

A stylized topographic map with green contour lines is positioned on the left side of the page, extending from the top to the bottom. The lines represent elevation, with some forming closed loops.

Breen Resource Management Facility Biodiversity Development Assessment Report

Breen Resources Pty Ltd

DOCUMENT TRACKING

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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Breen Resources Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) for the Proposal in the Sutherland Shire local government area (LGA). The proposed development is being assessed as State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) (SSD-10412).

This report has followed the Biodiversity Assessment Method 2017 (BAM) established pursuant to section 6.7 of the *Biodiversity Conservation Act 2016* (NSW) (BC Act). This BDAR outlines the measures taken to avoid, minimise and mitigate impacts on the vegetation and species habitat present within the development site and measures to minimise impacts during construction and operation of the development. Following consideration of the above aspects, the residual unavoidable impacts of the project were calculated in accordance with the BAM by utilising the Biodiversity Assessment Method Credit Calculator (BAMC). The report gives the number of biodiversity credits that would need to be retired to offset the residual loss of biodiversity if the development proceeds as described.

Requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), applicable State Environmental Planning Policies have also been addressed in this report.

The proposed development site is approximately 68.34 ha in size. This is defined by land title boundaries of Lots 1122 and 1123 DP794114 (Lot 1122 and Lot 1123) and Lots 5 and 6 DP1158627 (Lot 5 and Lot 6) located at 330 Captain Cook Drive, Kurnell.

The majority of vegetation within the development site is to be removed to meet previous EP&A Act consents and *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) licence requirements for capping and landfill (Licence no. 4608). The majority of the development site consists of cleared land or exotic vegetation cover, however native vegetation is present within the development site and includes PCT 661: *Bangalay - Smooth-barked Apple - Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion* (Coastal Sand Littoral Forest) and PCT 772: *Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion* (Coastal foredune wattle scrub). PCT 661 forms part of Kurnell Dune Forest in the Sutherland Shire and City of Rockdale, a threatened ecological community listed as endangered under the BC Act.

No ecosystem credits are required for the removal of vegetation within the development site for the following reasons:

- Removal of vegetation and capping of the majority of the site is required in accordance with Consent Condition 6 of Development Application 269/90, the existing Environmental Protection License (EPL) 4608 and subsequent Licence Variation No. 1120519.
- The vegetation integrity score for PCT 661 was below the minimum threshold (15) above which an offset is required where the PCT is representative of an endangered ecological community.
- The vegetation integrity score for PCT 772 was below the minimum threshold (20) above which an offset is required where the PCT is not representative of a threatened ecological community.

Due to existing NSW BioNet Atlas records for *Litoria aurea* (Green and Golden Bell Frog) and presence of potential habitat within the development site, this species credit species was assumed to be present.

A total of eleven species credits will be required for the removal of threatened species habitat within the development site, as outlined in the table below.

Scientific name	Common name	Species presence	Direct impact (ha)	Credit required
<i>Litoria aurea</i>	Green and Golden Bell Frog	Presence assumed	7.53	11

The development does not have impacts on any candidate Serious and Irreversible Impacts (SAII) entities.

The following Matters of National Environmental Significance (MNES), listed under the EPBC Act were identified as having the potential to be adversely affected by the proposed works:

- *Litoria aurea* (Green and Golden Bell Frog), listed as vulnerable
- *Pteropus poliocephalus* (Grey-headed Flying-fox), listed as vulnerable.

The significant impact criteria were applied with respect to these MNES and it was determined that a significant impact is unlikely to occur as a result of the proposed development.

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Abbreviations

Abbreviation	Description
BAAS	Biodiversity Accredited Assessor System
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and Environment
DCP	Development Control Plan
DECC	Department of Environment & Climate Change
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
EES	Environment, Energy and Science Group
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPA	NSW Environment Protection Authority
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environmental Protection Licence
FM Act	NSW <i>Fisheries Management Act 1994</i>
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environment Plan
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
OEH	NSW Office of Environment & Heritage (now Department of Planning, Industry and Environment)
PCT	Plant Community Type
SEARs	Planning Secretary's Environmental Assessment Requirements. In this case SSD-10412 dated 14 February 2020.
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
VPA	Voluntary Planning Agreement
WM Act	NSW <i>Water Management Act 2000</i>

1. Introduction

This BDAR has been prepared to meet the requirements of the BAM 2016 established under Section 6.7 of the *Biodiversity Conservation Act 2016* NSW (BC Act) and the Planning Secretary's Environmental Assessment Requirements (SEARs) pertaining to biodiversity for SSD-10412, issued 14 February 2020. This report has been prepared by Carolina Mora, Alex Gorey and Nicole McVicar (BAAS 18077) who is an Accredited Person under the BC Act. Definitions of terminology used throughout this report are presented in Appendix A.

1.1 General Description of the Development Site

The development site is located at 330 Captain Cook Drive, Kurnell and is within the Sutherland Shire local government area (LGA). It comprises the following lots:

- Lot 1122 DP794114 (**Lot 1122**)
- Lot 1123 DP79411 (**Lot 1123**);
- Lot 5 DP1158627 (**Lot 5**);
- Lot 6 DP1158627 (**Lot 6**).

The development site is bound by Captain Cook Drive to the north, Cronulla State Park to the south, Cronulla Wastewater Treatment Plant to the west and cleared land to the east. The development site is presently an active waste management and disposal centre, comprised predominantly of cleared land and exotic vegetation. However, there are scattered areas of regenerating vegetation comprised of opportunistic native species. Numerous dams are present within the development site as well as to its north and south. Ramsar wetlands are present to the north of the development site boundary.

This report includes two base maps, the Site Map (Figure 1) and the Location Map (Figure 2).

1.2 Project Description

The existing recycling infrastructure is located on land that will become the Embellished Marang Parklands. To deliver the Embellished Marang Parklands on Lots 1122 and 1123 and Lot 6, this existing infrastructure needs to be demolished and/or relocated.

Breen is therefore proposing to construct and operate a new integrated resource management facility to consolidate all functional recycling activities within the eastern part of the development site. This will allow Breen to deliver the recreational space and other publicly accessible parklands in the western part of the development site to the community. It will also provide improved recycling capability in line with NSW Government priorities and targets to increase resource recovery from the C&D and C&I sectors.

