Chullora Materials Recycling Facility

Environmental Impact Statement (SSD-10401)

Appendix P Biodiversity Development Assessment Report

SUEZ RECYCLING & RECOVERY PTY LTD

CHULLORA MATERIALS RECYCLING FACILITY

Appendix P Biodiversity Development Assessment Report

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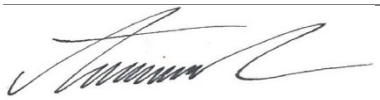
Checker	Ed Cooper	
Approver	Claire Hodgson	
Report No	1	
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REVISIONS

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A	04/03/20	Draft	ML/JR	CH
B	31/07/20	Final following adequacy comments	ML/JR	CH

CONTENTS

GLOSSARY OF TERMS

Table 0-1 Key terms

Key terms	Definition
The Applicant	SUEZ Recycling & Recovery Pty Ltd
The Chullora RRP	The Chullora Resource Recovery Park (RRP) to be developed across three stages at 21 Muir Road, Chullora in Sydney.
The previous Chullora RRC	The previous Chullora Resource Recovery Centre was the waste management infrastructure comprising a putrescible waste transfer station, a materials recovery facility, a glass processing facility and supporting infrastructure that was operated by SUEZ on the site from 1997 to 2017 when it was subject to a fire and subsequently demolished.
The Proposal	The development and operation of the first phase of the Chullora RRP as a Materials Recycling Facility (MRF) to process co-mingled and source separated recyclable from municipal sources and dry commercial and industrial (C&I) waste; with a material processing capacity of up to 172,000 tonnes per annum (tpa).
The Proposal site	The 2.5ha area occupied by Stage 1 of the Chullora RRP located at 21 Muir Road.
The Chullora RRP Site	The total 9.2 ha area of 21 Muir Road (Lot 2 DP1227526) comprising of the following: • The Proposal site – comprising a 2.5 ha developable area for the construction and operation of the MRF and internal roads and supporting infrastructure • The existing site office and car parking area - comprising the 0.7 ha eastern portion of the Chullora RRP site • A flood detention basin and stormwater infrastructure – comprising the 1.7 ha area in the western portion of the Chullora RRP site • The future development area – comprising the 1.8 ha central portion of the Chullora RRP site • The Cooks River stormwater canal • A 1.2 ha landscaping area comprising the southern portion of the Chullora RRP site • A 0.44 ha vegetated in the north-western corner of the Chullora RRP site.
The study area	The area in which this BDAR has investigated for assessment. This includes: • The site, as described above • A 0.5 ha vegetated area in the north-western corner of the Chullora RRP site.

Table 0-2 Glossary

Term	Definition
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	*Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
C&I	Commercial and industrial

Term	Definition
CBD	Central Business District
CEMP	Construction Environmental Management Plan
Council	City of Canterbury-Bankstown Council
DA	Development Application
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment
e.g.	for example
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environmental Protection Licence
GDE	Groundwater dependent ecosystem
ha	hectares
i.e.	that is
IBRA	Interim Biogeographically Regionalisation of Australia
km	kilometre
LGA	Local Government Area
m	metres
m^2	square metres
MNES	Matter of National Environmental Significance
MRF	Materials Recycling Facility
MSW	Municipal solid waste
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Type
RRC	Resource Recovery Centre
RRP	Resource Recovery Park

Term	Definition
SEARs	Secretary Environmental Assessment Requirements
SSD	State significant development
SUEZ	SUEZ Recycling & Recovery Pty Ltd
TEC	Threatened ecological community
tpa	tonnes per annum
TSC Act	*Threatened Species Conservation Act 1995*
VIS	Vegetation Information System

EXECUTIVE SUMMARY

SUEZ Recycling & Recovery Pty Ltd (SUEZ - the Applicant) are seeking to establish a state-of-the art Resource Recovery Park located at 21 Muir Road (Lot 2 DP1227526), Chullora in Sydney (the Chullora RRP). The Applicant are proposing to develop and operate the first phase of the Chullora RRP as a Materials Recycling Facility (MRF) (the Proposal) to process co-mingled and source separated recyclables from municipal sources and dry commercial and industrial (C&I) waste; with a material processing capacity of up to 172,000 tonnes per annum (tpa).

The Proposal would be considered State significant development (SSD) under Clause 23 (waste and resource management facilities) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011.* Accordingly, an Environmental Impact Statement (EIS) has been prepared to support the SSD Application for the Proposal. This Biodiversity Development Assessment Report (BDAR) has been prepared by Arcadis to support the preparation of the EIS and assess the Proposal's impact on any biodiversity values within the Proposal boundary.

Proposal overview

The Proposal would comprise the construction and operation of a MRF with a material handling capacity of up to 172,000 tpa. Waste streams that would be processed at the MRF would all comprise dry recyclables from municipal and C&I sources, including:

- Co-mingled material collected from municipal and C&I sources
- Source separated paper and cardboard
- Mixed plastics.

General operational activities are proposed to occur concurrently with the MRF within designated operational activities area, including truck parking, container storage and other ancillary activities as required.

Purpose of this assessment

This BDAR has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as they relate to biodiversity. This report presents an assessment of the construction and operational activities for the Proposal that have the potential to impact biodiversity.

Existing environment

The existing environment of the study area was investigated through desktop research and detailed field surveys, undertaken across the study area in December 2019 and January 2020. Subsequent to these investigations being carried out a development application (DA) has been lodged to carry out flood mitigation works (DA 366/2020) across the Chullora RRP site. Subject to approval, this DA would include clearing of vegetation across areas within the Chullora RRP site, which would be completed prior to commencement of the Proposal. Consequently, under the new baseline conditions established by the flood mitigation works, no vegetation or threatened species habitat is present within the Proposal boundary for the purpose of this assessment. One threatened ecological community is present within the study area but outside the Proposal boundary.

Construction and operational impacts

As there are no biodiversity values, including vegetation and threatened species habitat, within the Proposal boundary, the Proposal is unlikely to cause any direct construction or operational impacts.

During both the construction and operational phase of the Proposal, there is a possibility of indirect impacts being caused to biodiversity. These include:

- Inadvertent impacts on adjacent habitat or vegetation
- Reduced viability of adjacent habitat due to edge effects
- Reduced viability of adjacent habitat due to noise, dust or light spill
- Transport of weeds and pathogens from the Proposal site to adjacent vegetation.

However, with the appropriate mitigation measures implemented, the likelihood of these impacts is significantly reduced, and their affect is minor.

Mitigation measures

While there are no direct biodiversity impacts, there are some potential indirect impacts as a result of the Proposal. As such, the following measures should be implemented to mitigate these impacts during construction and operation:

- Preparation of a Construction Environmental Management Plan (CEMP) which identifies exclusion zones for threatened ecological communities adjacent to the Proposal boundary
- Site inductions which include a briefing regarding the local fauna of the Proposal site and protocols to be undertaken if fauna are encountered
- Directional lighting to be used where lighting is required in construction areas.

Conclusion

This BDAR considers the potential impacts of the Proposal to biodiversity values within the Proposal site. It is based on desktop research and detailed field surveys, undertaken across the study area in December 2019 and January 2020. It has identified minor indirect impacts to low value biodiversity and recommended mitigation measures to minimise these impacts where practicable.

1 INTRODUCTION

SUEZ Recycling & Recovery Pty Ltd (SUEZ – the Applicant) are seeking to establish the state-of-the art Chullora Resource Recovery Park (Chullora RRP) located at 21 Muir Road (Lot 2 DP1227526), Chullora in Sydney (Figure 1-1). SUEZ are proposing to design build and operate the first phase of the Chullora RRP as a Materials Recycling Facility (MRF) (the Proposal) to process co-mingled recyclable municipal solid waste (MSW) and dry commercial and industrial (C&I) waste; with a material processing capacity of up to 172,000 tonnes per annum (tpa).

The Proposal would be considered state significant development (SSD) under Clause 23 (waste and resource management facilities) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* being a recycling facility that handles more than 100,000 tonnes of waste per year. Accordingly, an Environmental Impact Statement (EIS) has been prepared to support the SSD Application for the Proposal. This Biodiversity Development Assessment Report (BDAR) has been prepared by Arcadis to support the preparation of the EIS and assess the Proposal's impact on any biodiversity values within the Proposal boundary.

1.1 Proposal overview

The Proposal would comprise the construction and operation of a MRF with a material handling capacity of up to 172,000 tonnes per annum (tpa), comprising:

- Up to 115,000 tpa of co-mingled recyclables collected from municipal and C&I sources
- Up to 50,000 tpa of source separated paper and cardboard for baling
- Up to 7,000 tpa of external mixed plastics for secondary processing.

Once operational the Proposal would receive waste from locally generated sources as well as the greater Sydney area. The total input in any year would not exceed 172,000 tpa, with the exact throughput from each source varying subject to the market conditions in that year and different Councils' recycling collection regimes.

The Proposal would represent a critical piece of waste management infrastructure which would mitigate significant capacity constraints currently impacting the Sydney region. The Proposal would provide advanced recycling processes to build resilience within the current network of recycling facilities as well as promote the principles of a circular economy through implementation of a pull-through model that conceives of the sorting, reprocessing and specified end uses of processed materials as an integrated, closed loop solution.

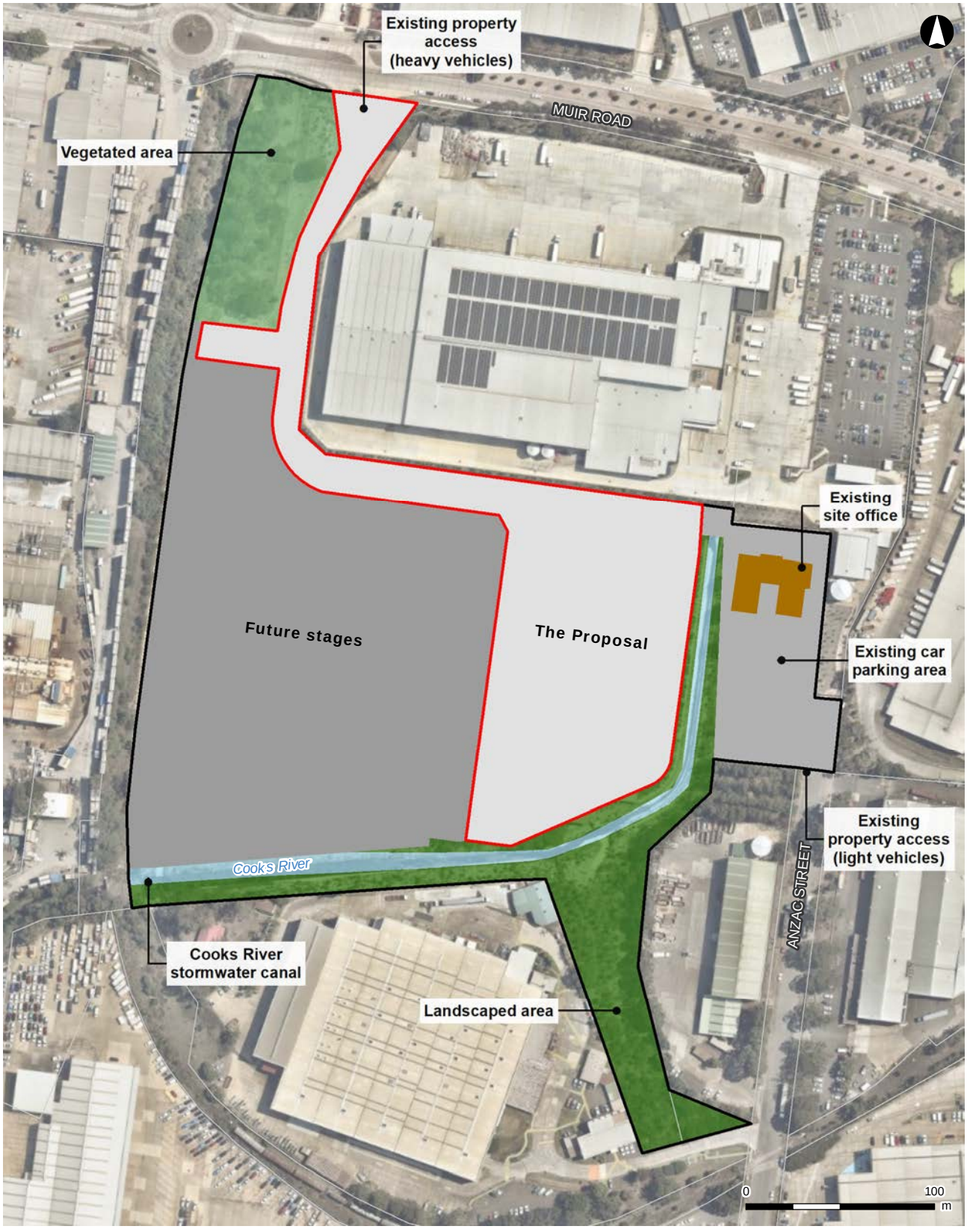
The key construction components of the Proposal would include:

- Establishment of a hardstand area and internal road network
- Construction of the enclosed MRF shed
- Installation and commissioning of fixed plant and equipment
- Installation of ancillary infrastructure, including weighbridges, pedestrian overbridge, and fire systems
- Installation and connection of site service infrastructure (electrical, water, sewer, gas and telecommunication services
- Installation of signage.

The key operational components of the Proposal would include:

- Operation of a MRF 24 hours per day, seven days per week (including processing and waste delivery and collection)
- Product storage.

The key components of the Proposal are shown in Figure 1-2.



LEGEND

- Chullora RRP site boundary
- Proposal site
- Future stages
- Property boundary

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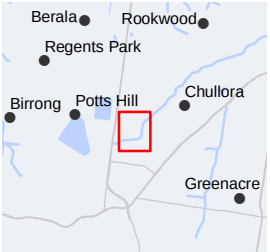
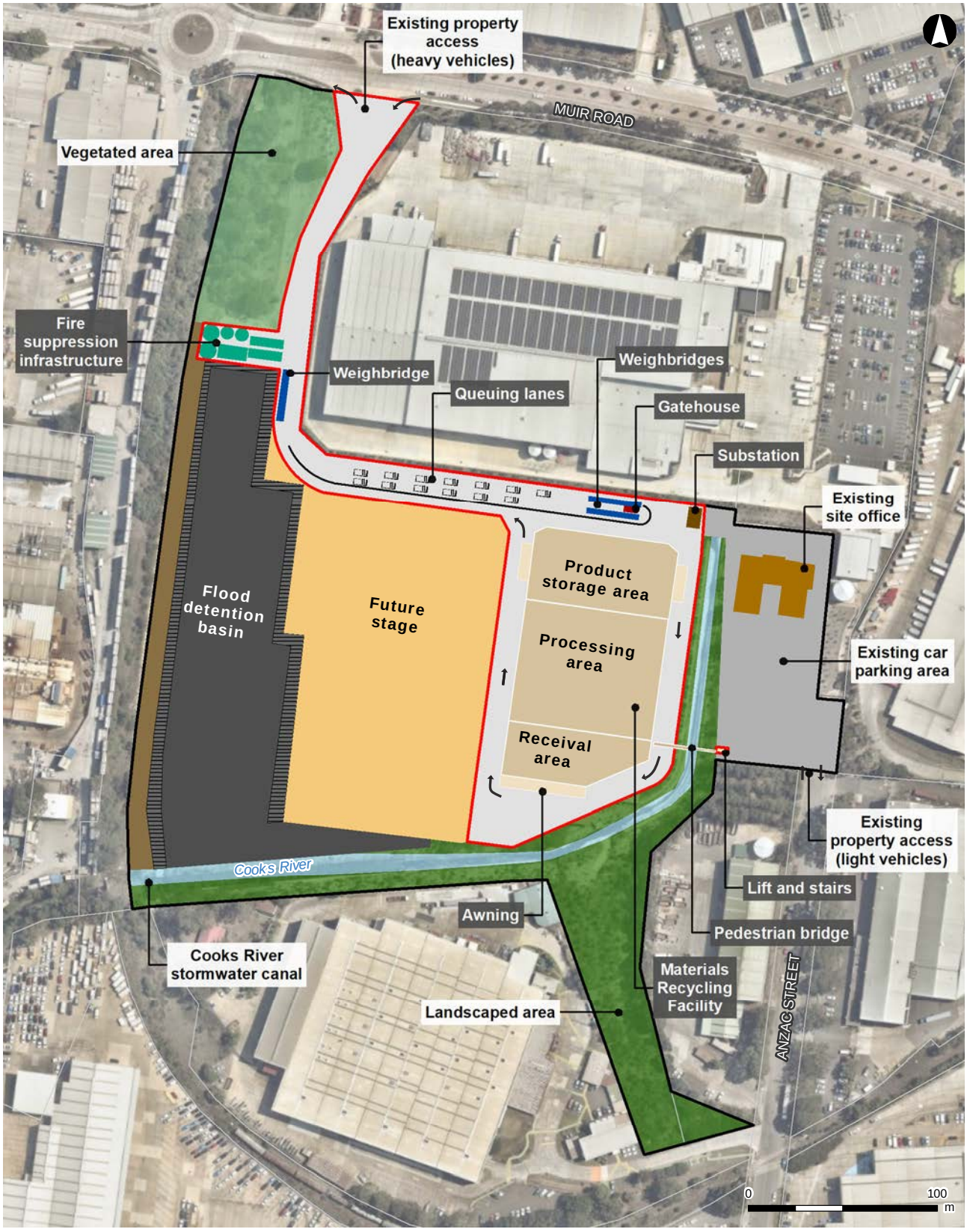


Figure 1-1: The Chullora RRP



LEGEND

- Chullora RRP site boundary
- Proposal site
- Future stage
- Established earthworks
- Batter
- Flood detention basin
- Property boundary

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Figure 1-2: The Proposal

1.2 Site location

The Chullora RRP site boundary including the Proposal site, shown in Figure 1-2, comprises one parcel of land being 21 Muir Road, Chullora (Lot 2 in DP 1227526)). The Proposal site is located in the Canterbury-Bankstown Local Government Area (LGA) and is approximately 2.5 hectares (ha) in size and is located approximately 18 kilometres (km) west of Sydney Central Business District (CBD) and 10 km east of Parramatta CBD.

The Chullora site is bounded by Muir Road to the north, Anzac Street to the east and existing industrial development further east and to the south. A disused freight railway line forms the site's boundary to the west. The Proposal site forms the central portion of the Chullora RRP site.

The Chullora site is located within the Chullora Technology Park, and surrounded by a range of industrial developments including PFD Storage Warehouse, Tip Top Bakery, News Limited, Fairfax, Volkswagen Distribution Centre, Bluescope Steel and Veolia transfer station. Directly to the west of the Proposal site is a narrow strip of land owned by the State Railway Authority, which formed part of the former railway through this area. A number of other businesses are located further to the west, including a service station, fitness centre and a range of other industrial warehouse (refer to Figure 1-3).

The closest residential receivers are located approximately 455 m to the southwest and 600 m to the east of the site (refer to Figure 1-3).

The Chullora RRP site currently has two vehicular access points. The access point for heavy vehicles is via Muir Road, west of the roundabout at Muir Road / Dasea Street. A secondary access point for light vehicles is provided from Anzac Street. The Proposal site would utilise these existing access points. Primary access to the Proposal site from the north will remain via Muir Road from both directions, and egress is via left turn only. There are four major intersections along Muir Road including linkages to Rookwood Road (Metroad 6) and the Hume Highway:

- Two-lane roundabout at the intersection of Muir Road and Dasea Street
- Signalised intersection at Muir Road and Worth Street
- Signalised intersection at Muir Road and Rookwood Road
- Signalised intersection at Muir Road and Hume Highway.

