suitable habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Calidris melanotos	Pectoral Sandpiper	-	M	Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	Unlikely – marginal suitable habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	Tall mountain forests and woodlands in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.	15	Potential – marginal foraging habitat available within the works site. Breeding habitat not present but habitat available due to absence of large intact areas of vegetation.	No – uncommon in the area. Negligible impact on foraging habitat.
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	30	Potential – marginal foraging habitat available within the study area	No - negligible impact on foraging habitat.
Cercartetus nanus	Eastern Pygmy-possum	V	-	Rainforest, sclerophyll forest (including Box-Ironbark), woodland and heath.	2	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	6	Potential – foraging habitat available within study area. No nearby breeding habitat (caves).	No – no foraging habitat available within the subject site
Charadrius veredus	Oriental Plover	-	M	Open plains, ploughed land, inland swamps, tidal mudflats, claypans, coastal marshes, grassy airfields, playing fields, lawns.	1	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Chthonicola sagittata	Speckled Warbler	V	-	*Eucalyptus*-dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.	6	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Cuculus optatus	Oriental Cuckoo	-	M	Non-breeding habitat: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodland.	0	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, mallee and Acacia woodland.	23	Potential. Suitable habitat available within the study area and abundance of nearby records	No – uncommon in the area. Negligible impact on foraging habitat.
Dasyurus maculatus (SE mainland population)	Spotted-tail Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	14	Unlikely - suitable habitat not recorded within the study areas.	No
Ephippiorhynchus asiaticus	Black-necked Stork	E1	-	In NSW, floodplain wetlands of the major coastal rivers are key habitat. Also, minor floodplains, coastal sandplain wetlands and estuaries.	2	Unlikely - suitable habitat not recorded within the study areas.	No
Eulamprus leuraensis	Blue Mountains Water Skink	E1	E	Restricted to the middle and upper Blue Mountains, from Newnes Plateau in the north-west to just south of Hazelbrook in the south-east. Sedge and shrub swamps with boggy soils, probably permanently wet.	1	Unlikely - suitable habitat not recorded within the study areas.	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Falsistrellus tasmaniensis	**Eastern False Pipistrelle**	**V**	**-**	**South-east coast and ranges of Australia, from southern Qld to Victoria and Tasmania. In NSW, records extend to the western slopes of the Great Dividing Range. Tall (greater than 20m) moist habitats.**	**1**	**Unlikely - suitable habitat not recorded within the study areas.**	**Yes (See Appendix C)**
Gallinago hardwickii	Latham's Snipe	-	M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	3	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Grantiella picta	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	13	Potential – marginal foraging habitat recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Heleioporus australiacus	Giant Burrowing Frog	V	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	1	Unlikely – Suitable habitat not available due to the degraded nature of creek lines and riparian areas.	No
Hieraaetus morphnoides	**Little Eagle**	**V**	**-**	**Throughout the Australian mainland, with the exception of the most densely forested parts of the Dividing Range**	**3**	**Potential – Foraging habitat available within**	**Yes (See Appendix C)**

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				escarpment. Open eucalypt forest, woodland or open woodland, including sheoak or Acacia woodlands and riparian woodlands of interior NSW.		**study areas. No suitable nests recorded.**	
Hirundapus caudacutus	**White-throated Needletail**	**-**	**M**	**All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.**	**2**	**Potential – habitat available within the airspace over the study area, however, unlikely to utilise habitat resources within the study areas.**	**Yes (See Appendix D)**
Hoplocephalus bungaroides	Broad-headed Snake	E1	V	Largely confined to Triassic and Permian sandstones within the coast and ranges in an area within approximately 250 km of Sydney. Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	2	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Ixobrychus flavicollis	Black Bittern	V	-	In NSW, records are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Terrestrial and estuarine wetlands. Also flooded grassland, forest, woodland, rainforest and mangroves where permanent water is present.	1	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Lathamus discolor	**Swift Parrot**	**E1**	**CE**	**Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.**	**27**	**Potential – marginal winter foraging habitat is available for this species.**	**Yes (See Appendix C and Appendix D)**
Limosa limosa	Black-tailed Godwit	V	M	Arrives in August and leaves in March. In NSW, most frequently recorded at Kooragang Island, with occasional records elsewhere along the coast, and inland in the Murray-	1	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state. Usually sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found around muddy lakes and swamps.			impact on foraging habitat.
Litoria aurea	Green and Golden Bell Frog	E1	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing Typha spp. (bullrushes) or Eleocharis spp. (spikerushes). Some populations occur in highly disturbed areas.	3	Unlikely – Suitable habitat not available due to the degraded nature of constructed dams	No
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Plateaus and eastern slopes of the Great Dividing Range from Watagan State Forest south to Buchan in Victoria. The species has not been recorded in southern NSW within the last decade. Breeding habitat is the upper reaches of permanent streams and perched swamps. Non-breeding habitat is heath-based forests and woodlands	0	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Lophoictinia isura	**Square-tailed Kite**	**V**	**-**	**In NSW, it 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. Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.**	**8**	**Potential. Suitable habitat available within the study area and nearby records**	**Yes (See Appendix C)**
Macquaria australasica	Macquarie Perch	E1	E	River and lake habitats, especially the upper reaches of rivers and their tributaries.	0	Unlikely – no suitable waterbodies are present.	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Found throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies *picata.* Open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	1	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Meridolum corneovirens	Cumberland Plain Land Snail	E1	-	Areas of 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. Primarily inhabits Cumberland Plain Woodland. Also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest.	91	Unlikely - suitable habitat not recorded within the study areas.	No – subject site is highly disturbed.
Merops ornatus	Rainbow Bee-eater	-	M	Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgelands, vine forest and vine thicket.	11	Potential – records within 5 km of the subject site	No – no foraging habitat within the subject site and negligible impact on foraging habitat
Micronomus norfolkensis	**Eastern Coastal Free-tailed Bat**	**V**	**-**	**Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.**	**11**	**Potential. Suitable habitat available within the study area and nearby records**	**Yes (See Appendix C)**
Miniopterus australis	**Little Bent-winged Bat**	**V**		**East coast and ranges south to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.**	**2**	**Potential. Suitable habitat available within the study area and nearby records**	**Yes (See Appendix C)**
Miniopterus orianae oceanensis	**Large Bent-winged Bat**	**V**	**-**	**Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made**	**15**	**Potential. Suitable habitat available within**	**Yes (See Appendix C)**