The Proposal is comprised of the delivery of the Embellished Marang Parklands, the continuation of landfilling on the residual parts of Lot 5 and the construction of the New Resource Recovery Facility.

Specifically, the Proposal involves the following key integrated components:

- Construction and operation of a resource management facility, comprising:

- A New Resource Recovery Facility on the eastern part of the development site (Lot 5), including consolidation of existing waste management activities within this part of the development site; and
- A waste disposal facility, being the continuation of current land restoration, landfilling and contouring operations at the development site by permanent application of some of the residual waste materials from the New Resource Recovery Facility to land on Lot 5;
- Use of suitable material processed by the New Resource Recovery Facility to cap, contour and re-profile areas of the development site and to construct the Embellished Marang Parklands on Lots 1122, 1123 and Lot 6;
- Re-profiling of parts of the Proposal Site within Lots 1122, 1123 and 6, with some existing waste materials from those lots;
- Delivery of an activated and integrated community space in the form of the Embellished Marang Parklands on Lots 1122, 1123 and Lot 6, to provide a superior parkland to that proposed under the Volunteer Planning Agreement (VPA) as detailed in Section 4.4.3 of this Environment Impact Statement. This will include, among other things, integrated water usage and management and utilising personnel, plant, material and infrastructure across the whole of the site.

To enable the above Proposal, the Existing Breen Resources Facility on Lots 1122, 1123 and 6 (this includes those parts of Lots 1122, 1123 and 6 that will comprise the Playing Fields) will be demolished and/or relocated (as required) to Lot 5.

The proposed Embellished Marang Parklands include the following improvements and benefits to the community over and above those contemplated by the 2010 VPA:

- A cleared 'Village Green' area in the middle of the parklands with amphitheatre, providing a place for the community to hold events and celebrations in a semi natural setting; and
- Associated picnic areas for all members of the local and wider community to use and enjoy; and
- A playground; and
- A network of accessible paths, including key pedestrian and cycle links between Quibray Bay and Cronulla Beach, to allow visitors to easily access the parklands for pedestrians and cycling, reinforcing the Sydney Green Grid; and
- An elevated landscape, including a panoramic look out in the western part of the parklands, that offers spectacular all-round regional views that will assist in a better understanding of the varied landscapes of this part of Sydney.

The construction and operational footprints for the proposed works are contained wholly within the development site and are presented in Figure 3.

1.3 Previous Approvals and Licenses

1.3.1 Development Application 269/90

In 1990, Breen was granted development consent (development application (DA) 269/90) by Sutherland Shire Council for the establishment of a depot for receipt of excavated materials and selected demolition

materials and land restoration on Lots 1122, 1123 and 1124 DP 794114. The 'depot' and land restoration activities together comprise the Breen Resources Facility, which has been continuously operating by Breen and remains fully operational. Prior to the current use, the site was subject of extensive sand mining by Breen.

In accordance with Condition Number 6 of DA/269/90, the approved development was required to 'be registered with the Waste Management Authority of New South Wales (now the NSW Environment Protection Authority (EPA)) prior to commencement of operations and comply with the requirements of that Authority'.

1.3.2 Environmental Protection Licence 4608 and Licence Variation No. 1120519

In 1990, Breen was granted development consent (development application (DA) 269/90) by Sutherland Shire Council for the establishment of a depot for receipt of excavated materials and selected demolition materials and land restoration on Lots 1122, 1123 and 1124 DP 794114. The 'depot' and land restoration activities together comprise the Breen Resources Facility, which has been continuously operating by Breen and remains fully operational. Prior to the current use, the site was subject of extensive sand mining by Breen.

In accordance with Condition Number 6 of DA/269/90, the approved development was required to 'be registered with the Waste Management Authority of New South Wales (now the NSW Environment Protection Authority (EPA)) prior to commencement of operations and comply with the requirements of that Authority'.

"The purpose of this condition is for final capping to be installed progressively to reduce leachate generation from the completed landfill cell. The licensee must prepare and submit to the [Environment Protection Authority (EPA)] a report outlining the design of the proposed final cap, taking into account the environmental goals of Appendix A Benchmark Techniques Number 28 of the Environmental Guidelines: Solid Waste Landfills 1996. The report must include the specifications for each layer in the cap, a quality assurance program to demonstrate that the cap can be installed in accordance with its design specifications, and details on the vegetation cover and root depth. The report must propose a progressive capping timetable, whereby final capping of the cells is completed as soon as practicable after the filling in the cell has been completed."

In 1990, Breen was granted development consent (development application (DA) 269/90) by Sutherland Shire Council for the establishment of a depot for receipt of excavated materials and selected demolition materials and land restoration on Lots 1122, 1123 and 1124 DP 794114. The 'depot' and land restoration activities together comprise the Breen Resources Facility, which has been continuously operating by Breen and remains fully operational. Prior to the current use, the site was subject of extensive sand mining by Breen.

In accordance with Condition Number 6 of DA/269/90, the approved development was required to 'be registered with the Waste Management Authority of New South Wales (now the NSW Environment Protection Authority (EPA)) prior to commencement of operations and comply with the requirements of that Authority'.

1.3.3 Development Application 11/0665

In 2011, Breen was granted development consent (DA 11/0665) by Sutherland Shire Council for the staged development of 10 sporting fields, a skate park and associated parking, lighting and amenities building and stormwater treatment facilities on Lot 111 DP 777967, Lot 1123 DP 794114, Lot 1 and Lot 2 DP 1101922 and Lot 1059 DP 1140838. As part of this DA a Flora and Fauna Assessment was undertaken, which assessed all biodiversity impacts to the site area, and which required habitat for the *Litoria aurea* (Green and Golden Bell Frog) to be constructed at the site. This habitat has been constructed in accordance with DA 11/0665 and remains in-place at the site.