LEGEND

- Chullora RRP site boundary
- Proposal site
- Future stage
- Flood detention basin
- Established earthworks
- Existing car parking area
- Existing site office
- Education facility
- Industrial receiver
- Recreational area
- Sensitive residential receiver
- Cooks River stormwater canal
- Landscaping area
- Vegetated area

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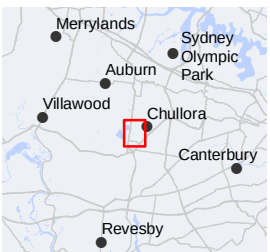

Figure 1-3 Surrounding land uses and residential receivers

1.3 Chullora RRP site footprint

The Chullora RRP site comprises the following elements:

- The Proposal site – comprising a 2.5 ha developable area for the construction and operation of the MRF and internal roads and supporting infrastructure
- The existing site office and car parking area - comprising the 0.7 ha eastern portion of the Proposal site
- A flood detention basin and stormwater infrastructure – comprising the 1.7 ha area in the western portion of the Chullora RRP site
- The future development area – comprising the 1.8 ha central portion of the Chullora RRP site
- The Cooks River stormwater canal
- A 1.2 ha landscaping area comprising the southern portion of the Chullora RRP site
- A 0.44 ha vegetated area in the north-western corner of the Chullora RRP site.

The Proposal would be support by ancillary infrastructure across the broader Chullora RRP. The built form of the key components of the Proposal, as well as relevant existing infrastructure that would support the operation of the Proposal, is described below.

1.4 Site history

In 1996 the Waste Recycling and Processing Service of NSW took ownership of the Chullora RRP site and neighbouring site to the north (now occupied by the PFD storage warehouse). WSN Environmental Solutions, a State-owned corporation, operated the site in 1997 until 2011 when they were acquired by SITA Australia Pty Ltd (now SUEZ). From this time SUEZ, operated the previous Chullora RRC site which included a Transfer Station, MRF, Garden Organics platform and glass processing shed. In 2016, Frasers Property acquired both the Chullora RRP site and the site to the north, leasing the previous Chullora RRC back to SUEZ for ongoing use as a waste facility.

In 2017, the MRF component of the previous Chullora RRC, was subject to a fire and subsequently demolished, along with the former glass processing building and other waste infrastructure. At this time the site was subdivided with the northern portion developed as the PFD storage warehouse. Since demolition of the previous Chullora RRC, the Proposal site has been used for storage of residential waste bins, maintenance and parking of waste trucks, a heavy vehicle workshop, 5000 L diesel tank and wash bay to support truck maintenance activities.

In 12th May 2020 SUEZ lodged a development application (DA) (DA366/2020) with Council for the development of flood mitigation works across the Chullora RRP site (the flood mitigation works). The DA is seeking approval for early works and site establishment across the Chullora RRP site to provide flood immunity and stormwater infrastructure. The flood mitigation works include:

- Site clearance, including:
  - Demolition of temporary structures and general clean-up of the proposed site fill area and flood storage area
  - Removal of tress and other vegetation (within fill area and flood storage area)
  - Crushing of the existing concrete slab, temporary stockpiling of crushed material and reuse of it as a fill material
- Earthworks, including:
  - Cut and fill for the flood storage area
  - Construction of a flood detention basin and installation of stormwater infrastructure
  - Filling the area to the required level using existing crushed recycled concrete material and imported shale / sandstone material.

The commencement of the construction of the Proposal would occur following completion of the flood mitigation works. Figure 1-4 shows the flood mitigation works; depicting the features of the Chullora RRP site upon commencement of the construction of the Proposal.

LEGEND

- Chullora RRP site boundary
- Established earthworks
- Batter
- Flood detention basin
- Property boundary

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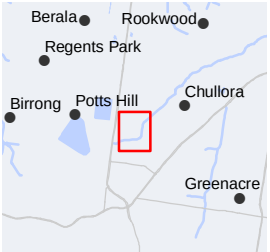


Figure 1-4: Chullora RRP site – current conditions

1.5 Purpose of this report

This BDAR supports the EIS for the Proposal and has been prepared as part of an SSD Application for which approval is sought under Part 4, Division 4.7 of the EP&A Act.

This report has been prepared to address the Amended Secretary's Environmental Assessment Requirements (SEARs) (SSD 10401) for the Proposal, issued by NSW Department of Planning, industry and Environment (DPIE) in May 2020.

Table 1-1 provides a summary of the relevant SEARs which relate to biodiversity and where these have been addressed in this report.

Table 1-1 SEARs relating to biodiversity

SEARs	Where Addressed
Biodiversity	
The EIS must address: 11. Biodiversity – including an assessment of biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR).	This report

Further to the above, the Environment, Energy and Science (EES) and Water and the Natural Resources Access Regulator (NRAR) Groups within DPIE require further details on specific requirements relating to their authority. These requirements are discussed throughout the report as indicated in Table 1-2.

Table 1-2 Other agency requirements and relevant report sections (biodiversity)

Biodiversity	Where Addressed
DPIE Environment, Energy and Science Group (EES)	
4. Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the *Biodiversity Conservation Act 2017* the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method, including an assessment of the impacts of the proposal (including an assessment of impacts prescribed by the regulations).	This report
5. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.	Section 4 and 5
6. The BDAR must include details of the measures proposed to address the offset obligation as follows; The total number and classes of biodiversity credits required to be retired for the development/project; • The number and classes of like-for-like biodiversity credits proposed to be retired;	Section 8 As the Proposal is not expected to result in any impacts, there are no impacts requiring offsetting.

Biodiversity	Where Addressed
• The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • Any proposal to fund a biodiversity conservation action; • Any proposal to conduct ecological rehabilitation (if a mining project); • Any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	
7. The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM.	To be submitted with this report
8. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.	This BDAR has been prepared by Jane Rodd, an accredited person under the *Biodiversity Conservation Act 2016* (Accreditation number BAAS17030)
9. The EIS must map the following features relevant to water and soils including: c) Wetlands as described in s4.2 of the Biodiversity Assessment Method. e) Groundwater dependent ecosystems	Section 3.3.5 (wetlands) and Section 3.4.8 (groundwater dependent ecosystems)
12. The EIS must assess the impact of the development on hydrology, including: c) Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems	Section 3.4.8
DPIE Water and NRAR	
Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts	Section 3.4.8

2 ASSESSMENT APPROACH

This section outlines the biodiversity policy framework, assessment approach, methodology and assessment boundary for the Proposal.

2.1 Policy framework

2.1.1 *Biodiversity Conservation Act 2016*

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The BC Act replaced *the Threatened Species Conservation Act 1995* (TSC Act) on 25 August 2017. The BC Act incorporates broadly similar objectives to those identified in the TSC Act, and additionally seeks to establish a framework for assessment and offsetting of development impacts as well as investment in biodiversity conservation, specifically:

- The NSW Biodiversity Offsets Scheme, established under Part 6 of the BC Act
- The BAM, established under Section 6.7 of the BC Act. The purpose of the BAM is to assess certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act.

The NSW Biodiversity Offsets Scheme applies to SSD projects, unless the Secretary of the DPIE and the Chief Executive of the DPIE EES determine that the project is not likely to have a significant impact. Under the NSW Biodiversity Offsets Scheme, an accredited assessor must apply the BAM to a project.

2.1.2 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is Commonwealth legislation that provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as Matters of National Environmental Significance (MNES). MNES identified in the EPBC Act include:

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

In accordance with sections 67 and 67A of the EPBC Act, any works that have the potential to result in an impact on any MNES or on Commonwealth land are considered ‘controlled actions’ and require a referral to the Federal Minister for the Environment for approval. The assessment of MNES in the study area, as detailed in section 8.4.1, found that the Proposal would not have a significant impact on any MNES or on Commonwealth land. Therefore, a referral to the Federal Minister for the Environment is not required.

2.2 Assessment methodology

2.2.1 Biodiversity Assessment Method requirements

The BAM (OEH, 2017a) is the assessment manual that outlines how an accredited person assesses impacts on biodiversity at development sites. The BAM provides:

- A consistent method for the assessment of biodiversity on a proposed development or major project, or clearing site
- Guidance on how a proponent can avoid and minimise potential biodiversity impacts
- The number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity.

An accredited assessor must document the results of the BAM in a BDAR. The BDAR identifies how the proponent proposes to avoid and minimise impacts, any potential impact that could be characterised as serious and irreversible (according to specified principles) and the offset obligation required to offset the likely biodiversity impacts of the development or clearing proposal, expressed in biodiversity credits.

The requirements for a BDAR (major projects) are listed in Appendix 10 of the BAM. Table 2-1 identifies where each requirement has been met in this report.

Table 2-1 Minimum information requirements for a BDAR (OEH, 2017)

BAM requirement		Where Addressed in this BDAR
Section	**Information to be included**	
Introduction	Identification of development site footprint, including: • Operational footprint • Construction footprint indicating clearing associated with temporary construction facilities and infrastructure.	Section 1.3
	General description of development site	Section 1.1
	Sources of information used in the assessment, including reports and spatial data.	Section 2.2.4
Landscape features	• Interim Biogeographically Regionalisation of Australia (IBRA) bioregions and subregions, NSW landscape region and area (ha) • Native vegetation extent in the assessment area • Cleared areas • Evidence to support differences between mapped vegetation extent and aerial imagery • Rivers and streams classified according to stream order • Wetlands within, next to and downstream of the site • Connectivity features • Areas of geological significance and soil hazard features • Site context components, including: – Identification of method applied (i.e. linear or site-based) – Per cent native vegetation cover in the landscape (development site).	Section 3.3 and Figure 2-1
Native vegetation	Describe Plant Community Types (PCTs) within the development site.	Section 3.4.2

BAM requirement		Where Addressed in this BDAR
Section	Information to be included	
	Perform a vegetation integrity assessment of the development site	Section 3.4.4
Threatened species	Identify ecosystem credit species associated with PCTs on the development site	Section 3.5.1
	Identify species credit species on the development site.	Section 3.5.2
Avoid and minimise impacts	Demonstration of efforts to avoid and minimise impact on biodiversity values.	Section 4
	Assessment of direct and indirect impacts unable to be avoided at the development site.	Section 5
	For major projects: details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain.	Not applicable
Impact summary	Identification and an assessment of the impacts which are potential serious and irreversible impacts.	Section 5.1.4
	Identification of impacts requiring offsets.	Section 8.1
	Identification of impacts not requiring offsets.	Section 8.2
	Identification of areas not requiring further assessment.	Section 8.3
	Ecosystem credits and species credits that measure the impact of the development on biodiversity values.	Not applicable
Biodiversity credit report	Credit classes for ecosystem credits and species credits at the development site.	Not applicable

2.2.2 Investigation area

The investigation area in which this BDAR has been undertaken is shown in Figure 2-1. This area is referred to as the study area throughout this report.

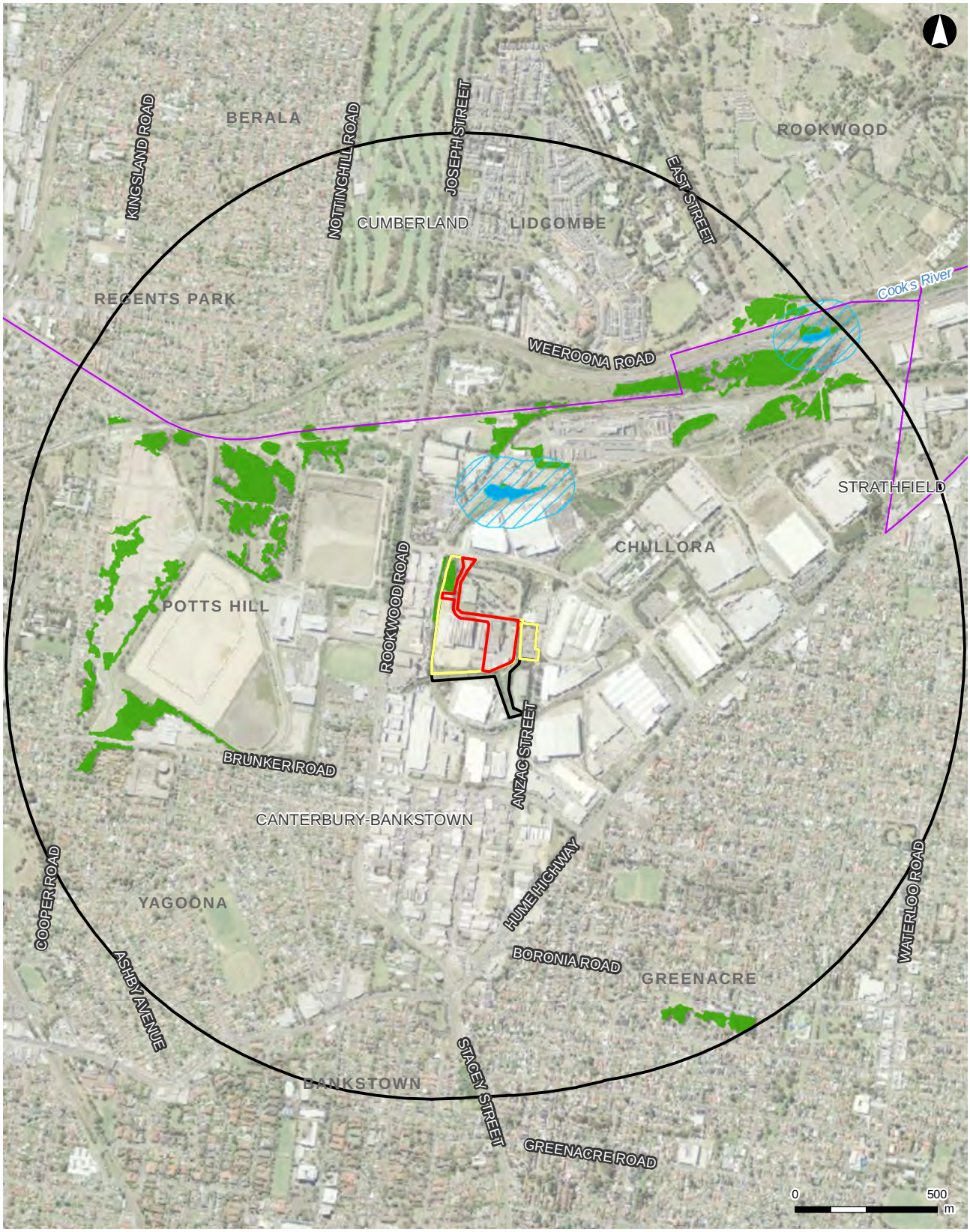
The study area includes the Proposal boundary as well as the area of vegetation in the north-west corner of the Chullora RRP site boundary. This section was included in the study area in order to investigate its biodiversity value and determine any indirect impacts on this vegetation.

2.2.3 Assessment boundary

The assessment boundary is referred to as Proposal boundary throughout this report. The Proposal boundary covers all areas where works are proposed as part of the Proposal. This area is shown in

Figure 2-2.

For the purpose of this assessment, it is assumed that the Proposal boundary has been cleared of all vegetation as these works are included in Stage 0 of the project, which covers the Proposal boundary of this assessment.



LEGEND

- Proposal boundary
- Chullora RRP site boundary
- Study area
- 1500m buffer
- Local government area

NSW Coastal Management SEPP (2018)

- Coastal Wetlands
- Coastal Wetlands Proximity Area

- Native vegetation

Note: IBRA region Sydney Basin, subregion Cumberland covers entire study area

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Figure 2-1: Location Map

LEGEND

Proposal boundary
Study area
Property boundary
Watercourse

Vegetation

Native vegetation

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Figure 2-2: Site map

2.2.4 Background research

Database searches

Database searches were undertaken in January 2020 to identify State and Commonwealth records of threatened entities and Commonwealth MNES that occur or have the potential to occur within 10 km of the Proposal site. Additional database searches were undertaken in relation to fisheries, weeds and vegetation types. Databases interrogated are listed in Table 2-2.

Table 2-2 Database interrogations carried out

Database	Purpose of search	Date of database search
NSW Bionet Wildlife Atlas, managed by the NSW Office of Environment and Heritage (DPIE)	Used to compile a list of threatened species records listed under the BC Act to within 10 km of the site.	28 January 2020
Protected Matters Search Tool, managed by the Commonwealth Department of the Agriculture, Water and the Environment (DoAWE)	Used to compile a list of potentially occurring Matters of National Environmental Significance (MNES) listed under the EPBC Act to within 10 km of the site (Appendix C).	28 January 2020
Vegetation Types Database, managed by DPIE	Information on PCTs and their relationship to a vegetation formation and vegetation class is managed and maintained in the BioNet Vegetation Classification data collection.	Referenced throughout
NSW WeedWise, managed by DPIE	Identifies species listed as priority weeds for a weed control area and their control requirements.	Referenced throughout
Fisheries NSW Spatial Data Portal	Maps threatened fish species distribution in NSW.	11 February 2020
NSW DPI's register of critical habitat	To identify any critical habitat for threatened fish in proximity to the site.	11 February 2020

Literature review

A review of relevant, existing, information was undertaken to identify the existing environment of the Proposal site and provide an understanding of ecological values occurring or potentially occurring across the site and locality. The review focused on relevant ecological reports previously prepared for the Proposal site and wider locality, as well as property boundaries, vegetation maps, topographic maps, aerial photography and relevant geographic information system (GIS) layers. Relevant literature included, but was not limited to:

- Chullora Resource Recovery Plan – Tree Removal and Reparation Plan (Eco Logical Australia, 2016)
- Ecological Constraints Assessment – Chullora Resource Recovery Centre Lot 21 DP 860283 and Lot 374 DP 1084113 (Eco Logical Australia, 2016)
- The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area (version 3.0) (OEH, 2016)
- Soil landscapes of the Penrith 1:100,000 Sheet 9030 (Hazelton, Bannerman, & Tille, 1989)
- Geology of the Penrith 1:100,000 Sheet 9030 (Clarke & Jones, 1991)
- Key Fish Habitat Mapping (Department of Primary Industries (DPI), 1994).

2.2.5 Field surveys

Field surveys were carried out by Arcadis ecologists over two days in December 2019 and January 2020 to provide survey results in accordance with current biodiversity assessment guidelines, including the BAM (OEH, 2017). All work was carried out under the appropriate licences, including scientific licences as required under Section 2 of the BC Act (Licence Number: SL100646).

The details of the vegetation surveys and fauna surveys are outlined in sections 2.2.6 and 2.2.7 below. Threatened species surveys are detailed in section 3.5.2.

Weather conditions were warm and clear throughout the survey period with no rainfall. The weather records from the closest weather station, Canterbury Racecourse AWS (station 066194) (6.7 km away) for the survey dates are detailed in Table 2-3.

Table 2-3 Survey details and weather conditions (BOM, 2020)

Date	Attendees	Temperature		Rain (mm)	Maximum wind gust	
		Min (°C)	Max (°C)		Direction	Speed (km/h)
04 December 2019	Jane Rodd	12.8	30	0	ESE	33
14 January 2020	Jane Rodd, Meredith Leal	16.4	28.1	0	E	35

2.2.6 Vegetation surveys

Vegetation mapping and PCT identification

Vegetation within the study area has previously been stratified by the Sydney Metropolitan Catchment Management Authority (OEH, 2016) (see section 3.4.1). The vegetation was then ground-truthed during surveys to update vegetation boundaries and confirm vegetation zone assignments.