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.		**the study area and nearby records**	
Mixophyes balbus	Stuttering Frog	E1	V	Along the east coast of Australia from southern Qld to north-eastern Victoria. Rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	0	Unlikely – suitable habitat is not present within the study area.	No
Monarcha melanopsis	Black-faced Monarch	-	M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	Unlikely – suitable habitat is not present within the study area.	No
Monarcha trivirgatus	Spectacled Monarch	-	M	Coastal eastern Australia south to Port Stephens in NSW. Mountain/lowland rainforest, wooded gullies, riparian vegetation including mangroves.	0	Unlikely – suitable habitat is not present within the study area.	No
Motacilla flava	Yellow Wagtail	-	M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in	0	Unlikely – suitable habitat is not present within the study area.	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.			
Myiagra cyanoleuca	Satin Flycatcher	-	M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands watercourses, and heavily vegetated gullies.	0	Unlikely – suitable habitat is not present within the study area.	No
Myotis macropus	Southern Myotis	V	-	In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers. Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	18	Potential. Suitable habitat available within the study area and nearby records	No – no impacts to foraging or roosting habitat
Neophema pulchella	Turquoise Parrot	V	-	Occurs along the length of NSW from the coastal plains to the western slopes of the Great Dividing Range. Eucalypt and cypress pine open forests and woodlands, ecotones between woodland and grassland, or coastal forest and heath.	2	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Ninox connivens	Barking Owl	V	-	Wide but sparse distribution in NSW, avoiding the most central arid regions. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest.	2	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Ninox strenua	Powerful Owl	V	-	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. Woodland, open sclerophyll forest, tall open wet forest and rainforest.	22	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Numenius madagascariensis	Eastern Curlew	-	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	0	Unlikely – suitable waterbodies not present.	No – uncommon in the area. Negligible impact on foraging habitat.
Numenius minutus	Little Curlew	-	M	Summer migrant to Australia. In NSW, most records scattered east of the Great Dividing Range, from Casino, south to Greenwell Point with a few scattered records west of the Great Dividing Range. Dry grasslands, open woodlands, floodplains, margins of drying swamps, tidal mudflats, airfields, playing fields, crops, saltfields, sewage ponds.	1	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Pandion haliaetus	Osprey	-	M	In Australia, Ospreys are generally found in the northern coastal areas, from Broome in Western Australia, across to the south coast of New South Wales. They tolerate a wide variety of habitats– all they need is a safe nesting site, shallow water and an abundant supply of fish. Ospreys generally nest within 3 to 5 km of a water of body. They choose tall structures that can support their large, bulky nests of some 1 to 1.5 m in diameter – and safe from ground-based predators.	0	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Petaurus australis	Yellow-bellied Glider	V	-	Along the eastern coast to the western slopes of the Great Dividing Range, from southern Qld to Victoria. Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	6	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Petauroides volans	Greater Glider	-	V	In Eastern Australia, it is found from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest). Eucalypt forests and woodlands. It is typically found	7	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.			impact on foraging habitat.
Petaurus norfolcensis	Squirrel Glider	V		Widely though sparsely distributed on both sides of the Great Dividing Range in eastern Australia, from northern Qld to western Victoria. 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	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.
Petroica boodang	Scarlet Robin	V		In NSW, it occurs from the coast to the inland slopes. Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	3	Potential. Suitable habitat available within the study area and nearby records	No – no foraging habitat within the subject site.
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	0	Unlikely - suitable habitat not recorded within the study areas.	No
Petroica phoenicea	Flame Robin	V	-	In NSW, breeds in upland areas, and in winter many birds move to the inland slopes and plains, or occasionally to coastal areas. Likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. reeds in upland tall moist eucalypt forests and woodlands. In winter uses dry forests, open woodlands, heathlands, pastures and native grasslands. Occasionally occurs in temperate rainforest, herbfields, heathlands, shrublands and sedgelands at high altitudes.	4	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	26	Potential – suitable habitat available.	No, no evidnece of species identified during survey
Pseudophryne australis	Red-crowned Toadlet	V	-	Confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.	23	Unlikely – suitable waterbodies not present.	No
Pommerhelix duralensis	Dural Land Snail		E	Endemic to NSW. Occurs along the northwest fringes of the Cumberland Plain, within the Hills Shire, Blue Mountains City, Penrith City, Hornsby Shire and Parramatta City LGAs. Shale-sandstone transitional landscapes. Found in Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest; Turpentine-Ironbark Forest; Shale/Sandstone Transition Forest; Turpentine Ironbark Margin Forest; Hinterland Sandstone Gully Forest; and Sydney Hinterland Transition Woodland.	0	Unlikely – lack of nearby records.	No, no evidnece of species identified during survey
Prototroctes maraena	Australian Grayling	-	V	Coastal rivers and streams, fresh and brackish coastal lagoons.	0	Unlikely – suitable waterbodies not present.	No
Pseudomys novaehollandiae	New Holland Mouse	-	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	Unlikely - suitable habitat not recorded within the study areas.	No