As part of this DA a Flora and Fauna Assessment was undertaken, which assessed all biodiversity impacts to the area subject to the Masterplan (Whelans InSites 2011). In relation to the likelihood of the Green and Golden Bell Frog to inhabit the development site, the Flora and Fauna Assessment concluded the following:

'The only amphibians likely to be present, on occasions, are ubiquitous and hardy species such as the Common Eastern Froglet and the Striped Marsh Frog. These species may be present under appropriate conditions but were not observed during recent investigations of the subject site. The Green and Golden Bell Frog is known to occur on the Australand land to the southwest, as well as on the Cronulla STP site. It has also been recorded historically on that land and on land to the east. However, the subject site per se does not contain and particularly relevant habitat for this or other amphibian species, other than possible the excavated swale in the south western corner of Stage 1B and the small ponds in Stage 3'.

Condition 22 of DA11/0665 required the preparation of a Green and Golden Bell Frog Management Plan as well as the construction of a Green and Golden Bell Frog habitat pond east of the existing playing field, outside of the development site (mapped as Green and Golden Bell Frog Habitat in Figure 12). Condition 83 of DA11/0665 also required continuous monitoring of the Green and Golden Bell Frog habitat pond for a period of two years. It is noted that no individuals were recorded.

It should also be noted that the area within the development site proposed for Playing Fields is already subject to DA11/0665, which has already approved vegetation and threatened species habitat removal within this area.

Site Map

Breen Resource Recovery Facility BDAR

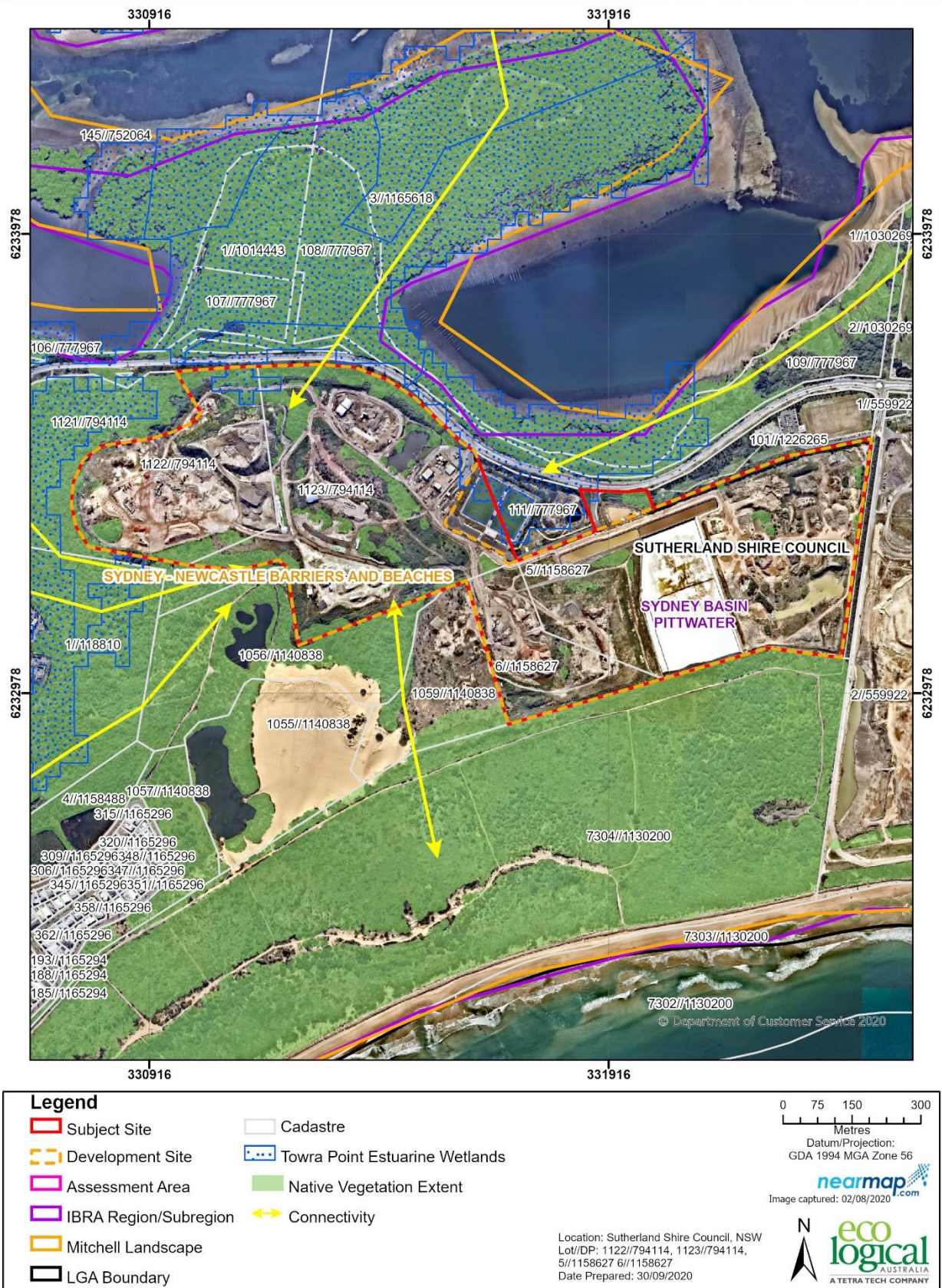


Figure 1: Site Map



Figure 2: Location Map

Operational and Construction Footprint Breen Resource Recovery Facility BDAR



Figure 3: Construction and operational footprint map

2. Legislative Context

Legislation relevant to the development site is outlined in Table 1.