During this assessment, the vegetation was initially stratified based on the composition of the canopy and vegetation structure (key elements in PCT assignment). It was then compared to recognised and accepted PCTs, as described in the BioNet Vegetation Information System (VIS) Classification database (DPIE, 2020b). The identification of PCTs and vegetation types in the study area was predominantly based on:

- Structure and species composition consistent with descriptions in the VIS Classification database and other published references
- Characteristic tree species present
- Previous regional mapping as an equivalent vegetation type
- Landscape position.

BAM vegetation integrity plots

One vegetation integrity plot was used to sample the vegetation of the study area. This quantitative site survey was conducted in accordance with the methodology described in the BAM as summarised in Table 2-4 below. Figure 2-3 illustrates the plot layout of nested 20 m by 50 m, 20 m by 20 m and 1 m by 1 m sub-quadrats used for the assessment of condition attributes at the plot site.

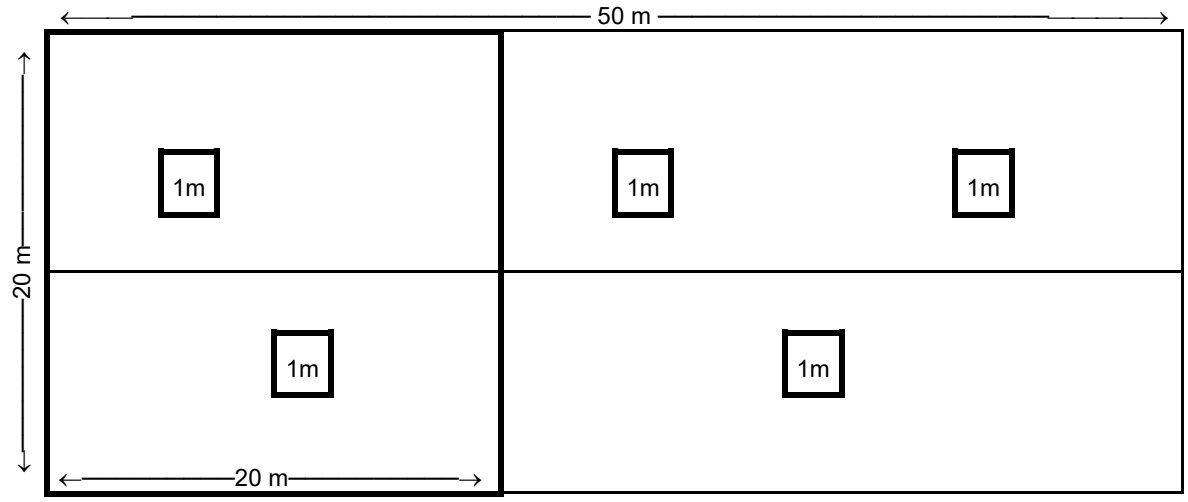

Figure 2-3 Schematic diagram illustrating the vegetation plot layout

Flora species identified in the vegetation plot are listed in the flora species inventory provided in Appendix A. The location of the vegetation plot is shown in Figure 2-4.

Table 2-4: Data collected from vegetation integrity plots

Attribute	Data collected
Location	Geographic co-ordinates (easting and northing; grid type MGA 94, Zone 56) – collected using GPS
Native and exotic species richness and cover	All plant species identified within the 20-metre x 20-metre nested quadrat were recorded. The cover (percentage of area of quadrat covered) and abundance of each species present was estimated. The growth form, stratum/layer and whether each species was native, exotic, or a high threat weed was recorded.
Number of trees with hollows	The number of living and dead trees with hollows within the 50-metre x 20-metre quadrat was recorded. A hollow was only recorded if: (a) the entrance could be seen; (b) the estimated entrance width was at least five centimetres; (c) the hollow appeared to have depth; (d) the hollow was at least one metre above the ground; and the (e) the centre of the tree was located within the sampled quadrat.
Tree stem size diversity and number of large trees	Tree stem size diversity was recorded by measuring the diameter at breast height (dbh) (i.e. 1.3 metres from the ground) of living trees (greater than five centimetres dbh) within each 50-metre x 20-metre quadrat. For multi-stemmed living trees, only the largest stem was included in the count. The number of large trees was determined by counting all trees with a dbh greater than the specified dbh of large trees for each vegetation formation, as noted in the VIS Classification Database (DPIE, 2020b).
Evaluation of regeneration:	Presence/absence of overstorey species present at the site that were regenerating (defined as seedlings or saplings with a dbh less than or equal to five centimetres).
Total length of fallen logs	Cumulative total of logs within each 50-metre x 20-metre quadrat with a diameter of at least 10 centimetres and a length of at least 0.5 metres.
Litter cover	Estimation of the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter less than 10 centimetres which is detached from a living plant) from within five sub-plots that measured one metre x one metre square spaced evenly on either side of the 50 metre central transect.

Survey effort

Native vegetation within the study area was classified into Plant Community Types (PCTs) and vegetation zones based on broad condition classes (see section 3.4.2). The size of the vegetation zone determines the sampling effort required, as outlined in Table 3.1 of the BAM (OEH, 2017).

Table 2-5 provides a summary of the vegetation present within the study area and the sampling effort that was applied. One BAM plot was completed.

Table 2-5 Comparison of number of plots required and completed per vegetation zone

Vegetation zone	Vegetation zone area (ha)	BAM plot requirements	Number of plots completed
PCT 725_Moderate	0.34	1	1
Total	**0.34**		**1**

LEGEND

- Proposal boundary
- Study area
- BAM plot
- Property boundary
- Watercourse

Plant Community Type

- Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 725)

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Figure 2-4: Survey effort

2.2.7 Fauna surveys

Incidental diurnal fauna surveys were conducted which involved recording of all fauna species opportunistically seen or heard during surveys (Appendix B). Field surveys also included incidental searches for indirect evidence of fauna, such as scats, nests, burrows, tracks, scratches, chewed cones and diggings.

In addition, general fauna habitat assessments were conducted across the study area. Specifically, habitat assessments involved surveying for the following features:

- Vegetation type, structure and extent
- Wetlands, watercourses, natural and artificial ponds, dams, soaks and drainage channels
- Adjacent habitats and barriers (natural or artificial) between the study area and adjacent lands
- Hollow-bearing trees species, size of hollows present and signs of fauna occupation
- Forage trees including blossom and fruit trees for birds and Grey-headed Flying-fox and feed trees for Koala
- Caves and cliffs
- Artificial microbat roosts (e.g. culverts, bridges, tunnels and mine adits)
- Terrestrial shelter habitat such as coarse woody debris, rock outcrops and artificial shelter (i.e. corrugated iron sheets, building refuse, rubbish) for invertebrates, amphibians, reptiles and small terrestrial mammals.

3 EXISTING ENVIRONMENT

3.1 Current site conditions

As discussed in Section 1.3, the Chullora RRP site was previously operated as the Chullora RRC. The Proposal site retains buildings and infrastructure associated with the previous Chullora RRC as well as broader SUEZ operations. There are currently no waste management activities occurring on the Proposal site. However, the Proposal site is used for the following activities:

- General SUEZ administration activities
- Storage of red, yellow and green lid putrescible waste bins and shipping containers
- Waste collection truck parking
- Truck maintenance activities
- Storage of plant and equipment
- Truck refuelling area and wash bay.

These activities have largely been carried out in the Stage 1 area that is proposed to be occupied by the MRF. The current infrastructure within this portion of the Proposal site (including a number of small warehouse structures, ancillary facilities, an internal road network and hardstand parking areas) would be removed as part of Stage 0 of the Proposal. The western portion of the Proposal site is currently largely vacant and unused.

An existing site and administrative office, and associated light vehicle parking, currently operates in the north-eastern portion of the Proposal site. The built form and the operation of the existing site office would not be altered as a result of this Proposal.

3.2 Approved operations

The Chullora RRP site operated as the previous Chullora RRC until 2017. The previous Chullora RRC hosted a range of waste infrastructure over time including:

- A putrescible waste transfer station and green waste platform (DA 897/1994) with approval to process up to 66,000 tpa of putrescible waste
- A materials recovery facility (DA 287/1996) with approval to recycle up to 100,000 tpa of recyclable material
- A glass processing facility (DA 973/2002) with approval to process up to 40,000 tpa of glass
- Supporting infrastructure, including workshops, offices, weighbridges, a leachate pond, a small vehicle drop off area, and a trade waste area.

Each of the above approvals remain active for the Proposal site with each activity currently approved to be undertaken.

The previous Chullora RRC holds Environmental Protection Licence (EPL) 5893 which authorises a number of scheduled activities including, composting, recovery of general waste, and waste storage. The existing EPL could either be updated via a variation application or a new one sought for the Proposal.

3.3 Landscape features

3.3.1 Landscape context

The study area is located within the Cumberland sub-region of the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion (see Figure 2-1).

Morgan (2001) describes the Cumberland sub-region as situated in a rain shadow area between the Blue Mountains and east coast on low rolling hills and valleys. The geology is dominated by Triassic

Wianamatta groups shales and sandstones with Quaternary alluvium present along the main streams. Vegetation associated with the Cumberland sub-region include woodlands dominated by *Eucalyptus moluccana*, *E. tereticornis* and *E. crebra* on the shale hills and *Angophora subvelutina, E. amplifolia* and *E. tereticornis* with abundant *Casuarina glauca* on river flats (Morgan, 2001).

The study area is also situated within the Ashfield Plains Mitchell Landscape (DPIE, 2016). The Ashfield Plains Mitchell Landscape is an over cleared landscape with 98 per cent of the landscape currently cleared. It consists of undulating hills and valleys on horizontal Triassic shale and siltstone and has a general elevation of 0 to 45m. The vegetation of the Ashfield Plans Mitchell Landscape is open forests of *Eucalyptus fibrosa* and *Eucalyptus moluccana* with *Leptospermum* spp. along creeks and forests of *Syncarpia glomulifera, Eucalyptus resinifera, Eucalyptus punctata, Eucalyptus saligna* and *Eucalyptus pilularis* with a grassy understorey of *Themeda triandra* on moister sites (Department of Environment and Climate Chanfe (DECC), 2002).

3.3.2 Native vegetation extent

Regional vegetation mapping (OEH, 2016) has been used for the purposes of mapping native vegetation within the 1500m buffer area, whereas ground-truthed vegetation mapping has been used within the study area. The area of native vegetation cover within the Proposal boundary and buffer area is outlined in Table 3-1 and shown in Figure 2-1.

Table 3-1 Areas of native vegetation cover within the Proposal boundary and buffer area

Location	Extent	Native vegetation extent	Percent cover
Proposal boundary	2.47	0 ha	0%
1500 m buffer area	912.06 ha	29.82 ha	3.3%

3.3.3 Cleared areas

The study area covers a total of 7.11 hectares. Of this, 6.77 hectares is comprised of cleared areas. This cleared area covers most of the study area, with vegetated areas being limited to the very north western corner of the study area which is outside the Proposal boundary.

3.3.4 Rivers and streams

The Cooks River storm water channel is a first-order stream which borders the southern edge, and traverses through the eastern section of the study area. This channel continues through industrial and residential areas of Chullora as well as Strathfield Golf Club and then joins the Coxs Creek and becomes a second-order stream.

3.3.5 Wetlands

There are no natural or artificial wetlands within the study area. A wetland listed under the *State Environmental Planning Policy* (Coastal Management SEPP) *2018* as a Coastal Wetland is located approximately 230 m to the north of the study area. This coastal wetland or its proximity area is not located within the study area (Figure 2-1).

3.3.6 Connectivity features

The BAM (2017) defines connectivity as a *measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation*.

The vegetation present in the study area is situated within a landscape of extensive industrial and residential developments with vegetation generally restricted to planted roadside vegetation and small, isolated areas of exotic and remnant native vegetation. The disused railway along the western study area boundary, now overgrown with exotic plant species, provides some connectivity to other areas of

vegetation to the north of the study area. However, the vegetation here is highly degraded, and there are significant barriers present including Muir Road, which result in this strip of vegetation providing very low connectivity value for the study area.

3.3.7 Areas of geological significance and soil hazard features

Most of the study area is situated within Disturbed Terrain soil landscape (DPIE, 2020c). This soil landscape is characterised by level plain to hummocky terrain which has been extensively disturbed by human activity, with most of the original soil either removed, buried or greatly disturbed. Artificial fill is often present, and typically includes soil, rock, building and waste materials. Local relief is generally less than ten metres, with slopes of less than thirty per cent. The landscape is completely cleared of original vegetation and has largely been replaced with turf or grassland.

Soils of the Disturbed Terrain landscape are generally loose black sandy loam, compacted mottled clay, variable transported fill or dark dredged muds and sands.

Disturbed Terrain has highly variable erosion hazards, ranging from low to extreme for non-concentrated flows and low to high for concentrated flows. The landscape is limited by mass movement, slope and erosion hazards as well as seasonal waterlogging, non-cohesive soils and rocky outcrops (DPIE, 2020c).

Two small areas, in the very north-west and south-west of the study area are situated within the Blacktown soil landscape (DPIE, 2020c). The Blacktown soil landscape is associated with gently undulating rises on Wianamatta Group shales.

Soils of the Blacktown soil landscape are shallow to moderately deep (greater than 100 centimetres) hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines (Hazelton, Bannerman, & Tille, 1989) (Clarke & Jones, 1991).

The erosion hazard for this soil landscape is generally moderate. It is limited by low soil fertility and poor soil drainage (Hazelton, Bannerman, & Tille, 1989).

The study area does not contain any karst, caves, crevices, cliffs or other areas of geological significance.

3.3.8 Areas of outstanding biodiversity value (AOBVs)

Areas of Outstanding Biodiversity Value (AOBVs), as defined under the BC Act, are currently limited to areas previously declared as critical habitat under the TSC Act. No AOBVs occur within or surrounding the study area.

3.3.9 Site context

The following section outlines the site context components entered into the BAMC (DPIE, 2020e).

Method applied

The site-based method has been applied for this BDAR.

Percent native vegetation cover in the landscape

The percentage of native vegetation cover in the landscape value has been derived using refined regional vegetation mapping (OEH 2016) of the 1500 metres Proposal boundary buffer (see Figure 2-1). The results of this assessment are shown in Table 3-2.

Table 3-2 Native vegetation cover in the landscape

Location	Extent	Native vegetation extent	Percent cover of native vegetation
1500 m buffer area	912.06 ha	29.82 ha	3.3%

3.4 Native vegetation

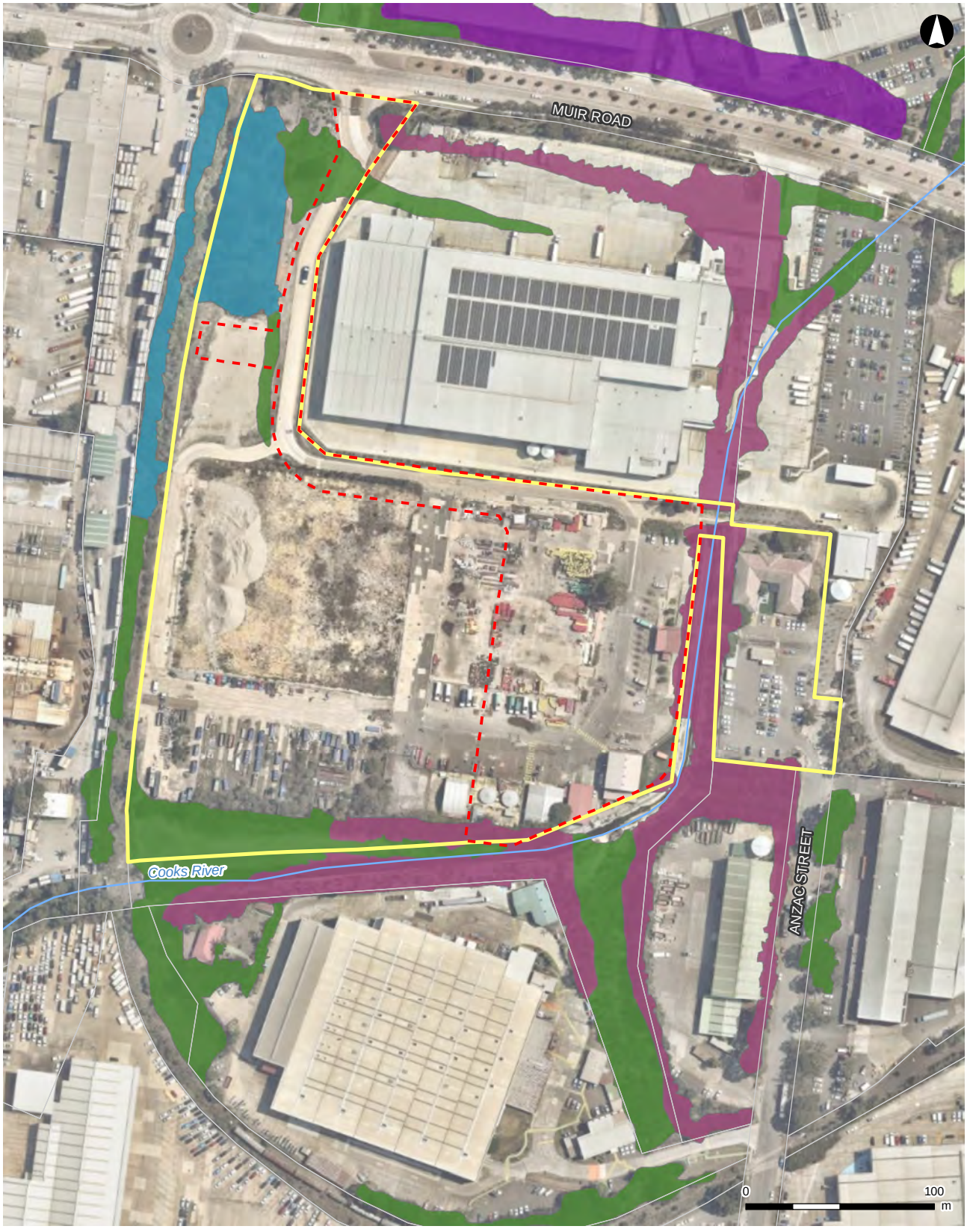
3.4.1 Regional vegetation mapping

OEH (2016) mapped the vegetation of the Sydney Metropolitan Catchment Management Authority (CMA) Area. The Sydney CMA Area encompasses the eastern portions of the Sydney Metropolis, extending from the coastline to the catchments that flow to the Parramatta, Georges and Hacking River.

Three vegetation types have been mapped within the study area by OEH (2016), as listed in Table 3-3 and shown in Figure 3-1. It is noted that development works (including the recent formalisation of the Cooks River stormwater canal, and the flood mitigation works currently being determined by Council (DA 366/2020)) will have occurred across the Chullora RRP prior to the commencement of the construction of the Proposal. Due to these works, all vegetation within the Proposal site would be cleared prior to the commencement of construction.