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Pteropus poliocephalus	**Grey-headed Flying-fox**	**V**	**V**	**Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.**	**248**	**Likely – suitable foraging habitat available. No camps within study area.**	**Yes (See Appendix C and Appendix D)**
Rhipidura rufifrons	Rufous Fantail	-	M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	Unlikely - suitable habitat not recorded within the study areas. Lack of nearby records.	No – uncommon in the area. Negligible impact on foraging habitat.
Rostratula australis	Australian Painted-snipe	E1	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	0	Unlikely - suitable habitat not recorded within the study areas. Lack of nearby records.	No – uncommon in the area. Negligible impact on foraging habitat.
Saccolaimus flaviventris	**Yellow-bellied Sheathtail-bat**	**V**		**There are scattered records of this species across the New England Tablelands and North West Slopes. Rare visitor in late summer and autumn to south-western NSW. Almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies.**	**1**	**Potential. Suitable habitat available within the study area and nearby records**	**Yes (See Appendix C)**
Scoteanax rueppellii	**Greater Broad-nosed Bat**	**V**	**-**	**Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW it is widespread on the New England Tablelands. Woodland, moist and dry eucalypt forest and rainforest.**	**10**	**Potential. Suitable habitat available within the study area and nearby records**	**Yes (See Appendix C)**

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Synemon plana	Golden Sun Moth	E1	CE	Natural Temperate Grasslands and grassy Box-Gum Woodlands in which ground layer is dominated by *Austrodanthonia* spp. (wallaby grasses).	0	Unlikely - suitable habitat not recorded within the study areas. Lack of nearby records.	No
Stagonopleura guttata	**Diamond Firetail**	**V**	**-**	**Widely distributed in NSW, mainly recorded in the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina, and less commonly found in coastal areas and further inland. Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.**	**2**	**Potential. Suitable habitat available within the study area and nearby records**	**Yes (See Appendix C)**
Tringa nebularia	Common Greenshank	-	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also, widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	0	Unlikely - suitable habitat not recorded within the study areas.	No
Tyto novaehollandiae	**Masked Owl**	**V**	**-**	**Recorded over approximately 90% of NSW, excluding the most arid north-western corner. Most abundant on the coast but extends to the western plains. Dry eucalypt forests and woodlands from sea level to 1100 m.**	**13**	**Potential – suitable foraging and roosting habitat within the study area.**	**Yes (See Appendix C)**

Scientific name	Common Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Number of Records within 5 km	Likelihood of Occurrence	Impact Assessment Required
Tyto tenebricosa	Sooty Owl	V	-	Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	5	Unlikely - suitable habitat not recorded within the study areas.	No – uncommon in the area. Negligible impact on foraging habitat.

BC ACT STATUS:X – EXTINCT, CE = CRITICALLY ENDANGERED; E = ENDANGERED; E1 = ENDANGERED; E2 = ENDANGERED POPULATION; E4A = CRITICALLY ENDANNGERED; V = VULNERABLE; EPBC ACT STATUS: CE = CRITICALLY ENDANGERED, E = ENDANGERED, V = VULNERABLE, M = MIGRATORY

Appendix C : Tests of Significance (BC Act)

The 'assessment of significance' (5-part test) is applied to species, populations and ecological communities listed on Schedules 1 and 2 of the BC Act and Schedules 4, 4A and 5 of the FM Act. The assessment sets out 5 factors, which when considered, allow proponents to undertake a qualitative analysis of the likely impacts of an action and to determine whether a significant impact is likely. All factors must be considered, and an overall conclusion made based on all factors in combination.

Threatened species, populations and ecological communities to be assessed under the BC Act, which have potential to occur within the study area or may be indirectly impacted are:

THREATENED FAUNA

Microchiropteran bats

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus orianae oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

Woodland birds

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Stagonopleura guttata* (Diamond Firetail).

Blossom nomads

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

Large Forest Owls and Raptors

- *Tyto novaehollandiae* (Masked Owl)
- *Hieraaetus morphnoides* (Little eagle)
- *Lophoictinia isura* (Square-tailed Kite)

C1 Microchiropteran Bats – Tree roosting

Due to similar habitat requirements and associated impacts, a single 5-part test has been undertaken for the following microchiropteran bats:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Freetail-bat)
- *Miniopterus australis* (Little Bent-winged bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The **Eastern False Pipistrelle** is wide-ranging, occurring along the southeast coast of Australia with records from South East Queensland, New South Wales, Victoria and Tasmania. The species occurs in sclerophyll forests from the Great Dividing Range to the coast, and generally prefers wet habitats where trees are more than 20 m high. Roosting occurs in hollow trunks of eucalypt trees, usually in single sex colonies, but the species has been recorded roosting in caves, under loose bark and occasionally in old wooden buildings (Churchill 1998). Their flight pattern is high and fast, and they forage within or just below the tree canopy. They feed on a variety of prey including moths, rove beetles, weevils, plant bugs, flies and ants. The Eastern False Pipistrelle was not recorded during the survey however, there is 1 record within a 5 km radius of the study area. Potential habitat exists within the study area and immediately adjacent to the study area.

The **Eastern Coastal Freetail-bat** is found along the east coast from south Queensland to southern NSW and occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. The Eastern Freetail-bat roost mainly in tree hollows but will also roost under bark or in man-made structures. They are usually solitary but also recorded roosting communally, probably insectivorous (OEH 2014). The Eastern Freetail-bat was not recorded during the survey however there are 11 records within a 5 km radius of the study area. Potential habitat exists within the study area and immediately adjacent to the study area.