Table 1: Legislative context

Name	Relevance to the project
Commonwealth	
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified as having the potential to be affected by the proposed works. This report assesses the potential impacts to MNES and concludes that the development is not likely to have a significant impact on MNES (Section 6.1). The development site is also located directly south of a Ramsar wetland, a MNES. However, the proposed development will not impact this wetland directly or indirectly, and therefore the Proposal will not have a significant impact on the MNES. (Figure 4).
State	
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. As the Proposal is being assessed as State Significant Development (SSD), the assessment framework for the Project is pursuant to Part 4, Division 4.7 of the EP&A Act. This BDAR addresses the Planning Secretary's Environmental Assessments Requirements (issued 14 February 2020) for key issues in relation to Biodiversity: <i>"an assessment of the biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR)."</i>
<i>Biodiversity Conservation Act 2016</i> (BC Act)	In accordance with section 7.9(2) of the BC Act, an application for approval under Part 4, Division 4.7 of the EP&A Act to carry out State Significant Development must be accompanied by a BDAR unless the Planning Agency Head and the Environmental Agency Head determine that the proposed development is not likely to have a significant impact on biodiversity values.
<i>Fisheries Management Act 1994</i> (FM Act)	Sections 201, 205 and 219 of the FM Act requires permits for dredging, harming marine vegetation or blocking fish passage. However, section 4.41 of the EP&A Act states that these approvals are not required for State Significant Development. The SEARs did not contain specific reference to fish habitat or its management. The development site does not contain Key Fish Habitat, as defined by the Department of Primary Industries (DPI) but it is located directly adjacent to it. Consideration of the proposed development's potential indirect impacts on nearby wetlands is provided in Section 6.2 of this BDAR.
<i>Water Management Act 2000</i> (WM Act)	In accordance with Part 4, Division 1.7, Section 4.41 (g) of the EP&A Act, a water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the WM Act is not required for SSD. Pursuant to section 4.41(g) of the EP&A Act, a water management work approval under section 90 or an activity approval (other than aquifer interference approval section 90 is not required for State Significant Development.
Environmental Planning Instruments	
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP)	The Vegetation SEPP regulates vegetation clearing in non-rural areas that is unconnected with other development. As this project requires consent under the EP&A Act, the Vegetation SEPP does not apply to the Project.

Name	Relevance to the project
State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP)	The development site includes land mapped as Littoral Rainforest Proximity Area, Coastal Wetland Proximity area, Coastal Use Area, and Coastal Environment Area under the Land Application Map of the Coastal Management SEPP. Further detail on how this SEPP relates to the development site is provided in Section 6.
SEPP (Koala Habitat Protection) 2019 (Koala SEPP)	The Koala SEPP does not apply to the Proposal.
State Environmental Planning Policy (Kurnell Peninsula) 1989 (NSW) (Kurnell SEPP)	The development site is zoned under the Kurnell SEPP as 7(b) Special Development. The objectives of Zone 7(b) are as follows: <i>To provide flexible planning controls which permit a broad range of land uses subject to compliance with environmental performance criteria</i> <i>To ensure that development is compatible with the unique ecological and landscape attributes of the Kurnell Peninsula, especially the wetland areas and their environs,</i> <i>To ensure that sand mining is controlled and to facilitate the progressive phasing out of sand mining and the rehabilitation of degraded lands,</i> <i>To promote the orderly and economic development of land within the zone subject to the provision of adequate water and sewerage services and the disposal, in an environmentally sensitive manner, of all wastes and stormwater from the land,</i> <i>To promote, enhance and utilise the development potential of the zone primarily for tourism, recreation or industrial parks, where this is consistent with the conservation of the unique, ecological and landscape attributes of the Kurnell Peninsula, and</i> <i>To promote the sharing of the responsibility for environmental planning by creating a broad framework of controls and requiring the Council to adopt development control codes or design and management guidelines applying to development in the zone.</i>



Figure 4: Location of Ramsar wetlands in relation to development site



Figure 5: SEPP (Coastal Management) 2018 map areas in relation to development site

3. Methodology

3.1 Literature and Data Reviews

The following literature and data sources were reviewed prior to undertaking the field survey:

- Biodiversity Assessment Method Calculator Version: 30
- NSW Government BioNet Vegetation Classification
- NSW BioNet / Atlas of NSW Wildlife 5 km database search (accessed 18 June 2020)
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool 5 km database search (accessed 28 August 2020)
- The Native Vegetation of the Sydney Metropolitan Area v.3 (NSW Office of Environment & Heritage (OEH) 2016)
- NSW Government ePlanning Spatial Viewer
- Breen Resource Recovery Facility State Significant Development Scoping Report 10 December 2019 prepared by Ethos Urban
- Marang Parklands Embellishment Plan Landscape Master Plan prepared by Clouston Associates 12 October 2020
- Additional Geographic Information Systems (GIS) datasets including soil, topography, geology and drainage.

Prior to the commencement of field surveys, a list of credit species and MNES, either known or considered likely to occur, was compiled to guide the field survey methodology.

3.1.1 Use of Local Data

The use of local data is not proposed for this assessment.

3.1.2 Expert Reports

Expert reports were not used as part of this assessment.

3.2 Survey effort: Native Vegetation

A vegetation survey was undertaken within the development site by Alex Gorey and Carolina Mora on 14 and 17 August 2020. A total of four full-floristic vegetation plots were surveyed to identify Plant Community Types (PCTs) and threatened ecological communities (TECs) on the development site (Table 2). A total of four vegetation integrity survey plots were undertaken on the development site to assess the composition, structure and function components of each vegetation zone in accordance with the BAM (Table 2).

The survey also involved vegetation mapping of the entire development site.

All field data collected at full-floristic and vegetation integrity survey plots is included in Appendix B.

Table 2: Vegetation integrity plots

Veg Zone	PCT ID	PCT Scientific Name	Condition	Area (ha)	Plots required	Plots surveyed
1	661	Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern	Low	5.88	3	3

Veg Zone	PCT ID	PCT Scientific Name	Condition	Area (ha)	Plots required	Plots surveyed
		Sydney, Sydney Basin Bioregion				
2	772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	Low	1.65	1	1
Total				7.71	4	4
N/A	N/A	Cleared/Exotic Cover	N/A	60.63	0	0
Total				68.34		

3.3 Survey Effort: Threatened species habitat

3.3.1 Habitat Assessments

Habitat assessments were undertaken during field survey on 14 and 17 August 2020 to determine the likelihood of threatened species occurring across the entire development site on an intermittent or permanent basis.

Habitat assessments involved a search for suitable habitat for threatened flora species and opportunistic sightings. Habitat assessments also involved a search for important habitat features for fauna species such as hollow bearing trees, rocky outcrops or deep leaf litter. Assessments also included a search for evidence of fauna foraging or roosting such as chewed cones, sap trees and whitewash/pellets. Binoculars were used when required to inspect high branches in a tree's canopy.