Table 3-3 Vegetation mapped within the study area (OEH, 2016)

Map Unit Name (Code)	Plant Community Type (OEH, 2016)	Total area mapped within the study area (ha)	Total area mapped within Proposal boundary (ha)
Castlereagh Ironbark Forest (S_DSF01)	*Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion* (PCT 725)	0.36	0.01
Urban Exotic/Native (Urban_E/N)	N/A	1.07	0.40
Weeds and Exotics (Weed_Ex)	N/A	1.07	0.26
Total		**2.50**	**0.67**



LEGEND

- Proposal boundary
- Study area
- Property boundary
- Watercourse

Vegetation zone (OEH, 2016)

- Cleared
- Castlereagh Ironbark Forest (S_DSF01)
- Urban Exotic/Native
- Weeds and Exotics

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Figure 3-1: Regional vegetation mapping of the study area (OEH, 2016)

3.4.2 Ground-truthed vegetation mapping

The vegetation within the study area was identified and mapped based on a review of existing regional vegetation mapping, observations made during site inspections, and analysis of data collected during field surveys. This resulted in the identification of one PCT within the study area: *Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion* (PCT 725). The extent of this vegetation zone within the study area and proposal boundary is listed in Table 3-4.

While during site inspections an area of exotic/native shrubland was identified within the study area, this vegetation is situated within the Proposal boundary would be subject to clearing under Stage 0 of the Chullora RRP project and is hence treated as cleared for this assessment.

Table 3-4 Ground-truthed vegetation mapped within the study area

Vegetation zone	Plant Community Type	Total area mapped within the study area (ha)	Total area mapped within Proposal boundary (ha)
725_Moderate	*Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion* (PCT 725)	0.34	0
Total		**0.34**	**0**

3.4.3 Plant Community Type descriptions

One PCT (PCT 725) was identified within the study area. The details of this PCT is provided below in Table 3-5.

Table 3-5 Attribute information for PCT 725

Attribute	PCT in study area
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Cumberland Dry Sclerophyll Forests
PCT	725
BVT	HN513, ME002
Conservation status	BC Act: endangered EPBC Act: not listed (falls below condition threshold)
Estimate of percent cleared	95 per cent
Condition	Moderate
Extent in the study area	0.34 ha
Extent in the Proposal boundary	0 ha
Plots completed in vegetation zones	One
Species relied upon for PCT identification	*Eucalyptus fibrosa, Melaleuca decora, Bursaria spinosa, Lomandra multiflora, Lepidosperma laterale, Paspalidium distans.*

Vegetation zone descriptions

725_Moderate

Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 725) is associated with clay soils derived from Tertiary alluvial deposits, and ranges from a moderately tall open eucalypt forest or woodland to a low dense thicket of paperbarks with low emergent eucalypts. The most common canopy species is *Eucalyptus fibrosa,* although at some sites it may be absent; *Eucalyptus longifolia* (Woollybutt) is also commonly present, and a range of other eucalypt species including *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum) (now *Eucalyptus racemosa*), *Angophora costata* (Smooth-barked Apple) and *Angophora bakeri* (Narrow-leaved Apple) may have localised occurrence on sites depending on soil composition (DPIE, 2020b). This PCT features a prominent small tree stratum of *Melaleuca decora* above a dense layer of shrubs that include *Melaleuca nodosa, Bursaria spinosa* and *Lissanthe strigosa* (Peach Heath). The ground layer is characterised by sparse cover of grasses and forbs and may be very depauperate in locations where dense shrub layers exclude light and suppress plant growth (DPIE, 2020b).

Within the study area, PCT 725 is present within the north western corner, outside of the Proposal boundary (Figure 3-2). Here, the vegetation is situated at a higher elevation than the rest of the study area and forms a small patch which adjoins exotic vegetation within the disused rail line (Plate 1).

The canopy comprises a number of mature Eucalyptus species including *Eucalyptus fibrosa, Eucalyptus sideroxylon* (Mugga Ironbark) and *Eucalyptus crebra* (Narrow-leaved Ironbark) as well as the non-locally native species *Corymbia citriodora* (Lemon-scented Gum). A sparse small tree layer is also present, consisting of *Notelaea longifolia* (Large Mock-olive) and *Allocasuarina littoralis* (Black She-Oak). There is a moderately dense shrub layer which is dominated by the native species *Acacia implexa* (Hickory Wattle) with *Melaleuca decora* and *Bursaria spinosa* (Native Blackthorn) also present in low abundance. Ground cover species are sparse in this patch, with leaf litter cover very high (approximately 90%). Commonly occurring native ground cover species include *Lepidosperma laterale* (Variable Sword-sedge), *Lomandra longifolia* (Spiny-headed Mat-rush), *Einadia hastata* (Berry Saltbush) and *Paspalidium distans.* Exotic ground cover species *Asparagus aethiopicus* (Asparagus Fern) and *Eragrostis curvula* (African Lovegrass) are also sparsely present.

Exotic cover in this vegetation zone is fairly low, with *Olea europaea subsp. cuspidata* (African Olive) and *Acacia saligna* (Golden Wreath Wattle) sparsely present in the shrub layer. However, the cover of these species increases to the west of the study area.

The entire area of PCT 725 within the study area is in moderate condition and covers 0.34 hectares. None of this vegetation is situated within the Proposal boundary.

The 0.34 hectares of vegetation mapped as PCT 725 - Moderate within the study area is consistent with the TEC *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin bioregion*, as listed under the BC Act. This vegetation does not meet the size and condition threshold criteria for the TEC *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin bioregion* as listed under the EPBC Act (see section 3.4.4 for further discussion).

Plate 1 PCT 725 within the study area

LEGEND

- Proposal boundary
- Study area
- Property boundary
- Watercourse

Plant Community Type

- Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 725)

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Figure 3-2: Ground-truthed vegetation within the study area (Arcadis, 2020)

3.4.4 Vegetation integrity assessment

The vegetation integrity score is a measure of the condition of native vegetation and is assessed for each vegetation zone by calculating the scores for the composition, structure and function attributes collected in plots within the vegetation zone against the benchmark values for the associated PCT.

According to section 3.1.1.3 of the BAM (OEH, 2017), if the assessor determines that:

- an area of land does not contain native vegetation, or
- a vegetation zone has a vegetation integrity score less than 15 where the PCT is representative of an endangered or critically endangered ecological community, or
- a vegetation zone has a vegetation integrity score less than 17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
- a vegetation zone has a vegetation integrity score less than 20 where the PCT is not representative of a TEC or associated with threatened species habitat

Then for that vegetation zone:

- assessment of native vegetation is not required beyond Section 5.4, and
- an assessment of threatened species habitat according to Section 6.2 and Paragraph 6.2.1.4 is not required.

The vegetation plot data was entered into the BAM credit calculator to generate vegetation integrity scores. The composition, structure and function data entered into the credit calculator is shown in Table 3-6. The benchmark data for PCT 725 has been included to demonstrate the attributes that are determining the integrity score.

With a vegetation integrity score of 39.1, the vegetation zone 725_Moderate is considered to be in moderate condition and above the offsetting threshold of 15. However, this vegetation is outside the Proposal boundary and will not be impacted.

Table 3-6 Plot data and vegetation integrity scores

Plot number	Composition (richness)						Structure (cover)						Function			Integrity Score
	Tree	Shrub	Grass	Forb	Fern	Other	Tree	Shrub	Grass	Forb	Fern	Other	Large tree	Fallen Logs	Leaf litter	
PCT 725 Benchmark	6	12	13	13	2	5	44	40	47	6	1	3	3	68	60	100
725_Moderate																
Plot 2	5	5	7	1	0	2	14.1	25.8	3.0	0.2	0.0	0.2	0	2	91	39.1

3.4.5 Threatened ecological communities

Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion

BC Act

Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion is listed as an endangered ecological community under the BC Act. Within the study area, it corresponds to the *PCT Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion* (PCT 725) which is located outside the Proposal boundary.

Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion occurs in western Sydney, with the most extensive stands in the Castlereagh and Holsworthy areas, and smaller remnants in the Kemps Creek area and the eastern section of the Cumberland Plain. It has a restricted natural distribution, mainly occurring on Tertiary alluvium or on shale soils of the Wianamatta Shales; the TEC grades into Shale-Gravel Transition Forest where alluvium is shallow (TSSC, 2011).

The structure ranges from open forest to low woodland, with the canopy dominated by *Eucalyptus fibrosa,* and *Melaleuca decora*; other eucalypts such as *Eucalyptus longifolia* may occur. The dense shrubby understorey comprises *Melaleuca nodosa, Lissanthe strigosa* and a range of pea flower shrubs (TSSC, 2011).

PCT 725 is recognised in the BioNet Vegetation Classification data collection as corresponding to *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion.* This TEC is present in the north west corner of the study area. A comparison of the vegetation mapped as PCT 725 in the study area with the relevant paragraphs of the final determination for Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion was undertaken (see Table 3-7).

Table 3-7 Comparison of area mapped as PCT 725 in the study area with final determination for Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion

Final determination identification attributes	Final determination paragraph extract	Comparison with areas mapped as PCT 725
Location	Paragraph 7: The community is or has been known to occur in the Auburn, Bankstown, Blacktown, Canterbury, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Strathfield local government areas, but may occur elsewhere in the Sydney Basin Bioregion.	The study area is within the Canterbury-Bankstown LGA.
Soils and landscape position	Paragraph 5: usually occurs on clay soils on Tertiary alluvium, or on shale soils on Wianamatta Shale including the Birrong Soil Landscape and associated shale lowlands.	Within the study area, PCT 725 is mostly mapped on the Blacktown soil landscape which is associated with Wianamatta group shales.
Floristic composition	Paragraph 2: Cooks River/Castlereagh Ironbark Forest is characterised by the following assemblage: 73 species listed	Of the 73 species listed, 8 were recorded in area mapped as PCT 725.
Characteristic tree species	Paragraph 4: usually with trees of *Eucalyptus fibrosa* and *Melaleuca decora,* sometimes with *Eucalyptus longifolia*.	Areas mapped as PCT 725 are characterised by a canopy of *Eucalyptus fibrosa*. *Melaleuca decora* and *Melaleuca nodosa* were often present in the midstorey.

Final determination identification attributes	Final determination paragraph extract	Comparison with areas mapped as PCT 725
Structure	Paragraph 4: predominantly of open-forest to low woodland structure.	The vegetation mapped as PCT 725 in the study area is of open-forest structure.

The vegetation mapped as PCT 725 is consistent with the floristic composition, distribution, landscape position and soil associations detailed in the final determination for Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (TSSC, 2011a).

The area mapped as this TEC as listed under the BC Act is shown in Figure 3-3.

EPBC Act

PCT 725 also forms part of the critically endangered *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin bioregion* under the EPBC Act. An analysis of PCT 725 within the study area revealed that it does not meet the condition criteria for the EPBC listed TEC. Table 3-8 demonstrates this.

Table 3-8 Condition criteria for EPBC listed Cooks River/Castlereagh Ironbark Forest in the Sydney Basin bioregion

TEC Name (EPBC Act)	EPBC Act Status	Summary of EPBC condition criteria	Meets criteria?
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Patch 0.5 ha or greater in size. One of the below applies: Over 50 per cent of perennial understorey vegetative cover is made up of native species. Patch contiguous with a native vegetation patch greater than 1 ha in size and has over 30 per cent native perennial understorey vegetative cover. Patch contains at least one tree with hollows or at least one large locally indigenous tree (>80 cm dbh) (DoE, 2015).	**No** The area mapped as PCT 725 within the study area was assessed against these condition criteria. The total area of the patch of PCT 725 is 0.34 ha, which does not meet the area threshold of 0.5 ha. Furthermore, the native perennial understorey cover is less than 30 per cent (29 per cent) and the patch is not contiguous with a native vegetation patch greater than 1 ha in size. Therefore, the entire area of PCT 725 within the study area does not meet the condition criteria and can not be classified as the EPBC TEC.

LEGEND

- Proposal boundary
- Study area
- Property boundary
- Watercourse

Threatended Ecological Community

- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Endangered - BC Act)

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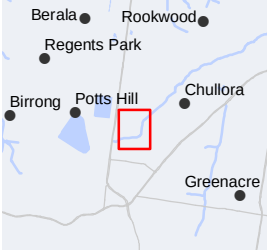

Figure 3-3: Threatened Ecological Communities within the study area

3.4.6 Weeds

Of the 30 exotic species recorded in the study area, three are listed as Priority Weeds (DPIE, 2020f) under the NSW *Biosecurity Act 2015* for the Greater Sydney region, which includes the City of Canterbury Bankstown LGA, and of these two are also listed as Weeds of National Significance (WoNS) (DotEE, 2020) (Table 3-9).

Areas of high weed cover also exist just outside the western boundary of the study area within the disused rail line. Species abundant here include *Lantana camara, Olea europaea subsp. cuspidata* and *Acacia saligna.*

Table 3-9 Priority Weeds listed under the Biosecurity Act 2015 and WoNS recorded in the study area

Scientific Name	Common Name	Listed as a WoNS?	Priority Weed category	Landholder duty
Asparagus aethiopicus	Asparagus Fern	**YES**	Prohibition on dealings	Must not be imported into the State or sold.
Olea europaea subsp. cuspidata	African Olive	**NO**	Regional Recommended Measure	The plant or parts of the plant are not traded, carried, grown or released into the environment. Land managers prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets.
Opuntia stricta	Common Prickly Pear	**YES**	Prohibition on dealings	Must not be imported into the State or sold.

3.4.7 Fauna habitat

The vegetation within the study area provides low value habitat for fauna species, due to high levels of disturbance, fragmentation and weed incursion. However, eight common fauna species were recorded during the surveys.

Within the study area, dense understorey vegetation and associated leaf litter provide suitable foraging and shelter habitat for common and adaptable small terrestrial species such as the Pale-flecked Garden Sunskink (*Lampropholis guichenoti*).

Areas of open grassland within the study area and parks, waterways and tips within the surrounding area, attract common urban bird species including the Australian Raven (*Corvus coronoides*), Australian White Ibis (*Threskiornis moluccus*), Crested Pigeon (*Ocyphaps lophotes*), Magpie-lark (*Grallina cyanoleuca*), Pacific Black Duck (*Anas superciliosa*) and the introduced Common Myna (*Acridotheres tristis*).

No hollow-bearing trees were recorded within the study area. The scarcity of tree hollows and mature eucalypts are likely to be significant limitations to habitat values for native arboreal mammals within the study area. In addition, other native terrestrial mammals are likely to be absent given existing barriers to habitat connectivity, and impacts of habitat degradation, fragmentation, isolation and pest species.

3.4.8 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecological communities that are dependent, either entirely or in part, on the presence of groundwater for their health or survival.

As part of this assessment, The Bureau of Meteorology's GDE Atlas was reviewed to determine the occurrence of potential groundwater dependent ecosystems within and surrounding the study area.

The results of that review show that there are no potential GDE's within the study area. The nearest GDEs are approximately one km to the west of the study area and 1.2 km to the north east of the study area (Figure 3-4). Through the implementation of water quality and quantity controls at the Proposal, it is not anticipated that there would be any impacts to this downstream GDE.

LEGEND

- Proposal site
- Study area
- Railway
- Watercourse

Potential for Groundwater interaction (BOM, 2017)

- High potential
- Moderate potential
- Low potential

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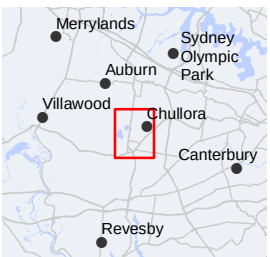

Figure 3-4: Groundwater Dependent Ecosystems (BOM, 2017)

3.5 Threatened species

3.5.1 Ecosystem credit species

Ecosystem credit species are those that can be readily predicted to occur within a PCT based on the attributes of a given vegetation zone. The ecosystem credit species that are predicted to occur within the study area, their associated habitat constraints, geographic limitations and sensitivity to gain score are outlined in Table 3-10.

Sensitivity to gain scores consider the ability of a species to respond to management actions implemented at a biodiversity stewardship site and for ecosystem credit species, help to determine ecosystem credits for vegetation zones. The predicted ecosystem species with the highest sensitivity to gain score and the sensitivity to loss score for the relevant vegetation zone determines the biodiversity risk weighting for the vegetation zone. Ecosystem credits required for this vegetation zone are then calculated using this biodiversity risk weighting. This is outlined in Appendix 7 of the BAM.

As there are no PCTs present within the Proposal boundary, no ecosystem credit species are predicted to occur within the area. However, in order to inform the assessment of potential indirect impacts, a list of ecosystem species was generated based on the area of adjoining vegetation in the study area (Table 3-10). As these species are not predicted to occur within the Proposal boundary they were not targeted during surveys. Appendix D provides further details on the assessment of potential habitat for these species.

Table 3-10 Ecosystem credit species predicted to occur within the study area

Common name	Scientific name	Sensi tivity to gain (DPIE, 2020g)	BC Act Status	EPBC Act Status
Regent Honeyeater (foraging only)	*Anthochaera phrygia*	High	CE	CE
Dusky Woodswallow	*Artamus cyanopterus*	Moderate	V	-
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	High	V	-
Speckled Warbler	*Chthonicola sagittata*	High	V	-
Spotted-tailed Quoll	*Dasyurus maculatus*	High	V	E
Little Lorikeet	*Glossopsitta pusilla*	High	V	-
White-bellied Sea-Eagle (foraging only)	*Haliaeetus leucogaster*	High	V	-
Swift Parrot (foraging only)	*Lathamus discolor*	Moderate	E	CE
Hooded Robin (south-eastern form)	*Melanodryas cucullata*	Moderate	V	-
Little Bent-winged Bat	*Miniopterus australis*	High	V	-
Large Bent-winged Bat (foraging only)	*Miniopterus orianae oceanensis*	High	V	-
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	High	V	-
Scarlet Robin	*Petroica boodang*	Moderate	V	-
Flame Robin	*Petroica phoenicea*	Moderate	V	-
Koala (foraging only)	*Phascolarctos cinereus*	High	V	V
Grey-headed Flying-fox (foraging only)	*Pteropus poliocephalus*	High	V	V

Common name	Scientific name	Sensi tivity to gain (DPIE, 2020g)	BC Act Status	EPBC Act Status
Diamond Firetail	*Stagonopleura guttata*	Moderate	V	-

V = vulnerable E = endangered CE = critically endangered

3.5.2 Species credit species

Species credit species are those that cannot be readily predicted to occur within a site based on the PCTs present and must therefore be surveyed for where potential habitat is considered to be present.

Section 6.4.1.17 of the BAM states that a candidate species credit species will be considered unlikely to occur on the subject land, or specific vegetation zones, if, after carrying out a field assessment of the habitat constraints or microhabitats on the subject land, the assessor determines that the habitat is substantially degraded such that the species is unlikely to utilise the subject land, or specific vegetation zones.

33 species credit species were identified by the BAMC as having the potential to occur within the study area based on the area of adjoining PCT vegetation. None of these species are considered likely to occur within the Proposal boundary due to the absence of vegetation and suitable habitat. Therefore, these species have been excluded from further assessment and were not targeted during surveys. Table 3-11 provides the full list of candidate species credit species returned by BAMC and Appendix D and Appendix E provide further justifications for their exclusion.

One threatened flora species, *Acacia pubescens*, was identified as having a moderate likelihood of occurrence in the study area due to the presence of multiple recent records nearby and the capacity of the species to survive in open, disturbed areas in association with exotic species (NPWS, 2003). Targeted surveys were therefore undertaken for this species in the form of random meanders in the area of PCT 725 within the study area. No individuals were recorded.

The biodiversity risk weighting for these species credit species is also listed in Table 3-11. For species credit species, the biodiversity risk weighting is calculated from the species sensitivity to gain score and sensitivity to loss score (as provided in the Threatened Biodiversity Data Collection (DPIE, 2020g). This biodiversity risk weighting is then used in the calculation of the number of species credits required for any species credit species which are determined to be impacted by the Proposal.