The **Little Bent-winged Bat** is listed as vulnerable species under Schedule 1 of the BC Act. It is found in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. The Little Bentwing-bat was not recorded during the field survey, but has previously been recorded from two database records within a 5 km radius of the study area

The **Large Bent-winged Bat** is listed as a vulnerable species under Schedule 1 of the BC Act. This species occupies a range of forested environments (including wet and dry sclerophyll forests), along the coastal portion of eastern Australia, and through the Northern Territory and Kimberley area (subject to subdivision of this species).

This species has a fast, level flight exhibiting swift shallow dives. It forages from just above the tree canopy, to many times the canopy height in forested areas, and will utilise open areas where it is known to forage at lower levels. Moths appear to be the main dietary component. This highly mobile species is capable of large regional movements in relation to seasonal differences in reproductive behaviour and winter hibernation. Though individuals often use numerous roosts, it congregates in large numbers at a small number of nursery caves to breed and hibernate. Although roosting primarily occurs in caves, it has also been recorded in mines, culverts, stormwater channels, buildings, and occasionally tree-hollows. This species occupies a number of roosts within specific territorial ranges usually within 300 km of the maternity cave and may travel large distances between roost sites. The Eastern Bentwing-bat was not recorded during the field survey but has previously been recorded from 15 database records within a 5 km radius of the study area.

The **Yellow-bellied Sheathtail-bat** roosts singly or in groups of up to six, in tree hollows and buildings. In treeless areas they are known to utilise mammal burrows. They forage in most habitats throughout their very wide range, including areas with and without trees and appear to defend an aerial territory. There is 1 record of this species within a 5 km radius of the study area.

The **Greater Broad-nosed Bat** is a large bat that feeds on moths and other large insects along edges of forest, cleared paddocks and tree-lined water courses. This species uses mostly tree hollows for roosting, and they have been recorded in a variety of vegetation types from woodland to rainforest. There are 10 records of Greater Broad-nosed Bat within a 5 km radius of the study area.

BC Act	Question	Response
7.3.1 a)	In the case of a threatened species: whether the proposed works 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	Under the proposed works 7 ha of open grasslands will be modified which contains marginal habitat for these species. Indirect impacts include the potential for these species to fly over the subject site. Given that there is well connected vegetation within the study area it is considered unlikely that microbat species would flyover the subject site to forage. Therefore, it is unlikely that the proposal would have an adverse effect on the lifecycle of these species that would place these species at risk of extinction.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed works or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – not a threatened ecological community
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed works or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable – not a threatened ecological community.

BC Act	Question	Response
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed works or activity	Under the proposed works 7 ha of open exotic grasslands will be modified which contains marginal habitat for these species. An additional 25.1 ha of similar open habitat will be retained, and 14.4 ha of native vegetation will be retained in the locality.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed works or activity	The proposed works will be limited to the subject site which is devoid of any native vegetation and therefore the proposed works will not result in additional clearing of vegetation. Areas of native vegetation which will be retained adjacent to the subject site and will not be impacted by the proposed flare release. Therefore, the proposed works will not result in the fragmentation or isolation of habitats for these species.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposal will not result in the clearing of vegetation within an area identified as land with high biodiversity value, as defined by the Biodiversity Conservation Regulation 2017.
7.3.1 d)	Whether the proposed works or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposal will not result in the clearing of vegetation within an area identified as land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*.
7.3.1 e)	Whether the proposed works or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	The proposed action does not constitute and is not part of a key threatening process (KTP) and will not result in the operation or increase in the impact of a KTP.
Conclusion	**Is there likely to be a significant impact?**	It is unlikely that the proposal will cause a significant impact on threatened microbat species given that these species are highly mobile and are more likely to use the vegetation within the study area and is therefore unlikely to fly over or forage within the subject site. Consequently, a BDAR is not required to be undertaken.

C2 Woodland birds

The two woodland and open habitat dwelling bird species discussed in this assessment have potential to occur within the study area. They have been grouped together for this Test of Significance because they have similar foraging and/or roosting behaviours and habitat requirements. Consequently, the predicted impact is the same or similar. Where obvious differences are apparent between each species, they are discussed separately. The species assessed are as follows:

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Stagonopleura guttata* (Diamond Firetail).

Both of these species listed above have been recorded within the locality (five kilometres of the subject site). None of these records were within the subject site. None of these species were recorded during the site investigation but suitable habitat was identified for these species.

The **Dusky Woodswallow** is listed as vulnerable under Schedule 1 of the BC Act. It's often recorded in dry open sclerophyll forests and woodlands, dominated by eucalypt species (OEH 2016). The understorey is generally composed of a sparse mixture of acacias and eucalypt saplings (OEH 2016). The diet of this species primarily consists of insects, which are captured above the canopy or occasionally over water during flight (OEH 2016).

The **Diamond Firetail** is listed as vulnerable under Schedule 1 of the BC Act. This species can be found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Woodlands. This species can also be found in open forest, mallee, riparian vegetation, and grasslands. This species is usually seen in flocks of between five to forty birds. This species is a ground feeder, feeding on ripe and partly ripe grass, herb seeds, green leaves, and on insects (Read, 1994).