3.3.2 Targeted Surveys

Based on habitat assessments, vegetation condition and BAM survey times, targeted surveys were not conducted as part of this assessment.

4. Results

4.1 Landscape features

Landscape features within the development site are described below and are shown above in Figure 1 and Figure 2.

4.1.1 Interim Biogeographic Regionalisation for Australia (IBRA) regions and subregions

The development site has an area of 68.34 ha and falls wholly within the Sydney Basin IBRA region and the Pittwater subregion (Figure 2). The assessment area, defined as the area within a 1,500 m buffer of the development site, also falls within the Sydney Basin IBRA region and Pittwater IBRA subregion.

4.1.2 Mitchell Landscapes

The development site and assessment area fall within the Sydney – Newcastle Barriers and Beaches Mitchell Landscapes (Department of Environment & Climate Change (DECC) 2002) as outlined in Table 3.

Table 3: Mitchell landscapes

Mitchell landscape	Description
Sydney – Newcastle Barriers and Beaches	Quaternary coastal sediments on long recurved quartz sand beaches between rocky headlands backed by sand dunes and intermittently closed and open lagoons. Includes areas of more extensive high dunes often located on top of the headlands. General elevation 0 to 30m, local relief 10m. Cliff top dunes may be found as high as 90m above sea level. Distinct zonation of vegetation and increasing soil development from the beach to the inland dunes. At the beach; <i>Spinifex hirsutus</i> (Hairy Spinifex), <i>Lomandra longifolia</i> (Spiny-headed Mat-rush), <i>Acacia longifolia</i> subsp. <i>sophorae</i> (Coastal Wattle) and <i>Leptospermum laevigatum</i> (Coast Teatree) colonise the frontal dune in which there is little soil development. <i>Banksia integrifolia</i> (Coast Banksia) and <i>Banksia serrata</i> (Old-man Banksia) are found on the second dunes and these merge with more complex forest containing blackbutt <i>Eucalyptus pilularis</i> (Blackbutt), <i>Corymbia gummifera</i> (Red Bloodwood), <i>Xanthorrhoea</i> spp. (Grass Trees) and numerous understorey shrubs on deep sands that have an organic rich A horizon, a bleached A2 horizon and the initial development of weak iron or organic pans in the sandy subsoil. Well-developed, deep podsol profiles are present in cliff top dunes with swampy swales indicating that these forms are probably older than the coastal dunes. Vegetation of <i>Banksia aemula</i> (Wallum Banksia) heathland and open scrub of <i>Banksia integrifolia</i> (Coast Banksia), <i>Westringia fruticosa</i> (Coastal Rosemary), <i>Leptospermum laevigatum</i> (Coast Teatree) and <i>Xanthorrhoea</i> spp. (Grass Trees), with dwarfed <i>Angophora costata</i> (Sydney Red Gum) and <i>Corymbia gummifera</i> (Red Bloodwood). Freshwater sedge swamps in larger areas of sand. In the lagoons, salinity varies depending on tidal flushing and they are often surrounded by <i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark) and <i>Casuarina glauca</i> (Swamp Oak). Water margins are occupied by <i>Juncus</i> spp. and <i>Phragmites australis</i> (Common Reed) in freshwater areas. <i>Avicennia marina</i> (Grey Mangrove) may occur in some tidal inlets.

4.1.3 Native vegetation extent and cover

The extent of native vegetation within the development site and assessment area is outlined in Table 4. There are no differences between the mapped vegetation extent and the aerial imagery.

The current percent native vegetation cover in the landscape was assessed in a Geographic Information System (GIS) using aerial imagery sourced from Nearmap using increments of 5%. The percent native vegetation cover within the assessment area (1431.66 ha) is 38.37% (549.31 ha) (Table 4).

Table 4: Native vegetation extent

Total area of land within the assessment area (ha)	Area of native vegetation within the assessment area (ha)	Area of native vegetation within the development site (ha)	Cover of native vegetation within the assessment area (%)
1431.66	549.31	7.71	38.37

4.1.4 Rivers and Streams

The development site does not contain any rivers or streams.

4.1.5 Wetlands

The development site contains dams created as part of the existing operations of the Breen Resource Management Facility. An artificial pond created as Green and Golden Bell Frog habitat as required by Condition 22 of DA11/0665, is present to the north of the development site boundary.

The development site is located directly south of the Towra Point Nature Reserve, a Nationally Important Wetland listed as Australian Ramsar site number 23 under the Ramsar Convention of Wetlands 1971 (Figure 4). As such, the Ramsar site is an MNES under the EPBC Act.

4.1.6 Connectivity Features

Vegetation within the development site consists almost entirely of exotic species with native vegetation limited to scattered areas of native regeneration. This limited native vegetation may provide stepping stone habitat within the broader context of the assessment area, linking remnant areas of native vegetation present on the Kurnell Peninsula (Figure 2).

The development contains artificial dams which may provide connectivity between Towra Point and Bate Bay (Figure 2).

4.1.7 Areas of Geological Significance and Soil Hazard Features

The development site does not contain areas of geological significance and soil hazard features.

4.1.8 Site Context

4.1.8.1 Method Applied

The site-based method has been applied to this development.

4.1.8.2 Patch Size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the development site. The patch size falls under the size category > 100 ha, as set out by the BAM.

4.2 Native Vegetation

4.2.1 Plant Community Types Present

Given the development site's historical use as a sand mine, landfill site and waste management centre, the soil landscape has a long history of disturbance. The majority of the development site (88.72%) is comprised of cleared areas or exotic vegetation which does not conform to a native PCT. Native vegetation within the development site is limited to scattered areas of regeneration comprised of opportunistic species. Under the BAM, all vegetation native to NSW requires consideration as to the 'best fit' PCT. Therefore, areas of regrowth were assigned to PCTs listed in Table 5 and displayed in Figure 6.