Table 3-11 Candidate species credit species, including those removed from further consideration

Common name	Scientific name	BC Act status	EPBC Act status	Biodiversity risk weighting (DPIE, 2020g)
Threatened Flora				
Bynoe's Wattle	*Acacia bynoeana*	E	V	2.00
Acacia prominens, Gosford, Hurstville and Kogarah LGAs endangered population	*Acacia prominens* (endangered population)	EP	-	2.00
Downy Wattle	*Acacia pubescens*	V	V	2.00
-	*Allocasuarina glareicola*	E	E	3.00
Thick Lip Spider Orchid	*Caladenia tessellata*	E	V	3.00
Netted Bottle Brush	*Callistemon linearifolius*	V	-	1.50
-	*Dillwynia tenuifolia*	V	-	2.00
Dillwynia tenuifolia, Kemps Creek endangered population	*Dillwynia tenuifolia* (endangered population)	EP	-	2.00

Common name	Scientific name	BC Act status	EPBC Act status	Biodiversity risk weighting (DPIE, 2020g)
-	*Epacris purpurascens var. purpurascens*	V	-	1.50
Juniper-leaved Grevillea	*Grevillea juniperina subsp. juniperina*	V	-	1.50
Small-flowered Grevillea	*Grevillea parviflora subsp. parviflora*	V	V	2.00
-	*Gyrostemon thesioides*	E	-	3.00
-	*Hibbertia fumana*	CE	-	3.00
-	*Hibbertia sp. Bankstown*	CE	CE	3.00
Marsdenia viridiflora subsp. viridiflora, Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGAs endangered population	*Marsdenia viridiflora subsp. viridiflora* (endangered population)	EP	-	2.00
-	*Micromyrtus minutiflora*	E	V	2.00
Nodding Geebung	*Persoonia nutans*	E	E	2.00
Pomaderris prunifolia, Parramatta, Auburn, Strathfield and Bankstown LGAs endangered population	*Pomaderris prunifolia* (endangered population)	EP	-	2.00
-	*Pultenaea parviflora*	E	V	2.00
Matted Bush-pea	*Pultenaea pedunculata*	E	-	2.00
Wahlenbergia multicaulis, Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield LGAs endangered population	*Wahlenbergia multicaulis* (endangered population)	EP	-	2.00
Threatened fauna				
Regent Honeyeater (breeding)	*Anthochaera phrygia*	CE	CE	3.00
White-bellied Sea-Eagle (breeding)	*Haliaeetus leucogaster*	V	-	2.00
Swift Parrot (breeding)	*Lathamus discolor*	E	CE	3.00
Green and Golden Bell Frog	*Litoria aurea*	E	V	2.00

Common name	Scientific name	BC Act status	EPBC Act status	Biodiversity risk weighting (DPIE, 2020g)
Cumberland Plain Land Snail	*Meridolum corneovirens*	E	-	2.00
Little Bent-winged Bat (breeding)	*Miniopterus australis*	V	-	3.00
Large Bent-winged Bat (breeding)	*Miniopterus orianae oceanensis*	V	-	3.00
Southern Myotis	*Myotis macropus*	V	-	2.00
Squirrel Glider	*Petaurus norfolcensis*	V	-	2.00
Koala	*Phascolarctos cinereus*	V	V	2.00
Dural Land Snail	*Pommerhelix duralensis*	E	E	2.00
Grey-headed Flying-fox (breeding)	*Pteropus poliocephalus*	V	V	2.00

V = vulnerable E = endangered EP = endangered population CE = critically endangered

4 AVOID AND MINIMISE IMPACTS

4.1 Measures to avoid and minimise impacts on native vegetation and habitat

The principles in Section 8.1 of the BAM (OEH, 2017) have been considered to avoid and minimise impacts on native vegetation and habitat, where possible, through the development process for the Proposal.

4.1.1 Locating the project

The avoidance and minimisation steps implemented during the development of the Proposal are outlined below in Table 4-1.

Table 4-1 Avoidance and minimisation measures implemented during project location

BAM principles	How addressed
(a) locating the project in areas where there are no biodiversity values	The study area has been historically cleared and no vegetation is present within the Proposal boundary. This land is therefore considered to have extremely low biodiversity value.
(b) locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)	No vegetation is present within the Proposal boundary. Outside the Proposal boundary, higher value vegetation is present in the form of PCT 725 in the north west corner of the study area. This area has been purposefully avoided during the development of the Proposal such that, despite being within the Chullora RRP lot boundary, it has been excluded from the Proposal boundary.
(c) locating the project in areas that avoid habitat for species that have a high biodiversity risk weighting or native vegetation that is a critically endangered ecological community (CEEC) or an endangered ecological community (EEC)	There are no threatened ecological communities, or habitat for threatened species present in the Proposal boundary. The EEC *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* listed under the BC Act, is present outside the Proposal boundary and would not be impacted by the Proposal.
(d) locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.	As no vegetation is present within the Proposal boundary, the Proposal would not impact connectivity through the study area. The limited vegetation surrounding the Proposal boundary provides low value connectivity to areas of nearby habitat and would not be impacted by the Proposal. The Cooks River stormwater channel, located to the south of the Proposal boundary, enables some movement of species and genetic material but this would not be impacted by the Proposal.

4.1.2 Designing the project

The avoidance and minimisation measures that have been implemented during the design of the development are provided in Table 4-2.

Table 4-2 Avoidance and minimisation measures implemented during project design

BAM principles	How addressed
(a) reducing the clearing footprint of the project	The clearing footprint for the Proposal has been reduced to avoid all areas of vegetation.

BAM principles	How addressed
(b) locating ancillary facilities in areas where there are no biodiversity values	No ancillary facilities have been located in an area of biodiversity value.
(c) locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)	As above
(d) locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	As above
(e) providing structures to enable species and genetic material to move across barriers or hostile gaps	Not applicable, the Proposal would not impact the movement of species or genetic material.
(f) making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.	No vegetation would be removed as a result of the Proposal. The native vegetation in the north western corner of the study area would be retained in a vegetated area and has been purposefully excluded from the Proposal footprint.

5 CONSTRUCTION IMPACT ASSESSMENT

5.1 Direct impacts

5.1.1 Removal of native vegetation

No vegetation is present within the Proposal boundary. The nearest vegetation to the Proposal boundary is the patch of PCT 725 approximately five metres away. Therefore, the Proposal would not result in the removal of any vegetation.

5.1.2 Removal of threatened fauna habitat

No threatened fauna habitat is present within the Proposal boundary. Therefore, the Proposal would not result in the removal of any threatened fauna habitat.

5.1.3 Removal of threatened flora habitat

There is no threatened flora habitat within the Proposal boundary and therefore no threatened flora habitat would be removed by the Proposal.

5.1.4 Serious and Irreversible Impacts

The DPIE (2019) *Guidance to assist a decision-maker to determine a serious and irreversible impact* identifies threatened species and ecological communities most at risk of serious and irreversible impacts.

None of the threatened species or ecological communities listed in the guidance document have been recorded, or are considered likely to occur, within the Proposal boundary.

One TEC identified within the guidance document (DPIE, 2019) is known to occur adjacent to the Proposal boundary: Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion. A small patch of this TEC about 0.34 hectares in area is located within the Chullora RRP boundary but outside the Proposal boundary. There would be no direct impacts to it as a result of the Proposal. Indirect impacts on this patch are also likely to be minimal, as the area of TEC is situated upslope of the Proposal boundary.

Therefore, the Proposal would not have any impacts to any threatened species or threatened ecological communities likely to result in a serious and irreversible impact.

5.2 Indirect impacts

During the construction phase of the Proposal, there are potential indirect impacts on the biodiversity within, and adjacent to, the Proposal boundary. While these indirect impacts may also occur during the operational phase of the project, they have been assessed within this section

The BAM (Section 9.1.4.2) identifies 16 potential indirect impacts that must be considered as a part of a BDAR, as a minimum. Many of these indirect impacts are not relevant to the development and are therefore not considered further. Table 5-1 provides consideration of the indirect impacts of the development on biodiversity values.

Table 5-1: Potential indirect impacts of the development

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	Adjacent vegetation to the Proposal boundary consists of disturbed exotic vegetation and a threatened ecological community. The threatened ecological community is approximately 5 metres from the Proposal boundary. While construction activities in close proximity to this ecological community represent a risk of inadvertent impacts, the probability of any inadvertent impacts occurring in this area is low based on the implementation of relevant mitigation measures.	Adjacent vegetation	Ongoing during construction and operation	Throughout the construction and operation period	Potentially permanent
Reduced viability of adjacent habitat due to edge effects	The areas of vegetation surrounding the Proposal boundary are already exposed to high levels of edge effects. As there is no connecting vegetation to be removed by the Proposal, it is unlikely that these edge effects would be exacerbated.	Adjacent vegetation	Ongoing during construction and operation	Throughout the construction and operation period	Potentially long term
Reduced viability of adjacent habitat due to noise, dust or light spill	As the surrounding area is highly industrialised, with several major roads, train lines and industrial developments, adjacent habitat is already subject to significant noise, dust and light spill. It is considered that any additional potential impacts of dust that can be attributed to the Proposal would be negligible due to the limited nature and timeframe of construction. No additional impacts from noise or light spill are anticipated.	Adjacent vegetation	Ongoing during construction activities	Throughout the construction period	Short term
Transport of weeds and pathogens from the site to adjacent vegetation	Whilst there is a potential risk of spreading exotic species to areas beyond the Proposal boundary, with the implementation of relevant mitigation measures this is considered unlikely.	Adjacent vegetation	Ongoing during construction activities	Throughout the construction period	Potentially long term
Increased risk of starvation, exposure and loss of shade or shelter	The Proposal is not expected to result in any indirect impacts resulting in an increased risk of starvation, exposure and loss of shade or shelter.	NA	NA	NA	NA
Loss of breeding habitats	The Proposal is not expected to result in any indirect loss of breeding habitats located adjacent to the Proposal boundary.	NA	NA	NA	NA
Trampling of threatened flora species	As no threatened flora species have been recorded within or adjacent to the site, trampling of threatened species is not expected to occur.	NA	NA	NA	NA
Inhibition of nitrogen fixation and increased soil salinity	The Proposal is not expected to result in any inhibition of nitrogen fixation.	NA	NA	NA	NA
Fertiliser drift	The Proposal is not expected to result in any fertiliser drift.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Rubbish dumping	The Proposal is not expected to result in any additional rubbish dumping.	NA	NA	NA	NA
Wood collection	The Proposal is not expected to result in any wood collection.	NA	NA	NA	NA
Bush rock removal and disturbance	The Proposal is not expected to result in any bush rock removal or disturbance.	NA	NA	NA	NA
Increase in predatory species populations	The Proposal is not expected to result in any increase in predatory species populations	NA	NA	NA	NA
Increase in pest animal populations	The Proposal is not expected to result in any increase in pest animal populations.	NA	NA	NA	NA
Increased risk of fire	The Proposal is not expected to result in any increased risk of fire.	NA	NA	NA	NA
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	The Proposal is not expected to result in any disturbance to specialist breeding and foraging habitat.	NA	NA	NA	NA

5.3 Prescribed impacts

Clause 6.1 of the *Biodiversity Conservation Regulation 2017* identifies actions that are prescribed as impacts to be assessed under the Biodiversity Offsets Scheme. Prescribed biodiversity impacts must be assessed in accordance with Section 9.2 of the BAM.

The prescribed biodiversity impacts in the BAM and their relevance to the Proposal are listed in Table 5-2.

Table 5-2 Prescribed biodiversity impacts specified by the Biodiversity Assessment Method

Prescribed biodiversity impact (Biodiversity Assessment Method)	Relevance to current proposal
Impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	None – no karst, caves, crevices, cliffs or other features of geological significance in or adjoining the Proposal boundary.
Impacts of development on the habitat of threatened species or ecological communities associated with rocks	No – no rock outcrops occur within or adjacent to the Proposal boundary.
Impacts of development on the habitat of threatened species or ecological communities associated with human made structures	No other human made structures to be impacted are likely to be inhabited by threatened species or TECs.
Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation	No – no vegetation, including threatened species habitat and ecological communities, occurs within the Proposal boundary.
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No – areas of habitat within and adjoining the Proposal boundary are currently fragmented by infrastructure and industrial and residential development. As there is no habitat or connectivity present with the Proposal boundary, the Proposal would not increase the existing fragmentation.
Impacts of the development on movement of threatened species that maintains their life cycle	
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	No – no waterways are present on the site, and the hydrology in the locality is already highly modified, with the constructed Cooks River storm water channel draining the site.
Impacts of wind turbine strikes on protected animals	No – Wind turbines are not proposed as part of this project.
Impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	No – the Proposal is adjacent to existing roads but would not increase the width of existing roads or result in fauna being directed into road corridors.

6 OPERATIONS IMPACT ASSESSMENT

Operational impacts as a result of the Proposal are considered to be unlikely to occur and be of minor severity in the event they do occur. These potential operational impacts are limited to the following:

- Inadvertent impacts on adjacent habitat or vegetation
- Reduced viability of adjacent habitat due to edge effects

These impacts are outlined in more detail above in Table 5-1. No additional operational impacts are expected to occur.

7 MITIGATION MEASURES

While the Proposal is not likely to result in any significant biodiversity impacts, the measures in Table 7-1 should be implemented to mitigate any potential impacts during construction and operation.

Table 7-1 Measures to be implemented to minimise impacts on biodiversity

Mitigation measure	Outcome	Timing	Responsibility
A Construction Environmental Management Plan (CEMP) would be prepared which would include the management of flora and fauna during construction. This CEMP would include the following: • Preparation of an environmental constraints maps to clearly identify the locations of threatened ecological communities adjacent to the Proposal boundary • Updates to avoid and minimise indirect impacts to ecological communities located adjacent to the Proposal boundary • Clear identification of vegetation exclusion zones • Any required updates to the site induction procedure	Flora and fauna would be managed in accordance with the requirements of the CEMP; prevention of inadvertent impacts to adjoining areas of TEC.	Pre-construction and construction	SUEZ and construction contractor
Site inductions are to include a briefing regarding the local fauna in areas adjoining the site and protocols to be undertaken if fauna are encountered.	Prevents fauna injury/mortality	Construction	Construction contractor
If any animal is injured, contact the relevant local wildlife rescue agency (e.g. WIRES) and/or veterinary surgery as soon as practical. Until the animal can be cared for by a suitably qualified animal handler, if possible minimise stress to the animal and reduce the risk of further injury by: • Handling fauna with care and as little as possible • Covering larger animals with a towel or blanket and placing in a large cardboard box • Placing small animals in a cotton bag, tied at the top • Keeping the animal in a quiet, warm, ventilated and dark location.	Prevents fauna injury/ mortality	Pre-construction, construction and operation	Construction contractor and SUEZ
Directional lighting will be used where lighting is required in construction areas.	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor
Where appropriate, mitigation measures to minimise the unnecessary generation of noise during construction will be reviewed and considered for incorporation into the CEMP.	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor

8 IMPACT SUMMARY AND OFFSETS

The following section summarises the impacts of the Proposal and outlines the offsets required in accordance with the BAM.

8.1 Impacts requiring offset

As the Proposal is not expected to result in any impacts, there are no areas within the Proposal boundary requiring offset.

8.2 Impacts not requiring offset

As the Proposal is not expected to result in any impacts, there are no impacts not requiring offset.

8.3 Areas not requiring assessment

Areas of the Proposal which do not require assessment are limited to cleared areas. As all areas of the Proposal boundary are cleared, these cover 2.47 hectares as described in Section 3.3.3.

8.4 Impacts not considered under the BAM

8.4.1 Impact to MNES

There are no threatened ecological communities listed under the EPBC Act within the Proposal boundary.

There is no habitat for threatened species listed under the EPBC Act present within the Proposal boundary.

9 CONCLUSION

Arcadis has been commissioned to prepare a Biodiversity Development Assessment Report to support the preparation of a State Significant Development (SSD) Environmental Impact Statement (EIS) under Part 4, Division 4.7 of the of the *Environmental Planning and Assessment Act 1979* (EP&A Act) the development of a Material Recovery Facility (MRF) (the Proposal) at the Chullora RRP.

This BDAR considers the potential impacts of the Proposal to biodiversity values within the Proposal boundary. It is based on desktop research and detailed field surveys, undertaken across the study area in December 2019 and January 2020.

As the vegetation currently within the Proposal boundary is to be cleared in Stage 0 of the project, no vegetation or threatened species habitat is present within the Proposal boundary for the purpose of this assessment. One threatened ecological community was identified within the study area but outside the Proposal boundary. This community would not be impacted by the Proposal.

Assessment of adjacent vegetation identified 21 threatened flora species and 12 threatened fauna species as candidate species credit species in the BAMC. None of these species were considered likely to occur in the Proposal boundary, as there is no vegetation or suitable habitat present. Targeted surveys were not conducted for any threatened species in the Proposal boun.

As there are no biodiversity values, including vegetation and threatened species habitat, present within the Proposal boundary, no direct construction impacts from the Proposal are expected.

Impacts on the identified ecological values have been avoided in the Proposal as far as practicable. A range of mitigation measures have also been recommended to ameliorate the potential indirect impacts on biodiversity values during construction and operation.

No offsets are required for the Proposal.