BC Act	Question	Response
7.3.1 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	Impacts likely to have an adverse effect on the lifecycle of these species includes the loss or degradation of significant areas of forest and woodland habitat. No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. Given that these species are highly mobile and there is well connected vegetation outside of the subject site it is considered unlikely that these species would utilise the subject site to forage. Therefore, it is unlikely that the proposed works will significantly disrupt the life cycle of these species such that a viable local population is placed at risk.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – not a threatened ecological community
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable – not a threatened ecological community
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	Under the proposed works 7 ha of open grasslands will be modified which contains marginal habitat for these species. An additional 25.1 ha of similar open habitat will be retained, and 14.4 ha of native vegetation will be retained in the adjacent conservation areas..
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community:	The proposed works will be limited to the subject site which is devoid of any native vegetation and therefore

BC Act	Question	Response
	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	no roosting or foraging habitat will be removed or modified and will not fragment or isolate any areas of habitat for these species as a result of the proposed works. Given the highly mobile nature of these species and that the connectivity of the surrounding vegetation would be maintained, it is unlikely that an area of habitat will become fragmented or isolated from other area of habitat.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposed works will be limited to the subject site which is devoid of any native vegetation and therefore only indirect impacts relating to these species flying over the subject site have been considered. If these highly mobile species are within the area, they are likely to use the subject site only on an occasional basis and would not be dependent on the foraging resources within the study site. Therefore, it is unlikely that the habitat to be removed would be considered important to the long-term survival of the species within the locality.
7.3.1 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).	The proposal will not result in the clearing of vegetation within an area identified as land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*.
7.3.1 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.	The proposed action does not constitute and is not part of a key threatening process (KTP) and will not result in the operation or increase in the impact of a KTP.
Conclusion	**Is there likely to be a significant impact?**	It is unlikely that the proposal will cause a significant impact on threatened microbat species given that these species are highly mobile and are more likely to use the vegetation within the study area and is therefore unlikely to fly over or forage within the subject site. Consequently, a BDAR is not required to be prepared.

C3 Blossom Nomads

The following three blossom dependant species are regarded as having potential to occur within the study area and, consequently, have been grouped together for this Test of Significance. This is because they have certain similarities in their foraging and/or roosting behaviours, habitat requirements and consequently the predicted impact is considered to be the same or similar. Where obvious differences are apparent between each species, they are discussed separately.

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

All of the species listed above have been recorded within the locality (five kilometres of the subject site). None of these records were within the subject site and none of these species were recorded during the site investigation but suitable habitat was identified for all of these species.

The **Regent Honeyeater** is listed as a critically endangered species under Schedule 1 of the BC Act. 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 occasionally. 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 non-breeding flocks converge on flowering coastal woodlands and forests (DoE 2015).

The Regent Honeyeater mostly occurs in dry-ironbark eucalypt woodland and dry sclerophyll forest associations, where they prefer the most fertile site available, e.g. along creek flats, or in broad river valleys and foothills. In NSW, riparian forests containing *Casuarina cunninghamiana* (River Oak), and with *Amyema cambagei* (Needle-leaf Mistletoe), are also important for feeding and breeding. They may also use other woodland types and wet lowland coastal forest dominated by *Eucalyptus robusta* (Swamp Mahogany) or *Corymbia maculata* (Spotted Gum).

The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include *E. sideroxylon* (Mugga Ironbark), *E. melliodora* (Yellow Box), *E. blakelyi* (Blakely's Red Gum), *E. albens* (White Box) and *E. robusta.* Also utilises: *E. microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea,* and *Angophora floribunda*. Nectar and fruit from the mistletoes *A. miquelii, A. pendula, A. cambagei* are also eaten during the breeding season. When nectar is scarce lerps and honeydew comprise a large proportion of the diet (NSW Scientific Committee, 2010).

***Lathamus discolor* (Swift Parrot)**

The Swift Parrot is listed as endangered under Schedule 1 of the BC Act. Swift Parrots are winter migrants to the south-eastern Australia mainland from Tasmania, where they feed on winter-flowering eucalypts. The Swift Parrot is a highly mobile species able to utilise a variety of nectar sources over large areas (TSSC 2016).

On the mainland they occur in areas where eucalypts are flowering profusely or where there is abundant lerp (sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *C. maculata, C. gummifera, E. sideroxylon,* and *E. albens.*

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

Pteropus poliocephalus (Grey-headed Flying-fox, GHFF) utilises a wide variety of habitats (including disturbed areas) for foraging and are recorded as travelling long distances on feeding forays (Churchill 1998). Fruits and flowering plants of a wide variety of species are the main food source. The species roosts in large 'camps' of up to 200,000 individuals. Camps are usually formed close to water and along gullies however the species has been known to form camps in urban areas (Churchill 1998).

It is unlikely that this species would use this site for roosting, but it does represent potential foraging habitat. The nearest flying-fox camp is located at Campbelltown, approximately ten kilometres north of the study area.

BC Act	Question	Response
7.3.1 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	Impacts likely to have an adverse effect on the lifecycle of these species includes the loss or degradation of significant areas of forest and woodland habitat. No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. Given that these species are highly mobile and there is well connected vegetation outside of the subject site it is unlikely that these species would utilise the subject site to forage. Therefore, it is unlikely that the proposed works will significantly disrupt the life cycle of these species such that a viable local population is placed at risk.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – not a threatened ecological community
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable – not a threatened ecological community
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposed works will be limited to the subject site which is devoid of any native vegetation and therefore no roosting or foraging habitat will be removed or modified.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposed works will be limited to the subject site which is devoid of any native vegetation and therefore no roosting or foraging habitat will be removed or modified and will not fragment or isolate any areas of habitat for these species as a result of the proposed works. Given the highly mobile nature of these species and that the connectivity of the surrounding vegetation would be maintained, it is unlikely that an area of habitat will become fragmented or isolated from other area of habitat.