Table 5: Plant Community Types within subject site

PCT ID	PCT Scientific Name	Vegetation Class	Vegetation Formation	Area	Percent (BAMC)	cleared
661	Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests (Shrubby sub-formation)	6.06	68	
772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	Sydney Coastal Heaths	Heathlands	1.65	65	
Total				7.71		
N/A	Cleared/Exotic Cover	N/A	N/A	60.63	N/A	
Total				68.34		

4.2.2 Plant Community Type Selection Justification

The development site has a long-standing history of sand extraction and waste management. The original landscape has been modified substantially such that the original landscape has been replaced by active resource recovery cells and waste produced by the facility's operations. No remnant vegetation is present within the development site.

Native vegetation species have opportunistically regenerated throughout the development site. Under the BAM, this vegetation must be assigned to the 'best fit' PCT for assessment. As a result, various attributes were considered in combination to assign regenerating vegetation to the best fit PCT. Attributes included dominant species, community composition, soils and landscape position. Reference was made to the PCT descriptions in the BioNet Vegetation Classification, the final determinations determined by the Scientific Committee and other published documents describing the vegetation community, including the Native Vegetation of the Sydney Metropolitan Area Volume 2: Vegetation Community Profiles Version 3.0. Justifications for the classification of each PCT are provided below and summarised in Table 6.

Table 6: PCT selection justification

PCT ID	PCT Name	Selection criteria	Species relied upon for identification of vegetation type
661	Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion	Diagnostic species, position in the landscape, region, proximity to previously mapped areas of PCT 661 (OEH 2016).	<i>Banksia integrifolia</i> (Coast Banksia) <i>Casuarina glauca</i> (Swamp Oak) <i>Leptospermum laevigatum</i> (Coast Teatree)
772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	Diagnostic species (including the absence of <i>Casuarina glauca</i> (Swamp Oak) which was dominant in PCT 661), position in the landscape, proximity to the Cronulla sand dunes, region, previously mapped vegetation (OEH 2016).	<i>Acacia longifolia</i> <i>Banksia integrifolia</i> <i>Leptospermum laevigatum</i> (Coast Teatree) <i>Pittosporum undulatum</i> (Native Daphne) Absence of <i>Casuarina glauca</i> (Swamp Oak)

4.2.3 Vegetation Zones

Occurrences of PCT 661 and PCT 772 did not differ in condition throughout the development site, therefore each PCT was assigned to a single separate vegetation zone (Figure 7). Descriptions of both vegetation zones are provided in Table 7.

All field data collected at full-floristic and vegetation integrity plots is included in Appendix B.

Table 7: Vegetation Zones

Vegetation Zone	PCT	Condition	Area within development site (ha)	Description
1	661: Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion	Low	5.88	This vegetation zone was present along the north-western boundary of the development site, along Captain Cook Drive. It was also scattered throughout the development site atop mounds of fill created as part of the existing waste facility's operations. The midstorey was dominated by an infestation of <i>Chrysanthemoides monilifera</i> subsp. <i>Rotundata</i> (Bitou Bush), however native species regenerating in the midstorey included, <i>Acacia falcata</i> (Hickory Wattle), <i>Casuarina glauca</i> (Swamp Oak), <i>Banksia integrifolia</i> (Coast Banksia), and <i>Leptospermum laevigatum</i> (Figure 8). The canopy was largely absent except for in some patches where midstorey species had grown to large tree size. Groundcover was dominated by weedy species <i>Cynodon dactylon</i> (Couch), <i>Bidens pilosa</i> (Cobbler's Pegs), and <i>Cenchrus clandestinus</i> (Kikuyu Grass), with the occasional occurrence of native vine, <i>Stephania japonica</i> (Snake Vine).
2	772: Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and	Low	1.65	This vegetation zone was limited to the south-western boundary of the site, nearest to the Cronulla sand dunes south of the development site (Figure 9). Unlike PCT 661, occurrences of PCT 772 were located on areas which would have been part of the original dune system and were not made up of large mounds of waste fill. Native species

Vegetation Zone	PCT	Condition	Area within development site (ha)	Description
	South East Corner Bioregion			regenerating in the midstorey included <i>Acacia falcata</i> (Hickory Wattle) <i>Banksia integrifolia</i> (Coast Banksia), and <i>Leptospermum laevigatum</i> . However, the species assemblage of this vegetation zone differed from that of Zone 1 – PCT 661 in that it did not contain any <i>Casuarina glauca</i> (Swamp Oak) and contained <i>Acacia longifolia</i> and <i>Pittosporum undulatum</i> (Native Daphne). This zone was also dominated by exotic species, including <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive) in the midstorey and <i>Stenotaphrum secundatum</i> (Buffalo Grass) in the understorey.

4.2.4 Threatened Ecological Communities

The BioNet Vegetation Classification lists PCT 661 as a component of *Kurnell Dune Forest in the Sutherland Shire and City of Rockdale*, a threatened ecological community listed as endangered under the BC Act. This community is not listed under the EPBC Act. Occurrences of PCT 661 within the development site were identified in low condition and substantially degraded, as evident by their position atop mounds of fill created as part of the existing waste facility's operations. However, Zone 1 – PCT 661 Low contained regenerating flora species (*Leptospermum laevigatum* and *Stephania japonica*) which fit the description of the community as listed in the NSW Scientific Committee's Final Determination. Therefore, the development site contains 5.88 ha of a very degraded form of the endangered ecological community Kurnell Dune Forest in the Sutherland Shire and City of Rockdale in low condition (Figure 10).

4.2.5 Vegetation Integrity Assessment

A vegetation integrity assessment using the Credit Calculator (BAMC) was undertaken and the results are outlined in Table 8.

Table 8: Vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	661	Low	5.88	0.7	2.8	16.7	3.2
2	772	Low	1.65	4.4	0.4	4.3	2

Plant Community Types

Breen Resource Recovery Facility BDAR



Legend

 Subject Site

 Development Site

Plant Community Types

PCT661: Bangalay - Smooth-barked Apple - Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion

PCT772: Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion

Cleared/Exotic Cover

0 75 150 300
Metres

Datum/Projection:
GDA 1994 MGA Zone 56

nearmap
Image captured: 02/08/2020

Location: Sutherland Shire Council, NSW
Lot/DP: 1122/794114, 1123/794114,
5/1158627 6/1158627
Date Prepared: 30/09/2020

eco
logical
AUSTRALIA
A TETRA TECH COMPANY

Figure 6: Plant Community Types



Figure 7: Vegetation zones and plot locations



Figure 8: PCT 661: Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion regrowth dominated by weeds



Figure 9: Vegetation identified as PCT 772: Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion

Threatened Ecological Communities

Breen Resource Recovery Facility BDAR



Figure 10: Threatened Ecological Communities

4.3 Threatened Species

4.3.1 Ecosystem Credit Species

Ecosystem credit species predicted to occur at the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 9. Ecosystem credit species which have been excluded from the assessment and relevant justification are also included in Table 9.