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APPENDIX A FLORA RECORDED IN THE STUDY AREA

Family	*Scientific name*	Common name	Status		Plot 2		Incidental observation
			BC Act	EPBC Act	C	A	
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	-	-	-	-	Yes
Apiaceae	*Foeniculum vulgare*	Fennel	-	-	-	-	Yes
Apocynaceae	*Araujia sericiflora*	Moth Vine	-	-	-	-	Yes
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	-	-	-	-	Yes
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	-	-	0.5	5	Yes
Asteraceae	*Aster subulatus*	Wild Aster	-	-	-	-	Yes
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	-	-	-	-	No
Asteraceae	*Cirsium vulgare*	Spear Thistle	-	-	-	-	Yes
Brassicaceae	*Hirschfeldia incana*	Buchan Weed	-	-	-	-	Yes
Cactaceae	*Opuntia stricta*	Common Prickly Pear	-	-	0.1	1	Yes
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	-	-	0.1	1	Yes
Celastraceae	*Denhamia silvestris*	Narrow-leaved Orangebark	-	-	0.1	3	Yes
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	-	-	0.2	2	Yes
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed	-	-	-	-	Yes

Family	*Scientific name*	Common name	Status		Plot 2		Incidental observation
			BC Act	EPBC Act	C	A	
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge	-	-	2.0	100	No
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata*	-	-	-	-	-	No
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	-	-	0.1	1	Yes
Fabaceae (Faboideae)	*Wisteria sinensis*	Chinese wisteria	-	-	-	-	No
Fabaceae (Mimosoideae)	*Acacia implexa*	Hickory Wattle	-	-	25.0	80	No
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle	-	-	-	-	Yes
Fabaceae (Mimosoideae)	*Acacia saligna*	Golden Wreath Wattle	-	-	0.1	3	Yes
Gentianaceae	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	-	-	-	-	No
Lamiaceae	*Plectranthus parviflorus*	-	-	-	-	-	Yes
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	-	-	0.3	20	Yes
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	-	-	0.2	10	Yes
Loranthaceae	*Amyema sp.*	Mistletoe	-	-	0.1	1	Yes
Malvaceae	*Malva parviflora*	Small-flowered Mallow	-	-	-	-	Yes
Myrtaceae	*Corymbia citriodora*	Lemon-scented Gum	-	-	1.0	1	Yes
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	-	-	3.0	1	Yes
Myrtaceae	*Eucalyptus fibrosa*	Red Ironbark	-	-	5.0	1	Yes

Family	*Scientific name*	Common name	Status		Plot 2		Incidental observation
			BC Act	EPBC Act	C	A	
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark	-	-	5.0	1	No
Myrtaceae	*Melaleuca decora*	-	-	-	0.4	1	Yes
Myrtaceae	*Notelaea longifolia f. longifolia*	-	-	-	1.0	2	Yes
Oleaceae	*Olea europaea subsp. cuspidata*	African Olive	-	-	3.0	10	Yes
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	-	-	0.1	20	Yes
Phytolaccaceae	*Phytolacca octandra*	Inkweed	-	-	-	-	No
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn	-	-	0.2	1	No
Poaceae	*Aristida ramosa*	Purple Wiregrass	-	-	0.1	20	No
Poaceae	*Austrostipa ramosissima*	Stout Bamboo Grass	-	-	0.1	10	No
Poaceae	*Avena sp.*	Oats	-	-	-	-	Yes
Poaceae	*Bromus catharticus*	Praire Grass	-	-	-	-	No
Poaceae	*Cynodon dactylon*	Common Couch	-	-	0.1	10	Yes
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	-	-	-	-	No
Poaceae	*Digitaria sanguinalis*	Crab Grass	-	-	-	-	Yes
Poaceae	*Echinochloa crus-galli*	Barnyard Grass	-	-	-	-	No
Poaceae	*Eragrostis curvula*	African Lovegrass	-	-	0.4	30	Yes

Family	*Scientific name*	Common name	Status		Plot 2		Incidental observation
			BC Act	EPBC Act	C	A	
Poaceae	*Lachnagrostis filiformis*	-	-	-	-	-	No
Poaceae	*Megathyrsus maximus*	-	-	-	-	-	Yes
Poaceae	*Melinus repens*	Red Natal Grass	-	-	-	-	Yes
Poaceae	*Paspalidium distans*	-	-	-	0.2	20	No
Poaceae	*Rytidosperma sp.*	-	-	-	0.1	10	No
Poaceae	*Setaria parviflora*	-	-	-	-	-	No
Poaceae	*Sporobolus africanus*	Parramatta Grass	-	-	-	-	Yes
Polygonaceae	*Persicaria decipiens*	Slender Knotweed	-	-	-	-	No
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	-	-	-	-	No
Urticaceae	*Parietaria judaica*	Pellitory	-	-	-	-	No
Verbenaceae	*Verbena bonariensis*	Purpletop	-	-	-	-	No

APPENDIX B FAUNA RECORDED IN THE STUDY AREA

Common name	*Scientific name*	BC Act status	EPBC Act status	Observation type	Introduced (Y/N)
BIRDS					
Australian Raven	*Corvus coronoides*	-	-	OW	N
Australian White Ibis	*Threskiornis molucca*	-	-	O	N
Common Myna	*Acridotheres tristis*	-	-	O	Y
Crested Pigeon	*Ocyphaps lophotes*	-	-	O	N
Magpie-lark	*Grallina cyanoleuca*	-	-	OW	N
New Holland Honeyeater	*Phylidonyris novaehollandiae*	-	-	OW	N
Pacific Black Duck	*Anas superciliosa*	-	-	O	N
REPTILES					
Pale-flecked Garden Sunskink	*Lampropholis guichenoti*	-	-	O	N

O = Observed OW = Observed and Heard

APPENDIX C PROTECTED MATTERS SEARCH TOOL

APPENDIX D FAUNA LIKELIHOOD OF OCCURRENCE IN THE PROPOSAL BOUNDARY

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
BIRDS						
Australasian Bittern	*Botaurus poiciloptilus*	E	E	The Australasian Bittern is widespread but uncommon across south-eastern Australia. In NSW, they can be found over most of the state except for the far north-west. The species favours permanent freshwater wetlands with tall, dense vegetation, particularly bulrushes (*Typha spp.*) and spikerushes (*Eleocharis spp.*).	9 – BioNet (2013) PMST	Low – no habitat present within the proposal boundary
Australian Painted Snipe	*Rostratula australis*	E	E	The Australian Painted Snipe is restricted to Australia. Most records are from the south-east, particularly surrounding the Murray Darling Basin. Scattered records exist across northern Australia and historical records exist around Perth in Western Australia. In NSW, many records are from the Murray-Darling Basin, including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and swamps surrounding Balldale and Wanganella. Other important locations include wetlands on the Hawkesbury River, and the Clarence and Lower Hunter Valleys. The species prefers fringes of swamps, dams and nearby marshes where there is a cover of grasses, lignum, low scrub or open timber.	4 – BioNet (2017) PMST	Low – no habitat present within the proposal boundary
Black Bittern	*Ixobrychus flavicollis*	V	-	The Black Bittern has a wide distribution from southern NSW to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. The species inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	11 – BioNet (2017)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
Black Falcon	*Falco subniger*	V	-	The Black Falcon is distributed widely but sparsely across NSW, mostly occurring in inland regions. In NSW, there is assumed to be a single population that is continuous with a broader continental population, as the species is highly mobile and commonly travels hundreds of kilometres. The species is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas.	1 – BioNet (1990)	Low – no recent (last 10 years) records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis* subsp. *Gularis*	V	-	The Black-chinned Honeyeater has two subspecies, with only the nominated gularis occurring in NSW. This subspecies extends south from central Queensland, through NSW, Victoria and into South Australia, although it is very rare in the latter State. Within NSW, it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although is regularly recorded from the Richmond and Clarence River areas, a few scattered sites in the Hunter and Central Coast regions, and rarely in the Illawarra. The species mostly occupies upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box *(E. microcarpa*), Yellow box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Is also known to inhabit open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	5 – BioNet (2016)	Low – no habitat present within the proposal boundary
Black-necked Stork	*Ephippiorhynchus asiaticus australis*	E	-	The Black-necked Stork, species *Ephippiorhynchus asiaticus*, comprises two subspecies, with *E. a. australis* occurring in Australia and New Guinea. In Australia, the species is widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW (although vagrants may occur further south or inland). In NSW, the species becomes increasingly uncommon south of the Clarence Valley,	2 – BioNet (2010)	Low – no recent (last 10 years) records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				and rarely occurs south of Sydney. The species inhabits floodplain wetlands, including swamps, billabongs, watercourses and dams, of the major coastal rivers. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.		
Black-tailed Godwit	*Limosa limosa*	V	-	The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. It is primarily a coastal species inhabiting sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the coast, and inland.	14 – BioNet (2017)	Low – no habitat present within the proposal boundary
Broad-billed Sandpiper	*Limicola falcinellus*	V	-	The eastern form of this species breeds in northern Siberia before migrating southwards in winter to Australia. In Australia, Broad-billed Sandpipers overwinter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast. The species favours sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs. In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for inland NSW.	2 – BioNet (2017)	Low – no habitat present within the proposal boundary
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	-	The Brown Treecreeper (eastern subspecies) is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands	BAMC	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.		
Bush Stone-curlew	*Burhinus grallarius*	E	-	The Bush Stone-curlew is found throughout Australia except for inland areas, the central southern coast, far south-east corner and Tasmania. In northern Australia the species is common, but in the south-east, it is either rare or extinct throughout its former range. The species inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	6 – BioNet (2017)	Low – no habitat present within the proposal boundary
Curlew Sandpiper	*Calidris ferruginea*	E	CE	The Curlew Sandpiper is distributed around most of the Australian coastline, including Tasmania. In NSW, it occurs along the entire coastline, particularly in the Hunter Estuary and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are likely to be during the species migration, where they arrive in Australia for the non-breeding period between August and November, departing between March and mid-April. The Curlew Sandpiper generally occupies littoral and estuarine habitats. In NSW, it is mainly found in intertidal mudflats of sheltered coasts.	354 – BioNet (2017) PMST	Low – no habitat present within the proposal boundary
Diamond Firetail	*Stagonopleura guttata*	V	-	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.	BAMC	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
Dusky Woodswallow	*Artamus cyanopterus*	V	-	The Dusky Woodswallow is widespread in eastern, southern and south-western Australia. The species occurs throughout most of NSW, but is sparsely scattered in, or largely absent from, much of the upper western region. The species primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses, sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. It has also been recorded in farmland, usually at the edges of forest or woodland.	39 – BioNet (2017) PMST BAMC	Low – no habitat present within the proposal boundary
Eastern Bristlebird	*Dasyornis brachypterus*	E	E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia. There are three main populations: Northern (southern Queensland/northern NSW), Central (Barren Ground Nature Reserve, Budderoo Nature Reserve, Woronora Plateau, Jervis Bay National Park, Booderee National Park and Beecroft Peninsula) and Southern (Nadgee Nature Reserve and Croajingalong National Park near the NSW/Victorian border). Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW, habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of which are prone to fire. Age of habitat since fire is of paramount importance to this species.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Eastern Curlew	*Numenius madagascariensis*	-	CE	The Eastern Curlew migrates to Australia for the non-breeding season. Within Australia, the Eastern Curlew is found across all States, and has a primarily coastal distribution, with birds rarely recorded inland. In NSW, the species occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond Ricer and	30 – BioNet (2017) PMST	Low – migratory species (likelihood of occurrence is low) and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				Intermittently Closed and Open Lakes and Lagoons (ICOLLs) of the south coast. The species generally occupies coastal lakes, inlets, bays and estuarine habitats. In NSW, it is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species is found on ocean beaches (often near estuaries) as well as coral reefs, rock platforms or rocky islets.		
Eastern Grass Owl	*Tyto longimembris*	V	-	Within NSW the Eastern Grass Owl is likely to be resident in the north-east. Occurs mainly in areas of tall grass including tussock grassland, in swampy areas, grassy plain, swampy heath and in cane grass or sedges on floodplains.	2 – BioNet (2017)	Low – no habitat present within the proposal boundary
Flame Robin	*Petroica phoenicea*	V	-	The Flame Robin is endemic to south-eastern Australia, ranging from the Queensland border to south-east South Australia and Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW; one in the Northern Tablelands, and one ranging from the Central to Southern Tablelands. The species breeds in upland tall moist eucalypt forests and woodlands, often of ridges and slopes. The Flame Robin prefers clearings or areas with open understoreys and are often found in recently burnt areas. The species occasionally occurs in temperate rainforest, as well as herbfields, heathlands, shrublands and sedgelands at high altitudes. Breeding habitat is typically dominated by native grasses and the shrub layer may either be sparse or dense.	5 – BioNet (2017) BAMC	Low – no habitat present within the proposal boundary
Freckled Duck	*Stictonetta naevosa*	V	-	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The species prefers permanent freshwater	1 – BioNet (1985)	Low – no recent (last 10 years) records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.		
Fork-tailed Swift	*Apus pacificus*	-	-	In NSW, the Fork-tailed Swift is recorded in all regions. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999). They forage aerially, up to hundreds of metres above ground, but also less than 1 m above open areas or over water.	2 – BioNet (2016)	Low – no habitat present within the proposal boundary
Gang-gang Cockatoo	*Callocephalon fimbriatum*	V	-	The Gang-gang Cockatoo is distributed from southern Victoria through south and central-eastern NSW. In NSW, the species is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. The Gang-gang Cockatoo occurs regularly in the ACT and is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. During spring and summer, the species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species typically moves to lower altitudes to inhabit drier, open eucalypt forests and woodlands (particularly Box-Gum and Box-Ironbark assemblages) or in dry forest in coastal and urban areas. It may also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland, and occasionally in temperate rainforests. The species	2 – BioNet (2011)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				favours old growth forest and woodland for nesting and roosting.		
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V	-	The Glossy Black-Cockatoo is widespread but uncommon throughout suitable forest and woodland habitats from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population also exists on Kangaroo Island in South Australia. The species inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. The species feeds almost exclusively on *Casuarina* and *Allocasuarina* species, with Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) being important foraging resources for the species. Inland populations feed on a wider range of Sheoaks, and Belah may also be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak and Belah.	1 – BioNet (2014)	Low – no habitat present within the proposal boundary
Glossy Ibis	*Plegadis falcinellus*	-	-	The Glossy Ibis frequents swamps and lakes throughout much of the Australian mainland but is most numerous in the north. It is a non-breeding visitor to Tasmania and the south-west of Western Australia. The Glossy Ibis requires shallow water and mudflats, so is found in well-vegetated wetlands, floodplains, mangroves and ricefields.	79 – BioNet (2016)	Low – no habitat present within the proposal boundary.
Great Knot	*Calidris tenuirostris*	V	-	In NSW the Great Know is recorded at scattered sites along the coast down to around Narooma. They occur in sheltered coastal habitats containing large intertidal mudflats, sandflats or sandy beaches with mudflats nearby. Sometimes they may be found on exposed reefs or rock platforms.	2 – BioNet (2017)	Low – no habitat present within the proposal boundary
Greater Sand-plover	*Charadrius leschenaultii*	V	-	Commonly found on the west coast of Australia and is rare on the east coast. In NSW the species has been recorded between the northern rivers and the Illawarra	1 – BioNet (1991)	Low – no recent (last 10 years) records of the species within 10

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				with the majority of records coming from the Clarence and Richmond estuaries. The Greater Sand-plover inhabits mainly sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks and roosts on sandy beaches and rocky shores during high tide.		kilometres of the site and no habitat present within the proposal boundary
Hooded Plover (eastern)	*Thinornis rubricollis*	CE	E	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). In south-west Western Australia the Hooded Plover is not restricted to the coast and can also live and breed around inland salt lakes. The range of the Hooded Plover has declined in eastern Australia since European settlement. Southern coastal Queensland and northern NSW were probably once part of the range of the Hooded Plover, but the species has not been recorded there since the 1920s. In the late 1920s and early 1930s the species was recorded from Port Stephens but are now considered locally extinct. It has not been seen in the Sydney area since the 1940s. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Hooded Robin (south-eastern form)	*Melanodryas cucullata*	V	-	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies cucullata) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies picata. Two other subspecies	BAMC	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				occur outside NSW. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.		
Lesser Sand-plover	*Charadrius mongolus*	V	-	The Lesser Sand-plover may occur around the entire Australian Coast but is most commonly found from northern NSW north along Queensland's east coast and in the Gulf of Carpentaria. Records are rare south of the Shoalhaven estuary and inland. The Lesser Sand-plover favours coastal environs within NSW including beaches of shelter bays and estuaries with large intertidal sandflats or mudflats. They roost on sandy beaches or rocky shores at high tide.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Little Eagle	*Hieraaetus morphnoides*	V	-	The Little Eagle is found throughout the Australian mainland, except the most densely forested parts of the Dividing Range escarpment. The Little Eagle occurs as a single population throughout NSW. The species occupies open eucalypt forest, woodland or open woodland, and uses Sheoak or Acacia woodlands and riparian woodlands of inland NSW.	20 – BioNet (2017)	Low – no habitat present within the proposal boundary
Little Lorikeet	*Glossopsitta pusilla*	V	-	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. In NSW, lorikeets are found westward as far as Dubbo and Albury, and the State provides a large portion of the species core habitat. The Little Lorikeet forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora*, *Melaleuca* and other tree species. Riparian habitats are highly used, due to higher soil fertility and greater productivity. The species targets isolated flowering trees in open country, such as in paddocks or in roadside remnants and street trees; which help sustain viable populations.	37 – BioNet (2018) BAMC	Low – may fly over the site while dispersing and foraging in the surrounding area and habitat adjacent to the northern extent of the site may provide opportunistic foraging habitat for the species. However, no habitat present within the proposal boundary
Masked Owl	*Tyto novaehollandiae*	V	-	The Masked Owl is most abundant on the coast but extends to the western plains. About 90% of overall records occur within NSW; excluding the most arid	4 – BioNet (2013)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				north-western corner. The species occupies dry, eucalypt forests and woodlands up to 1,100 m altitude. The Masked Owl typically prefers open forest with low shrub density and requires old trees for roosting and nesting.		
Orange-bellied Parrot	*Neophema chrysogaster*	CE	CE	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. It is expected that NSW habitats may be being more frequently utilised than observations suggest. Typical winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured, but they will turn up anywhere within these coastal regions. The species can be found foraging in weedy areas associated with these coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Osprey	*Pandion cristatus*	V	-	Eastern Ospreys are found around the coastline of mainland Australia, except for Victoria. The species is common around the northern coast, especially on rocky shorelines, islands and reefs. Eastern Osprey are uncommon to rare, or absent, from closely settled parts of south-eastern Australia. A few records exist inland. The species favours coastal areas, especially the mouths of large rivers, lagoons and lakes.	14 – BioNet (2019)	Low – may fly over the site while dispersing and foraging in the surrounding area. However, no habitat present within the proposal boundary.
Painted Honeyeater	*Grantiella picta*	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of Painted Honeyeater, as well as all breeding events, occur on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter, it is more likely to be found in the north of its range. The species inhabits Boree/Weeping Myall (*Acacia pendula*), Brigalow (*A.*	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				harpophylla), Box-Gum Woodlands and Box-Ironbark Forests. The Painted Honeyeater is also a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias; preferring mistletoes of the genus *Amyema*.		
Pink Robin	*Petroica rodinogaster*	V	-	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. It inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	1 – BioNet (1972)	Low – no recent (last 10 years) records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Powerful Owl	*Ninox strenua*	V	-	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Throughout its eastern range is occurs at low densities and are rare along the Murray River. Former inland populations may never recover. The species inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl typically requires large tracts of forest or woodland habitat with dense wet gullies and creek areas but can also occur in fragmented landscapes. The species breeds and hunts in open or closed sclerophyll forest of woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine (*Syncarpia glomulifera*), Black She-oak (*Allocasuarina littoralis*), Blackwood (*Acacia melanoxylon*), Rough-barked Apple (*Angophora floribunda*), Cherry Ballart (*Exocarpos*	58 – BioNet (2018)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				cupressiformis) and a number of eucalypt species. The Powerful Owl requires large, mature trees with hollows for breeding, and dense areas of vegetation for foraging and roosting.		
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. The species is also found in drier coastal woodlands and forests. The species range has contracted to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: North-east Victoria (Chiltern – Albury) and the Capertee Valley and Bundarra-Barraba region in NSW. In NSW, the distribution is very patchy and mainly confined to the two listed breeding areas and surrounding fragmented woodlands. In some years, flocks converge on flowering coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species; these woodlands generally have a large number of mature trees, high canopy cover, and an abundance of mistletoes. Non-breeding flocks are observed foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the Central Coast and occasionally on the upper North Coast. Individuals are occasionally seen on the South Coast. In the last decade, the species has been recorded in urban areas around Albury where Mugga Ironbark and Yellow Box were planted 20 years ago. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important.	16 – BioNet (2017) PMST BAMC	Low – no habitat present within the proposal boundary
Scarlet Robin	*Petroica boodang*	V	-	The Scarlet Robin is found from south-east Queensland to south-east South Australia and in	6 – BioNet (2018)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				Tasmania, and south-west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. The species inhabits dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. The species lives in both mature and regrowth vegetation, occasionally occurring in mallee or wet forest communities, or in wetlands and tea-tree swamps. Abundant logs and fallen timber are key components of the species habitat. In autumn and winter, the Scarlet Robin may occupy open grassy woodlands and grasslands or grazed paddocks with scattered trees.	BAMC	
Speckled Warbler	*Chthonicola sagittata*	V	-	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	BAMC	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Spotted Harrier	*Circus assimilis*	V	-	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. The species inhabits grassy open woodland including *Acacia* and *Mallee* remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native	9 – BioNet (2017)	Low – may fly over the site while dispersing and foraging in the surrounding area. However, no habitat present within the proposal boundary.