BC Act	Question	Response
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposed works will be limited to the subject site which is devoid of any native vegetation and therefore only indirect impacts relating to these species flying over the subject site have been considered. If these highly mobile species are within the area, they are likely to use the subject site only on an occasional basis and would not be dependent on the foraging resources within the study site. Therefore, it is unlikely that the habitat to be removed would be considered important to the long-term survival of the species within the locality.
7.3.1 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).	The proposal will not result in the clearing of vegetation within an area identified as land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*.
7.3.1 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.	The proposed action does not constitute and is not part of a key threatening process (KTP) and will not result in the operation or increase in the impact of a KTP.
Conclusion	**Is there likely to be a significant impact?**	It is unlikely that the proposal will cause a significant impact on threatened microbat species given that these species are highly mobile and are more likely to use the vegetation within the study area and is therefore unlikely to fly over or forage within the subject site. Consequently, a BDAR is not required to be prepared.

C4 Large Forest Owls and Raptors

The following large forest owl and Cockatoo species are regarded as having potential to occur within the study area and, consequently, have been grouped together for this Test of Significance. This is because they have certain similarities in their foraging and/or roosting behaviours, habitat requirements and consequently the predicted impact are the same or similar. Where obvious differences are apparent between each species, they are discussed separately.

- *Tyto novaehollandiae* (Masked Owl).
- *Hieraaetus morphnoides* (Little Eagle)
- *Lophoictinia isura* (Square-tailed Kite)

The **Square-tailed Kite** is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. This species is found in a variety of timbered habitats including dry woodlands and open forests and shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs (DPI&E 2010b) When foraging, this species typically glides just above the tree canopy in search of prey and, therefore, they are more likely to forage above timbered areas rather than open country.

All of the species listed above have been recorded within the locality (five kilometres of the subject site). None of these records were within the subject site. Of particular importance for these species is suitable

breeding sites comprising large hollows in the trunks and limbs of tall living or dead trees. The subject site does not include any hollow bearing trees.

The **Masked Owl** occurs in undulating wet-dry forests of the coast and dry eucalypt forests of the tablelands, with optimal habitat including a mosaic of sparse (grassy) and dense (shrubby) groundcover on gentle terrain (DPI&E 2020c). The species forages preferentially in ecotones within forests or along forest edges but also in open areas, and usually hunts from a perch at or near ground level, sometimes near the edges of roads (DPI&E 2020c).

Roosts are located in live or occasionally dead hollow eucalypts, dense foliage in gullies and caves and recesses in cliffs. They require mature forest or woodland with large hollow trees and dense trees or shrubs for fledglings to shelter in. Hollows greater than 40 cm wide and 100 cm deep in trees at least 90 cm DBH are used. Masked Owls are faithful to traditional nest trees but may use alternative hollows within the breeding territory in different years. Home ranges are estimated to be 400-1000 ha, varying with habitat productivity (DPI&E 2020c).

The **Little Eagle** occupies many habitats including open forest, woodland and scrub communities, as well as open agricultural land (Simpson & Day 2004). Little Eagles are known to nest in canopy trees during spring and early summer, in open woodland or riparian zones, where open areas are available to forage for birds, reptiles and mammals (Morcombe 2004; Marchant & Higgins 1993).

BC Act	Question	Response
7.3.1 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	Impacts likely to have an adverse effect on the lifecycle of these species includes the loss or degradation of significant areas of forest and woodland habitat. The proposed works will result in the removal of a small area of vegetation (approximately 7.0 ha) in the form of exotic grasses. Given that these species are highly mobile and there is well connected vegetation outside of the subject site it is unlikely that these species would utilise the subject site to forage. Therefore, it is unlikely that the proposed works will significantly disrupt the life cycle of these species such that a viable local population is placed at risk.
7.3.1 b) i	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – not a threatened ecological community
7.3.1 b) ii	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Not applicable – not a threatened ecological community

BC Act	Question	Response
7.3.1 c) i	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	Under the proposed works 7 ha of open grasslands will be modified which contains marginal habitat for these species. An additional 25.1 ha of similar open habitat will be retained, and 14.4 ha of native vegetation will be retained in the adjacent conservation areas.
7.3.1 c) ii	In relation to the habitat of a threatened species or ecological community: Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposed works will result in the removal of a small area of vegetation (approximately 7.0 ha) in the form of exotic grasses and therefore no roosting habitat will be removed or modified and will not fragment or isolate any areas of habitat for these species as a result of the proposed works. Given the highly mobile nature of these species and that the connectivity of the surrounding vegetation would be maintained, it is unlikely that an area of habitat will become fragmented or isolated from other area of habitat.
7.3.1 c) iii	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposed works will result in the removal of a small area of vegetation (approximately 7.0 ha) in the form of exotic grasses. This represents a relatively small area, compared with potential habitat remaining within the locality. If these highly mobile species are within the area, they are likely to use the subject site only on an occasional basis and would not be dependent on the foraging resources within the subject site. Therefore, it is unlikely that the habitat to be removed would be considered important to the long-term survival of the species within the locality.
7.3.1 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).	The proposal will not result in the clearing of vegetation within an area identified as land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*.
7.3.1 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.	The proposed action does not constitute and is not part of a key threatening process (KTP) and will not result in the operation or increase in the impact of a KTP.
Conclusion	**Is there likely to be a significant impact?**	It is unlikely that the proposal will cause a significant impact on threatened microbat species given that these species are highly mobile and are more likely to use the vegetation within the study area and is therefore unlikely to forage within the subject site. Consequently, a BDAR is not required to be prepared.