Table 9: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
<i>Anthochaera phrygia</i>	Regent Honeyeater (Foraging)	-	High	Critically Endangered	Critically Endangered	<u>Excluded</u> The development site is substantially degraded and does not contain the preferred foraging items of this species, such as eucalypt or mistletoe species.
<i>Artamus cyanopterus</i>	Dusky Woodswallow	-	Moderate	Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo (Foraging)	-	Moderate	Vulnerable	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain suitable habitat for this species.
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo (Foraging)	Other. Presence of Allocasuarina and Casuarina species.	High	Vulnerable	Not Listed	<u>Included</u> The development site contains <i>Casuarina glauca</i> (Swamp Oak) within areas of vegetation identified as PCT 661.
<i>Circus assimilis</i>	Spotted Harrier	-	Moderate	Vulnerable	Not Listed	<u>Included</u>

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing	EPBC Act listing	Justification for inclusion or exclusion of species
						The development site contains marginal habitat for this species.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	Moderate	Vulnerable	Not Listed	Included The development site contains marginal habitat for this species.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	-	High	Vulnerable	Endangered	Excluded The development site is substantially degraded and does not contain the habitat features necessary for this species, such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage.
<i>Falsistrellus tasmaniensis</i>	Eastern Pipistrelle	False -	High	Vulnerable	Not Listed	Excluded The development site is substantially degraded and does not contain the habitat features necessary for this species, such as trees taller than 20 m and hollow bearing trees.
<i>Glossopsitta pusilla</i>	Little Lorikeet	-	High	Vulnerable	Not Listed	Excluded The development site is substantial degraded and does not contain the preferred foraging items of this species, such as <i>Eucalyptus</i> , <i>Angophora</i> or <i>Melaleuca</i> species.
<i>Haliaeetus leucogaster</i>	White-bellied Eagle (Foraging)	Sea- Waterbodies. Within 1km of rivers, lakes, large dams or	High	Vulnerable	Not Listed	Included The development site contains marginal foraging habitat for this species.

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity gain class	to	BC Act status	listing	EPBC Act status	listing	Justification for inclusion or exclusion of species
		creeks, wetlands and coastlines.							
<i>Hieraaetus morphnoides</i>	Little Eagle (Foraging)	-	Moderate		Vulnerable		Not Listed		<u>Included</u> The development site contains marginal habitat for this species.
<i>Ixobrychus flavicollis</i>	Black Bittern	Waterbodies. Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation.	Moderate		Vulnerable		Not Listed		<u>Included</u> The development site contains marginal foraging habitat for this species.
<i>Lathamus discolor</i>	Swift Parrot (Foraging)	-	Moderate		Endangered		Critically Endangered		<u>Excluded</u> The development site is substantially degraded and does not contain the preferred foraging items of this species, such as <i>Eucalyptus</i> species.
<i>Lophoictinia isura</i>	Square-tailed Kite (Foraging)	-	Moderate		Vulnerable		Not Listed		<u>Included</u> The development site contains marginal foraging habitat for this species.
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	-	Moderate		Vulnerable		Not Listed		<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species, such as woodlands dominated by box and ironbark eucalypts.
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	-	High		Vulnerable		Not Listed		<u>Included</u>

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to BC Act listing	to status	EPBC Act listing	status	Justification for inclusion or exclusion of species
							The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Miniopterus australis</i>	Little Bent-winged Bat (Foraging)	-	High		Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Miniopterus oceanensis</i>	<i>oriana</i> e Large Bent-winged Bat (Foraging)	-	High		Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Ninox strenua</i>	Powerful (Foraging)	Owl -	High		Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Pandion cristatus</i>	Eastern (Foraging)	Osprey -	Moderate		Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Petaurus australis</i>	Yellow-bellied Glider	Hollow bearing trees. Hollow >25 cm diameter	High		Vulnerable	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species, such as hollow bearing trees.

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing	EPBC Act listing	Justification for inclusion or exclusion of species
<i>Phascolarctos cinereus</i>	Koala (Foraging)	-	High	Vulnerable	Vulnerable	<u>Excluded</u> The development site is substantial degraded and does not contain the preferred foraging items of this species.
<i>Phoniscus papuensis</i>	Golden-tipped Bat	-	High	Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Foraging)	-	High	Vulnerable	Vulnerable	<u>Included</u> The development site contains marginal foraging habitat for this species.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	9	High	Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	-	High	Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Tyto novaehollandiae</i>	Masked Owl (Foraging)	-	High	Vulnerable	Not Listed	<u>Included</u> The development site is substantially degraded. However, the species is highly mobile and may occasionally forage within the development site.
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	-	High	Vulnerable	Not Listed	<u>Excluded</u>

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
						The development site is substantially degraded and does not contain the habitat features necessary for this species, such as large areas of habitat.

4.3.2 Species Credit Species

Species credit species predicted to occur at the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 10. Species credit species which have been excluded from the assessment and relevant justification are also included in Table 10.

Table 10: Predicted candidate species credit species

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
<i>Anthochaera phrygia</i>	Regent Honeyeater (Breeding)	Other. As per mapped areas.	High	Critically Endangered	Critically Endangered	<u>Excluded</u> The development site is not included in the DPIE BAM – Regent Honeyeater Important Areas Map (accessed 26 August 2020).
<i>Burhinus grallarius</i>	Bush Stone-curlew	Fallen/standing dead timber including logs	High	Endangered	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	-	Moderate	Endangered	Vulnerable	<u>Excluded</u> The development site is substantially degraded such that there is no suitable habitat for the species.