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.		
Square-tailed Kite	*Lophoictinia isura*	V	-	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the Square-tailed Kite 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. The species is found in a variety of timbered habitats including dry woodlands and open forests and shows a preference for timbered watercourses. In arid north-western NSW, the species has been observed in stony country with a ground cover of chenopods and grasses, open *Acacia* scrub and patches of low open eucalypt woodland.	4 – BioNet (2013)	Low – may fly over the site while dispersing and foraging in the surrounding area. However, no habitat present within the proposal boundary
Superb Fruit-Dove	*Ptilinopus superbus*	V	-	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	4 – BioNet (2007)	Low – no recent (last 10 years) records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Swift Parrot	*Lathamus discolor*	E	CE	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. In NSW, it mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there is abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species	17 – BioNet (2017) PMST BAMC	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*), and White Box (*E. albens*). Commonly used lerp infested trees include Inland Grey Box (*E. microcarpa*), Grey Box (*E. moluccana*) and Blackbutt (*E. pilularis*).		
Turquoise Parrot	*Neophema pulchella*	V	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. The species lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	2 – BioNet (2013)	Low – no habitat present within the proposal boundary
Varied Sittella	*Daphoenositta chrysoptera*	V	-	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades. The species inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, *Mallee* and *Acacia* woodland.	17 – BioNet (2017)	Low – no habitat present within the proposal boundary
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	The White-bellied Sea-Eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.	367 – BioNet (2019) BAMC	Low – may fly over the site while dispersing and foraging in the surrounding area. However, no habitat present within the proposal boundary.
White-fronted Chat	*Epthianura albifrons*	V	-	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate	508 – BioNet (2017)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas.		
White-throated Needletail	*Hirundapus caudacutus*	-	-	White-throated Needletails are non-breeding migrants in Australia between late spring and early autumn, but most common in summer. The species often occur in large numbers over eastern and northern Australia. White-throated Needletails are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.	BioNet PMST	Low – no habitat present within the proposal boundary
AMPHIBIANS						
Giant Burrowing Frog	*Heleioporus australiacus*	V	V	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria and appears to exist as two distinct populations: Northern (largely confined to the sandstone geology of the Sydney Basin, extending as far south as Ulladulla) and Southern (occurring from north of Narooma through to Walhalla, Victoria). The species is found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. The Giant Burrowing Frog requires ephemeral and permanent freshwater wetlands, ponds and dams with an open aspect and fringed by Typha, as well as free from predatory fish. The species spends more than 95% of its time in non-breeding habitat; burrowing below the soil surface or in the leaf litter. Individuals occupy a series of burrow sites, some of which are used repeatedly. Non-breeding sites are usually located up to 300 m from breeding sites, and home ranges are approximately 0.04 ha in size.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
Green and Golden Bell Frog	*Litoria aurea*	E	V	The Green and Golden Bell Frog exists in approximately 50 recorded locations across NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range; however, they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and the mid-north coast (with one island population). There is only one known population on the NSW Southern Tablelands. The species inhabits marshes, dams and stream-sides, particularly those containing bulrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimal habitat includes waterbodies that are unshaded, free of predatory fish such as Plague Minnow/Mosquito Fish (*Gambusia holbrooki*), have a nearby grassy area and available sheltering sites. Some sites, particularly in the Greater Sydney region, occur in highly disturbed areas.	16075 – BioNet (2019) PMST BAMC	Low – no habitat present within the proposal boundary
Littlejohn's Tree Frog	*Litoria littlejohni*	V	V	The Littlejohn's Tree Frog is distributed on plateaus and eastern slopes of the Great Diving Range, from Watagan State Forest in NSW, to Buchan in Victoria. Most records are from within the Sydney Basin Bioregion, with only scattered records south to the Victorian border. This species has not been recorded in southern NSW within the last decade. Records are isolated and tend to be at higher altitudes. The species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath-based forests and woodlands where it shelters under leaf litter and low vegetation.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Red-crowned Toadlet	*Pseudophryne australis*	V	-	The Red-crowned Toadlet is confined to the Sydney Basin, from Pokolbin in the north, Nowra to the south, and Mt Victoria in the Blue Mountains to the west. The species occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. The Red-crowned Toadlet inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or	2 – BioNet (2015)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				capping, and shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. The species has not been recorded breeding in waters that are even mildly polluted, or with a pH outside of 5.5 – 6.5.		
Southern Bell Frog	*Litoria raniformis*	E	V	In NSW, the Southern Bell Frog was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district, and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain, and around Lake Victoria. In recent years, a few unconfirmed records have also been made in the Murray Irrigation Area. The Southern Bell Frog is also found in Victoria, Tasmania and South Australia, where it has also become endangered. The species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. During the breeding season, the Southern Bell Frog is found floating amongst aquatic vegetation (especially *Cumbungi* or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops. Outside of the breeding season, the species disperses away from the water and takes shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Stuttering Frog	*Mixophyes balbus*	V	-	Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Considered to have disappeared from Victoria and to have undergone considerable range contraction in	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				NSW, particularly in south-east NSW. It is the only *Mixophyes* species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney. The Dorrigo region, in north-east NSW, appears to be a stronghold for this species. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.		
MAMMALS						
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	The Brush-tailed Rock-wallaby is distributed from south-east Queensland to the Grampians in western Victoria, roughly following the lines of the Great Diving Range. In NSW, the species occurs from the Queensland border in the north, to Shoalhaven in the south. The population in the Warrumbungle Ranges is the western limit of the species range. Brush-tailed Rock-wallaby occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges often facing north.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Eastern Coastal Free-tailed Bat	*Micronomus norfolcensis*	V	-	The Eastern Coastal Free-tailed Bat is found along the east coast from south Queensland to southern NSW. The species occurs 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.	12 – BioNet (2018) BAMC	Low – no foraging habitat present within the proposal boundary and no suitable breeding or winter torpor roosting habitat present in the proposal boundary.
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species prefers moist habitats, with trees over 20 m tall. The Eastern False Pipistrelle generally roosts in eucalypt hollows but has also been found under loose bark on trees, or in buildings.	10 – BioNet (2018)	Low – no foraging habitat present within the proposal boundary and no suitable breeding or winter torpor roosting habitat present in the proposal boundary.
Eastern Pygmy-possum	*Cercartetus nanus*	V	-	The Eastern Pygmy Possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW, the species is	5 – BioNet (2015)	Low – no habitat present within the proposal boundary

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				found from the coast to inland on the western slopes, around the Pilliga, Dubbo, Parkes and Wagga Wagga. The Eastern Pygmy Possum is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath. Woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently found in rainforests.		
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Diving Range, from north-eastern Victoria to the Atherton Tableland. The species extends to the coast over much of its range. In NSW, the Greater Broad-nosed Bat is widespread over the New England Tablelands, however it does not occur at altitudes above 500 m. The species utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although the species predominantly roosts in tree hollows, it has also been recorded roosting in buildings.	8 – BioNet (2018)	Low – no foraging habitat present within the proposal boundary and no suitable breeding or winter torpor roosting habitat present in the proposal boundary
Greater Glider	*Petauroides volans*	-	V	The Greater Glider is endemic to eastern Australia, ranging from Windsor Tableland in far northern Queensland to the Wombat Forest in central Victoria, except in altitudes above 1,200 m. The species is largely restricted to eucalypt forests and woodlands, with higher abundances occurring in taller, denser, montane, moist eucalypt forests with old trees and abundant hollows.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present within the proposal boundary
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	The Grey-headed Flying-fox is generally found within 200 km of the coast in eastern Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, the species can occur in unusual locations. The Grey-headed Flying-fox occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and	1767 – BioNet (2019) PMST BAMC	Low – a large number (1767) of recent records (2019) within 10 kilometres of the site. However, there is no vegetation within the proposal boundary which could provide potential foraging habitat for the species. The species may fly over the site while dispersing and

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				cultivated fruit crops. Roosting camps are generally located within 20 km of regular food sources, and are commonly found in gullies, close to water, in vegetation with a dense canopy. Site fidelity to camps are high, and the species travels up to 50 km from these camps to forage, typically commuting distances up to 20 km from the camp site.		foraging in the surrounding area. The site does not contain any camps required for breeding and/or roosting. The nearest camp is about nine kilometres south-west of the site.
Koala	*Phascolarctos cinereus*	V	V	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW, it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It also has sparse and possibly disjunct populations in the Southern Tablelands. The Koala is also known from several sites on the Southern Tablelands. The species inhabits eucalypt woodlands and forests, and feeds on select species; about 70 eucalypt species and 30 non-eucalypt species but will select preferred browse species in any one area.	31 – BioNet (2019) PMST BAMC	Low – no habitat present within the proposal boundary
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	The Large Bent-winged Bat (formerly the Eastern Bentwing-bat) occurs along the east and north-west coasts of Australia. Their primary roosting habitat are caves, but the species is also known to use derelict mines, stormwater tunnels, buildings and other man-made structures.	99 – BioNet (2019) BAMC	Low – no suitable foraging habitat present in the proposal boundary and no suitable breeding or winter torpor roosting habitat present in the site.
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, and in well-timbered areas containing gullies, from Rockhampton in Queensland to Bungonia in the NSW Southern Highlands. In NSW, the species is generally rare with a very patchy distribution. Scattered records exist from the New England Tablelands and North West Slopes. The species roosts in cave entrances, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of Fairy Martins (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	3 – BioNet (2017) PMST	Low – no suitable foraging habitat present in the proposal boundary and no suitable breeding or winter torpor roosting habitat present.

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
Little Bent-winged Bat	*Miniopterus australis*	V	-	The Little Bent-winged Bat (formerly the Little Bentwing-bat) occurs along the east coast of Australia, ranging from Cape York in Queensland to Wollongong in NSW. The species inhabits moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and Banksia scrub. The bat is generally found in well-timbered areas, and roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings.	8 – BioNet (2018) BAMC	Low – no suitable foraging habitat present in the proposal boundary and no suitable breeding or winter torpor roosting habitat present.
Long-nosed Bandicoot (endangered population)	*Perameles nasuta*	EP	-	The Inner Wester Sydney endangered population of the Long-nosed bandicoot includes local government areas (LGA) of Marrickville and Canada Bay with the likelihood that is also includes Canterbury, Ashfield and Leichardt LGAs. Disjunct from nearest records which occur norther of the Parramatta River or further south at Holsworthy Military Reserve. Shelter mostly under older houses and buildings with no large blocks of suitable habitat likely to support a large source population. North Head population is restricted to North Head in the Manly LGA. Shelters during the day in a well-concealed nest based on a shallow hole lined with leaves and grass, sometimes under debris.	24 – BioNet (2015)	Low – the site is not located in any of the listed LGAs, therefore potential impacts do not need to be considered.
New Holland Mouse	*Pseudomys novaehollandiae*	-	V	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, NSW and Queensland. The species is known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.
Southern Brown Bandicoot (eastern)	*Isoodon obesulus obesulus*	E	E	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.		
Southern Myotis	*Myotis macropus*	V	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. The species generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	43 – BioNet (2019) BAMC	Low – no suitable foraging habitat present in the proposal boundary and no suitable breeding or winter torpor roosting habitat present.
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. The species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites, and have communal latrine sites; often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks.	2 – BioNet (2002) PMST BAMC	Low – no recent (last 10 years) records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.
Squirrel Glider	*Petaurus norfolcensis*	V	-	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	BAMC	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range (most of Victoria, south-western NSW and adjacent South Australia) it is a rare visitor in late summer and autumn. There are	12 – BioNet (2018)	Low – no suitable foraging habitat present in the proposal boundary and no suitable breeding or winter torpor roosting habitat present.

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				scattered records of this species across the New England Tablelands and North West Slopes. The species roosts in tree hollows and buildings. In treeless areas, they are known to utilise mammal burrows.		
REPTILES						
Broad-headed Snake	*Hoplocephalus bungaroides*	E	V	Largely confined to the Hawkesbury, Narrabeen and Shoalhaven sandstone groups within the coast and ranges in an area within approximately 250 km of Sydney. The Broad-headed Snake shelters in crevices or hollows of large trees.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.
Rosenberg's Goanna	*Varanus rosenbergi*	V	-	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland, and associated with termite mounds.	1 – BioNet (2012)	Low – no habitat present in the proposal boundary.
INVERTEBRATES						
Cumberland Plain Land Snail	*Meridolum corneovirens*	E	-	The Cumberland Plain Land Snail lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. The species primarily inhabits the Critically Endangered Ecological Community (CEEC) Cumberland Plain Woodland, which is characterised by grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest; all of which are also listed Threatened Ecological Communities (TECs).	18 – BioNet (2018) BAMC	Low – no habitat present in the proposal boundary.

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
Dural Land Snail	*Pommerhelix duralensis*	E	E	The Dural Land Snail is a shale-influenced-habitat specialist, which occurs on shale-sandstone transitional landscapes in the Cumberland IBRA subregion. Currently, there is a degree of uncertainty about the distribution and identity of the snails in this and related species. The species is found, with certainty, within the Local Government Areas (LGAs) of The Hills Shire, Hawkesbury Shire and Hornsby Shire. Records from the Blue Mountains, Penrith and Parramatta Cities may represent this species. The Dural Land Snail has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forest habitats that have a good native cover and contain woody debris. It favours sheltering under rocks or inside curled-up bark and has been observed resting in exposed areas such as on rocks or leaf litter. It is also known to shelter beneath leaves, rocks and light woody debris.	PMST BAMC	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.
FISH						
Black Rockcod	*Epinephelus daemelii*	V	-	The Black Rockcod has been recorded from the temperate and subtropical waters of the southwestern Pacific: Australia, Norfolk Island, Kermadec Islands and New Zealand (North Island and Poor Knights Island). The Australian range extends from southern Queensland to Kangaroo Island off South Australia. NSW is the centre of the species distributional range.	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.
Macquarie Perch	*Macquaria australasica*	V	-	Macquarie Perch have declined considerably from their historical distribution within NSW and they are now considered isolated to the upper reaches of the Lachlan and Murrumbidgee Rivers in southern NSW (Ingram et al. 1990). It is also found in low numbers in the Mongarlowe River, where the population is considered likely to be the result of a translocation from the Murray-Darling Basin (Lintermans 2008). Other populations exist in Cataract Dam in the Nepean River	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.

Common name	*Scientific name*	BC Act status	EPBC Act status	Habitat requirements	Source	Likelihood of Occurrence
				catchment, as well as a 2008 record from Georges River near Campbelltown, the first record from the river since 1894 (NSW DPI 2008a). It persists in the Burrinjuck, Cotter (Murrumbidgee) and Wyangala impoundments (McDowall 1996). A breeding population in the Queanbeyan River upstream of the Googong Reservoir exists solely due to a translocation of individuals from the reservoir past a natural barrier (Lintermans 2006). The Googong reservoir population is believed to be effectively extinct. Macquarie perch may occasionally become displaced downstream from the Queanbeyan River into Googong, but they do not form a population in the reservoir (Lintermans pers comm 2009).		
INSECTS						
Golden Sun Moth	*Synemon plana*	-	CE	Until 1997, very few targeted surveys for the Golden Sun Moth had been undertaken in NSW. Targeted surveys have since been undertaken during the flying seasons of 1997 (Clarke & Dear 1998); 1998 (Clarke & O'Dwyer 1999); 1999 (Clarke 2000 cited in DEC 2007); and 2000 (Clarke 2001 cited in DEC 2007). The majority of survey work has been conducted on public land and there is potential for additional populations to occur on private lands. Surveys for the species have been undertaken as a result of planning for development proposals, particularly residential and rural residential subdivisions to the south of Queanbeyan (DEC 2007). In NSW, further targeted surveys in the Southern Tablelands and South West Slopes regions, and even further west into the Riverina region, as identified by the Draft NSW and National Recovery Plan (DEC 2007), are likely to locate further populations (DEC 2007).	PMST	Low – no records of the species within 10 kilometres of the site and no habitat present in the proposal boundary.

APPENDIX E FLORA LIKELIHOOD OF OCCURRENCE WITHIN THE PROPOSAL BOUNDARY

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
Anthericaceae	*Caesia parviflora* var. *minor*	Small Pale Grass-lily	E	-	Distributed through the Hawkesbury-Nepean, Murrumbidgee and Northern Rivers as well as the Sydney Metro region. An outlying population occurs in NSW, in Barcoongere State Forest, between Grafton and Coffs Harbour. Found in damp places in open forest on sandstone. Vegetation types include: Dry Sclerophyll Forests, Freshwater wetlands, Grassy woodlands and Heathlands.	1-BioNet (2001)	Low – no habitat present in the proposal boundary.
Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E	E	This species is restricted to eastern NSW from Brunswick Heads to Gerroa. It occurs mainly at the ecotone between dry subtropical rainforest and sclerophyll forest/woodland communities.	PMST	Low – no habitat present in the proposal boundary.
Apocynaceae	*Marsdenia viridiflora* subsp. *viridiflora* (endangered population)	Native Pear	EP	-	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Mary's. Previously known Razorback Range. Grows in vine thickets and open shale woodland.	337-BioNet (2014) BAMC	Low – no habitat present in the proposal boundary.
Campanulaceae	*Wahlenbergia multicaulis* (endangered population)	Tadgell's Bluebell	EP	-	Populations occur in 13 known sites, two in northern Sydney and the remainder in western Sydney. Generally found in disturbed sites in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites and flowers throughout the year.	87-BioNet (2018) BAMC	Low – no habitat present in the proposal boundary.
Casuarinaceae	*Allocasuarina diminuta* subsp. *mimica* (endangered population)	-	EP	-	Occurs in a range of heath and woodlands including open woodlands and along sandstone ridges. Populations occur in Royal National Park from the south of Sydney, to the east of Campbelltown and just south of Stanwell Tops.	1-BioNet (1987)	Low – no habitat present in the proposal boundary.
Casuarinaceae	*Allocasuarina glareicola*	-	E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier	PMST	Low – no records within the locality

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	BAMC	and no habitat present in the proposal boundary.
Convolvulaceae	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V	-	Found on the coast of NSW between Mimosa Rocks NP and Wamberal. The species grows in the margins of salt marshes and lakes, flowering from Spring to Summer.	113-BioNet (2019)	Low – no habitat present in the proposal boundary.
Dilleniaceae	*Hibbertia fumana*	-	-	CE	The only known extant population is in the Moorebank area. Generally found in areas of woodland with a more open understorey, in a long intergrade between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest at the Moorebank Site.	1-BioNet (2018) BAMC	Low – no habitat present in the proposal boundary.
Dilleniaceae	*Hibbertia puberula*	-	E	-	Widespread but not common. Populations extend from Wollemi NP to Morton NP and south to Nowra. Early records indicates populations in Hawkesbury River and South Coogee. Grows on sandy soil often associated with sandstone or on clay. Flowers October to December.	1-BioNet (2017)	Low – no habitat present in the proposal boundary.
Dilleniaceae	*Hibbertia sp. Bankstown*	-	CE	CE	This species is endemic to New South Wales and is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown LGA. Known only from Tertiary alluvial soil along Airport Creek on Bankstown Airport and not from areas where subsequent fill has been deposited in between (Gibson 2007a, b). The plant assemblage is attributable to "Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion".	216-BioNet (2019) PMST BAMC	Low – no habitat present in the proposal boundary.
Dilleniaceae	*Hibbertia stricta* subsp. *furcatula*	-	E	V	Occurs in two populations, one in the southern outskirts of Sydney (on either side of the Woronora River) and one near Nowra. Species	6-BioNet (2011)	Low – no habitat present in the