Appendix D : EPBC Act Impact Assessments

The EPBC Act Administrative Guidelines on Significance set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance (MNES). Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World heritage properties
- National heritage places
- Nuclear actions

Specific 'Significant Impact Criteria' are provided for each MNES except for threatened species and ecological communities in which separate criteria are provided for those listed as critically endangered, endangered and vulnerable under the EPBC Act. The following MNES were assessed:

Critically Endangered

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)

Vulnerable

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

Migratory

- *Apus pacificus* (Fork-tailed Swift)
- *Hirundapus caudacutus* (White-throated Needletail)

D1 Vulnerable

Pteropus poliocephalus (**Grey-headed Flying-fox**) is listed as a vulnerable species under the EPBC Act. This species inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).

This species was not recorded within the subject site during field survey but has been recorded within five kilometres of the study area. It is unlikely that this species would use this site for roosting, but it does represent potential foraging habitat. The closest known Grey-headed Flying fox camp as identified on the National Flying-fox Monitoring viewer (DotE, 2020) is at Emu Plains, which is located approximately 7.5 km to the north of the study area.

VULNERABLE SPECIES

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	An important population is defined as a population that is necessary for a species' long-term survival and recovery (DoE 2013). The GHFF is one population that intermixes up and down the east coast, therefore any bat population is a meta-population of this one "important population". No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. As such, it is unlikely that the proposal would lead to a long-term decrease in the size of a population of GHFF.
2)	reduce the area of occupancy of an important population	The distribution of the GHFF extends from Bundaberg in Queensland to Melbourne, Victoria and from the coast inland to the western slopes of New South Wales. No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and therefore would not reduce the area of occupancy of GHFF.
3)	fragment an existing important population into two or more populations	The GHFF is a highly mobile species and forms one large intermixing population along the east Australian coast. No roosting habitat will be affected. The proposed work is unlikely to result in the fragmentation or isolation of areas of potential habitat as the proposed work is located in a cleared and disturbed area adjacent to larger highly connected vegetation patch. The proposed action will not fragment an existing important population into two or more populations.
4)	adversely affect habitat critical to the survival of a species	The draft recovery plan for GHFF (DECCW 2009) identifies foraging habitat that is critical to the survival of GHFF as follows: *Foraging habitat that meets at least one of the following criteria can be explicitly identified as habitat critical to*

Criterion	Question	Response
		survival, or essential habitat, for GHFF. Natural foraging habitat that is: *1. productive during winter and spring, when food bottlenecks have been identified* *2. known to support populations of > 30 000 individuals within an area of 50 km radius (the maximum foraging distance of an adult)* *3. productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May)* *4. productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions)* *5. known to support a continuously occupied camp.* No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. Given no native vegetation is to be removed from the subject site, that potential foraging habitat would be conserved within the study area and that these species are highly mobile, it is unlikely that the habitat to be removed would be considered important to the long-term survival of these species in the locality.
5)	disrupt the breeding cycle of an important population	The proposed action will not disrupt the breeding cycle of the GHFF. The closest camp is located 7.5 km north of the study area at Emu Plains. The proposed action is situated far enough away and is unlikely to disrupt this camp during construction.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No GHFF camps would be removed or disturbed, and extensive foraging habitat exists in the region within large conservation areas and in urban areas. The proposed works would be unlikely to modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The subject site is already disturbed and modified, and the proposed works will not result in the establishment of an invasive species that is harmful to the GHFF.
8)	introduce disease that may cause the species to decline, or	Grey-headed Flying-foxes are reservoirs for the Australian bat lyssavirus (ABL) and can cause clinical disease and mortality in GHFF (DECCW 2009a). The proposed works is unlikely to present a significant ecological stress on known individuals or camps utilizing the subject site and therefore unlikely to affect this species. The proposed work would be unlikely to introduce a disease that may cause this species to decline.
9)	interfere substantially with the recovery of the species.	A Draft National Recovery Plan for the Grey-headed Flying-fox was developed in 2009. As no maternity camps would

Criterion	Question	Response
		be removed, and no native vegetation is proposed to be removed it is unlikely the proposed works would to interfere with the recovery of this species.
Conclusion	**Is there likely to be a significant impact?**	Based on the information provided above, the proposed works are unlikely to result in a significant impact for the Grey-headed Flying-fox.

D2 Critically Endangered

The **Swift Parrot** is listed as a critically endangered and marine species under the EPBC Act. The Swift Parrot is a widespread highly mobile species which is endemic to South-Eastern Australia. It is known to utilise habitat within the Central West CMA region (Saunders & Tzaros, 2011). The species breeds in Tasmania between September and January then migrates to the mainland in autumn to feed on eucalypt species in flower.

The Swift Parrot has been recorded within the locality (five kilometres of the subject site). This species was not recorded during the site investigation, but suitable habitat was identified.

The **Regent Honeyeater** is listed as a critically endangered species under the EPBC Act. 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 occasionally. 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 non-breeding flocks converge on flowering coastal woodlands and forests (DPI&E 2020a).

The Regent Honeyeater mostly occurs in dry-ironbark eucalypt woodland and dry sclerophyll forest associations, where they prefer the most fertile site available, e.g. along creek flats, or in broad river valleys and foothills. In NSW, riparian forests containing *Casuarina cunninghamiana* (River Oak), and with *Amyema cambagei* (Needle-leaf Mistletoe), are also important for feeding and breeding. They may also use other woodland types and wet lowland coastal forest dominated by *Eucalyptus robusta* (Swamp Mahogany) or *E. maculata* (Spotted Gum).