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					usually grows in gravelly loam or clay soil in heath under open woodland. Sydney population is in dry eucalypt forest and woodland.		proposal boundary.
Elaeocarpaceae	*Tetratheca glandulosa*		-	V	Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. There are approximately 150 populations of this plant ranging from Sampons Pass (Yengo NP) in the north to West Pymble (Lane Cove NP) in the south. The eastern limit is at Ingleside (Pittwater LGA) and the western limit is at East Kurrajong (Wollemi NP). From north to south the popuation ranges 65km and is associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes. The species occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Vegetation structure varies from heath and scrub to woodland/open woodland and open forest. Associated species include Corymbia gummifera, C. eximia, Eucalyptus haemastoma, E. punctata, E. racemosa, and/or E. sparsifolia.	1-Bionet (n.d.)	Low – no habitat present in the proposal boundary.
Elaeocarpaceae	*Tetratheca juncea*	Black-eyed Susan	V	V	Populations occur in the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion. Generally found in low open forest/woodland with a mixed shrub understorey and grassy groundcover but it has been recorded in heathland and moist forest. Most of the populations occur in low nutrient soils associated with the Awaba Soil Landscape. Prefers well-drained sites below 200m and with annual rainfall between 1000-1200mm. The preferred substrates are sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral.	11-Bionet (1913)	Low – no recent records and no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
Ericaceae	*Epacris purpurascens* var. *purpurascens*	-	V	-	Recorded between Gosford and Avon Dam (north to south) and Narrabeen to Silverdale (east to west). Can grow in a range of habitats, generally with strong shale soil.	29-BioNet (2017) BAMC	Low – no habitat present in the proposal boundary.
Ericaceae	*Leucopogon exolasius*	Woronora Beard-heath	V	V	The species has a small range and is found along the upper Georges River area and in Heathcote NP. The species occurs in woodland on sandstone.	2-BioNet (2014) PMST	Low – no habitat present in the proposal boundary.
Fabaceae (Faboideae)	*Dillwynia tenuifolia*	-	V	-	The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities outside the Cumberland Plain include the Bulga Mountains at Yengo in the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains. In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	1-BioNet (2005) BAMC	Low – no habitat present in the proposal boundary.
Fabaceae (Faboideae)	*Dillwynia tenuifolia* (endangered population)	-	EP	-	The endangered population occurs in the area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local Government Area. The population occurs on a small outlier of the Berkshire Park Soil Landscape. The site supports a transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland. Portions of the site contain a form of Shale Gravel Transition Forest.	BAMC	Low – the study area is not within Kemps Creek.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
Fabaceae (Faboideae)	*Pultenaea parviflora*	-	E	V	Endemic to the Cumberland Plain, mainly distributed from Windsor to Penrith and east to Dean Park with outlier populations from Kemps Creek and Wilberforce. Can be locally abundant in scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. The species could be common in transitional areas where the communities join Castlereagh Scribbly Gum Woodland.	2-BioNet (1999) BAMC	Low – no habitat present in the proposal boundary.
Fabaceae (Faboideae)	*Pultenaea pedunculata*	Matted Bush-pea	E	-	In NSW, populations occur on the Cumberland Plain, and on the coast between Tathra and Bermagui and Windellama. The species generally occurs among woodland vegetation, but plants have been found on road batters and coastal cliffs. Associated species in the Sydney area include *Eucalyptus moluccana*, *E. fibrosa*, *E. crebra*, *E. longifolia* and *Melaleuca decora*.	11-BioNet (2017) BAMC	Low – no habitat present in the proposal boundary.
Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E	V	The species is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Found in heath or dry sclerophyll forest on sandy soils, often in slightly disturbed areas, in association with Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	4-BioNet (1913) PMST BAMC	Low – no habitat present in the proposal boundary.
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs in on alluviums, shales and between shales and sandstones in open woodland and forest. Occurs in a variety of plant communities including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	4832-BioNet (2018) PMST BAMC	Low – no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
Fabaceae (Mimosoideae)	*Acacia prominens* (endangered population)	Gosford Wattle	EP	-	Grows in open areas on clay and sandy soils, flowers July to September. Populations visible at railway line at Penshurst and known to occur from Blacktown to Stanwell Tops, inclusive with Campbelltown.	14-BioNet (2008) BAMC	Low – study area is not situated within the LGAs for this population.
Fabaceae (Mimosoideae)	*Acacia terminalis subsp. terminalis*	Sunshine Wattle	E	E	Generally sparse and scattered due to urban development, grows in dry sclerophyll woodland on sandy soils. Distributed through coastal environments from Sydney Harbour to Botany Bay and Eastern Suburbs.	2-Bionet (2018)	Low – no habitat present in the proposal boundary.
Gyrostemonaceae	*Gyrostemon thesioides*	-	E	-	Recorded in three sites near the Colo, Georges and Nepean Rivers. The most recent record is of a single individual near the Colo River, but it has not been recorded from the Nepean and Georges Rivers for 90 and 30 years respectively. The species grows on hillsides and riverbanks and is likely to be restricted to fine sandy soils.	BAMC	Low – no records in the locality and no habitat present in the proposal boundary.
Myrtaceae	*Callistemon linearifolius*	Netted Bottle Brush	V	-	Recorded from the Georges River to Hawkesbury River and north to Nelson Bay. Currently only 5-6 populations in the Sydney area, likely limited to the Hornsby Plateau. Three of the remaining populations are in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. Grows in dry sclerophyll forest on the coast and adjacent ranges.	36-BioNet (2014) BAMC	Low – no habitat present in the proposal boundary.
Myrtaceae	*Darwinia biflora*		V	V	Populations in Ku-ring-gai, Hornsby, Baulham Hills and Ryde. Grows on edges of weathered shale-capped ridges, on Hawkesbury Sandstone in woodland, open forest or scrub-heath. Associated overstorey species include Eucalyptus haemastoma, Corymbia gummifera and/or E. squamosa.	PMST	Low – no habitat present in the proposal boundary.
Myrtaceae	*Eucalyptus camfieldii*	Camfield's Stringybark	V	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. Poor coastal country in	PMST	Low – no habitat present in the

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges.		proposal boundary.
Myrtaceae	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. It is found largely on private property and roadsides, and occasionally in conservation reserves. Often planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges, on granite or metasedimentary rock.	4-BioNet (2009)	Low – outside the species native range and no habitat present in the proposal boundary.
Myrtaceae	*Eucalyptus scoparia*	Wallangarra White Gum	E	V	In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. In Queensland it is equally rare, occurring at three sites on the Stanthorp Plateau including one population in Girrawween National Park. Only one Queensland population has more than a dozen trees. Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes.	1-BioNet (2002)	Low – outside the species native range and no habitat present in the proposal boundary.
Myrtaceae	*Melaleuca biconvexa*	Biconvex Paperbark	V	V	Only found in NSW with scattered and dispersed populations in the Jervis Bay area in the south and Gosford-Wyong area in the north. Generally grows in damp places, often near streams or low-lying areas on alluvial soils low slopes or sheltered aspects.	PMST	Low – no habitat present in the proposal boundary.
Myrtaceae	*Melaleuca deanei*	Deane's Paperbark	V	V	Species occurs in two distinct areas, Ku-ring-gai/Berowra and Holsworthy/Wedderburn. There are also isolated occurrences in Springwood, Wollemi National Park, Yalwal and Central Coast (Hawkesbury River areas). Occurs mostly in ridgetop woodland, with only 5% of sites in heath and sandstone.	3-BioNet (1912) PMST	Low – no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
Myrtaceae	*Micromyrtus minutiflora*	-	E	V	Restricted to the general area between Richmond and Penrith, western Sydney. Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	BAMC	Low – no records in the locality and no habitat present in the proposal boundary.
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	CE	-	Occurs in coastal districts north from Batemans Bay in New South Wales, to areas inland of Bundaberg in Queensland. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	6-BioNet (2007)	Low – no suitable habitat present.
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E	V	Found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. South coast populations occur on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast, populations occur on gravels, sands, silts and clays in rainforest communities.	12-BioNet (2019) PMST	Low – no habitat present in the proposal boundary.
Orchidaceae	*Caladenia tessellata*	Thick-lipped Spider-orchid	E	V	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	PMST BAMC	Low – no habitat present in the proposal boundary.
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V	V	Can occur along almost the entire NSW eastern coast with recent records between Batemans Bay and Nowra. It is found in a range of communities, including swamp-heath and woodland. Larger populations often occur in woodlands dominated by *Eucalyptus sclerophylla*, *E. sieberi*, *Corymbia*	PMST	Low – no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					gummifera and *Allocasuarina littoralis* with populations preferring open areas in the understorey of this type of community.		
Orchidaceae	*Genoplesium baueri*	Bauer's Midge Orchid	E	E	Species recorded between Ulladulla and Port Stevens with historic recordings in Sydney suburbs. Likely to be in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone.	PMST	Low – no habitat present in the proposal boundary.
Orchidaceae	*Pterostylis gibbosa*	Illawarra Greenhood	E	E	Known in Milbrodale, Albion Park, Yallah and the Shoalhaven region. Grows in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum, Woollybutt and White Feather Honey-Myrtle. In Nowra, it grows amongst Spotted Gum, Forest Red Gum and Grey Ironbark. In the Hunter, it grows amongst Narrow-Leaved Ironbark, Forest Red Gum and Black Cypress Pine.	PMST	Low – no habitat present in the proposal boundary.
Orchidaceae	*Pterostylis saxicola*	Sydney Plains Greenhood	E	E	Restricted to western Sydney between Freemans Reach to Picton. There are very few populations, and all are very small and isolated. The species is most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	PMST	Low – no habitat present in the proposal boundary.
Orchidaceae	*Thelymitra kangaloonica*	-	CE	CE	Endemic to NSW and is only known to occur on the southern tablelands of NSW in the Moss Vale/Kangaloon/Fitzroy Falls area at 550-700 m above sea level. The swamp habitat in which the species occurs has an extent of occurrence of 300 km^2 and an area of occupancy of 10 km^2. The	PMST	Low – no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					species grows amongst tall sedges and rushes in seasonally swampy sedgeland on grey silty clay loam at 600-700 m above sea level.		
Poaceae	*Deyeuxia appressa*	-	E	E	Has not been collected since 1942, near Bankstown and Killara, but could be extinct now. Flowers Spring to Summer and grows in moist conditions.	2-BioNet (1930) PMST	Low – no habitat present in the proposal boundary.
Polygonaceae	*Persicaria elatior*	Tall Knotweed	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	PMST	Low – no habitat present in the proposal boundary.
Proteaceae	*Grevillea beadleana*	Beadle's Grevillea	E	E	Known from four separate areas, all in north-east NSW: the Torrington area west of Tenterfield, Oxley Wild Rivers National Park, Guy Fawkes River National Park and at Shannon Creek south-west of Grafton. Historical records suggest it was also once found near Walcha.	1-BioNet (2002)	Low – no habitat present in the proposal boundary.
Proteaceae	*Grevillea juniperina subsp. juniperina*	Juniper-leaved Grevillea	V	-	Native to Western Sydney, bounded by Blacktown, Erskine Park, Londonderry and Windsor. Outlier populations occur in Kemps Creek and Pitt Town. The species grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium containing lateritic gravels. Associated with canopy species within Cumberland Plain Woodland and Shale/Gravel Transition Forest including Forest Red Gum, Grey Box and Red Ironbark. Has also been recorded in Castlereagh	BAMC	Low – No records in the locality and no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					Ironbark and Castlereagh Scribbly Gum Woodland.		
Proteaceae	*Grevillea parviflora* subsp. *parviflora*	Small-flowered Grevillea	V	V	Sporadically distributed through Sydney Basin with larger populations around Picton, Appin, Bargo and the Cessnock-Kurri Kurri area of the Hunter. The species grows in sandy or light clay soils over thin shales, with lateritic ironstone gravels and nodules. Occurs in heath and shrubby woodland or open forest and often in open, slightly disturbed sites such as along tracks.	115-BioNet (2018) PMST BAMC	Low – no habitat present in the proposal boundary.
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E	E	The species has a scattered distribution around Sydney, from Singleton to Bargo and west towards the Blue Mountains. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	4-BioNet (1988) PMST	Low – no habitat present in the proposal boundary.
Proteaceae	*Persoonia nutans*	Nodding Geebung	E	E	Restricted to the Cumberland Plain in western Sydney between Richmond and Macquarie Fields. Northern populations grow on aeolian and alluvial sediments in sclerophyll forest and woodland vegetation. Southern populations grow on tertiary alluvium and shale sandstone transition communities.	31-BioNet (2016) PMST BAMC	Low – no habitat present in the proposal boundary.
Rhamnaceae	*Pomaderris prunifolia* (endangered population)	Plum-leaf Pomaderris	EP	-	Known from only three sites within Rydalmere, Rookwood (Cemetery) and Bankstown (The Crest) LGA's. At Rydalmere it occurs along a road reserve near a creek, among grass species and sandstone. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River/Castlereagh Ironbark Forest on shale soils.	23-BioNet (2017) BAMC	Low – no habitat present in the proposal boundary.
Santalaceae	*Thesium australe*	Austral Toadflax	V	V	Found in small populations scattered across eastern NSW, the coast, and the Northern and Southern Tablelands. Populations occur in grassland on coastal headlands or grassland and grassy woodland away from the coast. The	PMST	Low – no habitat present in the proposal boundary.

Family	*Scientific Name*	Common Name	BC Act status	EPBC Act status	Habitat Requirements	Source	Likelihood of Occurrence
					species is often found in association with Kangaroo Grass (*Themeda australis*).		
Thymelaeaceae	*Pimelea curviflora var. curviflora*	-	V	V	Confined to the coastal area of the Sydney and Illawarra regions and between Sydney and Maroota in the north-west. A new population has been discovered at Croom Reserve near Albion Park in August 2011. Grows on shaley/lateric soils over sandstone and shale/sandstone transition soils. Occurs on ridgetops and upper slopes amongst woodlands.	1-Bionet (1907) PMST	Low – no habitat present in the proposal boundary.
Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E	E	Occurs in two populations; the Cumberland Plain (Marayong, Prospect Reservoir, Narellan and Douglas Park) and the Illawarra (Landsdowne, Shellharbour and Kiama). The species is found on well-structured clay soils. The Cumberland population is associated with canopy species *Eucalyptus moluccana*, *E. tereticornis* and *E. crebra*. Other co-occurring species include *Bursaria spinosa* and *Themeda australis*. In the Illawarra population, it is associated with coastal woodland and coastal grassland species.	322-BioNet (2015)	Low – no habitat present in the proposal boundary.
Zannichelliaceae	*Zannichellia palustris*		-	E	Submerged aquatic plant known from the lower Hunter and in Sydney Olympic Park. Grows in fresh or slightly saline stationary or slowly flowing water. Flowers during warmer months.	5-Bionet (2017)	Low – no habitat present in the proposal boundary.

APPENDIX F BAMC REPORT

BAM Candidate Species Report

Proposal Details

Assessment Id 00019165/BAAS17030/20/00019167	Proposal Name Chullora MRF	BAM data last updated * 26/11/2019
Assessor Name	Report Created 12/02/2020	BAM Data version * 22
Assessor Number	Assessment Type Major Projects	BAM Case Status Open
	Assessment Revision 0	Date Finalised To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia bynoeana Bynoe's Wattle		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Acacia pubescens Downy Wattle		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Allocasuarina glareicola Allocasuarina glareicola		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Caladenia tessellata Thick Lip Spider Orchid		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Callistemon linearifolius Netted Bottle Brush		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Dillwynia tenuifolia Dillwynia tenuifolia		Jan Feb Mar Apr May Jun Jul **Aug** **Sep** **Oct** Nov Dec
Epacris purpurascens var. purpurascens Epacris purpurascens var. purpurascens		Jan Feb Mar Apr May Jun Jul Aug **Sep** **Oct** Nov Dec
Grevillea juniperina subsp. juniperina Juniper-leaved Grevillea		**Jan** **Feb** **Mar** **Apr** **May** **Jun** **Jul** **Aug** **Sep** **Oct** **Nov** **Dec**
Grevillea parviflora subsp. parviflora Small-flower Grevillea		Jan Feb Mar Apr May Jun Jul **Aug** **Sep** **Oct** **Nov** Dec
Gyrostemon thesioides Gyrostemon thesioides		**Jan** **Feb** **Mar** **Apr** **May** **Jun** **Jul** **Aug** **Sep** **Oct** **Nov** **Dec**
Pommerhelix duralensis Dural Land Snail		**Jan** **Feb** **Mar** **Apr** **May** **Jun** **Jul** **Aug** **Sep** **Oct** **Nov** **Dec**
Haliaeetus leucogaster White-bellied Sea-Eagle		Jan Feb Mar Apr May Jun **Jul** **Aug** **Sep** **Oct** **Nov** **Dec**
Hibbertia fumana Hibbertia fumana		Jan Feb Mar Apr May Jun Jul Aug Sep **Oct** **Nov** **Dec**
Acacia prominens - endangered population Gosford Wattle, Hurstville and Kogarah Local Government Areas		**Jan** **Feb** **Mar** **Apr** **May** **Jun** **Jul** **Aug** **Sep** **Oct** **Nov** **Dec**
Dillwynia tenuifolia - endangered population Dillwynia tenuifolia, Kemps Creek		Jan Feb Mar Apr May Jun Jul **Aug** **Sep** **Oct** Nov Dec

Marsdenia viridiflora subsp. viridiflora - endangered population Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pomaderris prunifolia - endangered population P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Wahlenbergia multicaulis - endangered population Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Lathamus discolor Swift Parrot		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Litoria aurea Green and Golden Bell Frog		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Meridolum corneovirens Cumberland Plain Land Snail		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Micromyrtus minutiflora Micromyrtus minutiflora		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Miniopterus australis Little Bent-winged Bat		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Miniopterus orianae oceanensis Large Bent-winged Bat		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Myotis macropus Southern Myotis		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Persoonia nutans Nodding Geebung		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Petaurus norfolcensis Squirrel Glider		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascolarctos cinereus Koala		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pteropus poliocephalus Grey-headed Flying-fox		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pultenaea parviflora Pultenaea parviflora		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pultenaea pedunculata Matted Bush-pea		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Anthochaera phrygia Regent Honeyeater		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hibbertia sp. Bankstown Hibbertia sp. Bankstown		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00019165/BAAS17030/20/00019167	Chullora MRF	26/11/2019
Assessor Name	Report Created	BAM Data version *
	12/02/2020	22
Assessor Number	Assessment Type	BAM Case Status
	Major Projects	Open
	Assessment Revision	Date Finalised
	0	To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Diamond Firetail	Stagonopleura guttata	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Flame Robin	Petroica phoenicea	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion

Koala	Phascolarctos cinereus	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Little Bent-winged Bat	Miniopterus australis	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Little Lorikeet	Glossopsitta pusilla	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Regent Honeyeater	Anthochaera phrygia	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Scarlet Robin	Petroica boodang	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Speckled Warbler	Chthonicola sagittata	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Swift Parrot	Lathamus discolor	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	725-Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion

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