The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include *E. sideroxylon* (Mugga Ironbark), *E. melliodora* (Yellow Box), *E. blakelyi* (Blakely's Red Gum), *E. albens* (White Box) and *E. robusta*. Also utilises: *E. microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea*, and *Angophora floribunda*. Nectar and fruit from the mistletoes *A. miquelii, A. pendula, A. cambagei* are also eaten during the breeding season. When nectar is scarce lerp and honeydew comprise a large proportion of the diet (DECCW 2010).

The Regent Honeyeater has been recorded within the locality (five kilometres of the subject site). This species was not recorded during the site investigation, but suitable habitat was recorded adjacent to the subject site identified.

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

Criterion	Question	Response
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility of the following:		
1)	will the action lead to a long-term decrease in the size of a population	The subject site does not support key source populations for breeding or dispersal, populations necessary for maintaining genetic diversity, or populations near the limit of the species range. No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. As such, it is unlikely that the proposal would lead to a long-term decrease in the size of a population of these species.
2)	will the action reduce the area of occupancy of the species	The distribution of the Regent Honeyeater is 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. Swift Parrots are winter migrants to the south-eastern Australia mainland from Tasmania, where they feed on winter-flowering eucalypts. The Swift Parrot is a highly mobile species able to utilise a variety of nectar sources over large areas (DECCW 2010b). No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and therefore would not reduce the area of occupancy of these highly mobile species.
3)	will the action fragment an existing population into two or more populations	The proposed work is unlikely to result in the fragmentation or isolation of areas of potential habitat as the proposed work is located in a cleared and disturbed area adjacent to larger highly connected vegetation patch and these birds are highly mobile species.
4)	will the action adversely affect habitat critical to the survival of a species	No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. Given no native vegetation is to be removed from the subject site, that potential foraging habitat would be conserved within the study area and that these species are highly mobile, it is unlikely that the habitat to be removed would be considered important to the long-term survival of these species in the locality.

Criterion	Question	Response
5)	will the action disrupt the breeding cycle of a population	The Regent Honeyeater is only known to breed in north-east Victoria (Chiltern-Albury), and in Capertee Valley and the Bundarra-Barraba region in NSW. The Swift Parrot 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. It is unlikely that the proposal would disrupt the breeding cycle of these species.
6) i	will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No vegetation exists within the subject site; therefore, no foraging or roosting habitat will be impacted by the proposal and hence only indirect impacts have been assessed. Indirect impacts include the potential for these species to fly over the subject site. Given no native vegetation is to be removed from the subject site, that potential foraging habitat would be conserved within the study area and that these species are highly mobile, it is unlikely that the proposal would modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline
6) ii	will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The proposal would not result in the establishment of an invasive species that is harmful to these species
7)	will the action introduce disease that may cause the species to decline	The proposal would not result in the introduction of a disease that is harmful to these species.
8)	will the action interfere with the recovery of the species	Considering the above factors, the proposal would not interfere substantially with the recovery of these species.
Conclusion	**Is there likely to be a significant impact?**	Based on these criteria, it is unlikely that the proposed work would lead to a significant impact on the Regent Honeyeater or Swift Parrot.

D3 Migratory

The following migratory bird species are regarded as having potential to occur within the study area and, consequently, have been grouped together for this assessment. This is because they have certain similarities in their foraging and/or roosting behaviours, habitat requirements and consequently predicted impacts are considered to be the same or similar. Where obvious differences are apparent between each species, they are discussed separately. These species are listed as migratory marine species under the EPBC Act.

In Australia, the **White-throated Needletail** is almost exclusively aerial, from heights of less than one metre up to more than 1000 metres above the ground (Coventry 1989; Tarburton 1993; Watson 1955). They occur over most types of habitat, but are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy.

In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level'. The species has been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows (Corben et al. 1982; Day 1993; Quested 1982; Tarburton 1993).

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. It is found in a variety of timbered habitats including dry woodlands and open forests and shows a particular preference for timbered watercourses.

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.

LISTED MIGRATORY SPECIES

Criterion	Question	Response
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
1)	substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	*Note: An "area of important habitat for a migratory species" is defined as:* • Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or • Habitat that is of critical importance to the species at particular life-cycle stages; and/or • Habitat utilised by a migratory species which is at the limit of the species' range; and/or • Habitat within an area where the species is declining. The subject site does not represent important habitat for the species listed above as it does not occur on the limit of the species' range and does not support an ecologically significant proportion of the population of these species. In addition, the habitat to be removed is not of critical importance to these species at particular life cycle stages and is not within an area where any of these species are declining. The proposal would result in the removal of potential foraging habitat for these species in the form of exotic grasslands. However, removal of vegetation would not represent a substantial loss of foraging habitat for these species, as they are unlikely to be reliant on the resources present in the study area and able to use other areas due to their highly mobile nature. Therefore, the proposed loss of potential foraging habitat is not likely to substantially modify, destroy, or isolate an area of important habitat for the species.
2)	result in an invasive species that is harmful to the migratory species becoming established in	The proposal would not result in the establishment of an invasive species that are harmful to any of the species listed above.

Criterion	Question	Response
	an area of important habitat for the migratory species, or	
3)	seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	A "population of a migratory species" is the entire population or any geographically separate part of the population, a significant proportion of whose members cyclically and predictably cross one or more nationally jurisdictional boundaries including Australia. The proposal is unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the population of these species. The subject site does not represent the preferred breeding habitat for any of the species listed above. The removal of vegetation within the study site represents a relatively small amount of potential foraging habitat, compared with potential habitat remaining within the study area and wider landscape, and as such would be unlikely to affect these species.
Conclusion	**Is there likely to be a significant impact?**	Based on the information provided above, the proposed work is unlikely to result in a significant impact for the species listed above

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