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo (Breeding)	Hollow bearing trees. Eucalypt tree species with hollows >9 cm diameter	High	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain hollow bearing trees.
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo (Breeding)	Hollow bearing trees. Living or dead tree with hollows >15 cm diameter and >5 m above ground.	High	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain hollow bearing trees.
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	-	High	Vulnerable	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Cliffs. Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops or crevices, or within 2 km of old mines or tunnels.	Very High	Vulnerable	Vulnerable	<u>Excluded</u> The development site does not contain cliffs and is not within 2 km of suitable habitat features.
<i>Haematopus longirostris</i>	Pied Oystercatcher	Other. Within 100 m of estuarine areas and the ocean.	High	Endangered	Not Listed	<u>Excluded</u> The development site is within 100 m of estuarine areas, however it does not contain the habitat features necessary for this species, such as beaches or saltmarsh.

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle (Breeding)	Other. Living or mature dead trees within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines.	High	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain large stick nests or suitable nest trees.
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	-	Moderate	Vulnerable	Vulnerable	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Hieraaetus morphnoides</i>	Little Eagle (Breeding)	Other. Nest trees – live (occasionally dead) large old trees within vegetation	Moderate	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain suitable nest trees.
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	Other. Requires dense ground cover in a variety of habitats.	High	Endangered	Endangered	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Lathamus discolor</i>	Swift Parrot (Breeding)	Other. As per mapped areas.	Moderate	Endangered	Critically Endangered	<u>Excluded</u> The species is known to breed in Tasmania. The development site is not included in the DPIE BAM – Important Areas Map (confirmed 28 September 2020 by BAM Support (BSM-1332)).

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
<i>Litoria aurea</i>	Green and Golden Bell Frog	Semi-permanent/ephemeral wet areas. Within 1km of wet areas Swamps. Within 1km of swamp Waterbodies. Within 1km of waterbody.	High	Endangered	Vulnerable	<u>Included</u> This species has previously been recorded within the development site and marginal habitat, suitable for dispersal, is present within the development site. This species was assumed present.
<i>Lophoictinia isura</i>	Square-tailed Kite (Breeding)	Other. Nest trees.	Moderate	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain suitable nest trees.
<i>Meridolum maryae</i>	Maroubra Woodland Snail	-	High	Endangered	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Miniopterus australis</i>	Little Bent-winged Bat (Breeding)	Caves. Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'.	Very High	Vulnerable	Not Listed	<u>Excluded</u> Species known only to breed in maternity caves. No breeding habitat present in the development site.

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
		Observation type code 'E nest-roost'. With numbers of individuals >500. Or from the scientific literature.				
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Breeding)	Caves. Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'. Observation type code 'E nest-roost'. With numbers of individuals >500.	Very High	Vulnerable	Not Listed	<u>Excluded</u> Species known only to breed in maternity caves. No breeding habitat present in the development site.
<i>Mixophyes balbus</i>	Stuttering Frog	-	Very High	Endangered	Vulnerable	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Myotis macropus</i>	Southern Myotis	Hollow-bearing trees. Within 200m of a riparian zone Other.	High	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain the habitat features necessary for this species.

Species	Common Name		Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
			Bridges, caves or artificial structures within 200m of riparian zone Waterbodies. This include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200 m of the site.				
<i>Ninox strenua</i>	Powerful (Breeding)	Owl	Hollow bearing trees. Living or dead trees with hollow >20 cm diameter.	High	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain hollow bearing trees.
<i>Pandion cristatus</i>	Eastern (Breeding)	Osprey	Other. Presence of stick- nests in living and dead trees (>15m) or artificial structures within 100 m of a floodplain for nesting	Moderate	Vulnerable	Not Listed	<u>Excluded</u> The development site does not contain stick nests or suitable dead trees.
<i>Petaurus norfolcensis</i>	Squirrel Glider	-		High	Vulnerable	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Phascolarctos cinereus</i>	Koala (Breeding)	Other.		High	Vulnerable	Vulnerable	<u>Excluded</u> The development site is substantially degraded and does

Species	Common Name		Habitat Constraints / Geographic limitations		Sensitivity to gain class	BC Act listing status	EPBC Act listing status	Justification for inclusion or exclusion of species
			Areas identified via survey as important habitat.					not contain the habitat features necessary for this species.
<i>Prostanthera densa</i>	Villous Mint-bush		-		High	Vulnerable	Vulnerable	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Pteropus poliocephalus</i>	Grey-headed fox (Breeding)	Flying-	Other. camps.	Breeding	High	Vulnerable	Vulnerable	<u>Excluded</u> The development site does not contain breeding camps.
<i>Rhodamnia rubescens</i>	Scrub Turpentine		-		High	Critically Endangered	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Senecio spathulatus</i>	Coast Groundsel		Other. Headlands within 500 m of the coast.		High	Endangered	Not Listed	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly		-		High	Endangered	Vulnerable	<u>Excluded</u> The development site is substantially degraded and does not contain the habitat features necessary for this species.
<i>Tyto novaehollandiae</i>	Masked (Breeding)	Owl	Hollow bearing trees.		High	Vulnerable	Not Listed	<u>Excluded</u>

Species	Common Name	Habitat Constraints / Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC status	Act listing	Justification for inclusion or exclusion of species
		Living or dead trees with hollows >20 cm diameter.					The development site does not contain hollow bearing trees.

4.3.3 Threatened Species Habitat Survey Results

Due to the high level of modification of vegetation within the development site, no suitable habitat for threatened flora species was identified.

No hollow bearing trees were identified within the development site. No evidence of threatened fauna foraging was identified within the development site.

The development site contained artificial dams and ephemeral drainage lines created by the operations of the existing waste Facility (Figure 11). These areas may provide dispersal habitat for the Green and Golden Bell Frog. However, the dams are not considered suitable breeding habitat due to water depth and the absence of small pools and fringing vegetation.

No threatened flora or fauna species were identified in the development site during survey.

4.3.4 Targeted Survey Results

Targeted surveys were not conducted as part of this assessment due to BAM survey times. Species credit species requiring targeted survey were assumed present, as detailed in the following section.

4.3.5 Species Credits Species Included in this Assessment

The Green and Golden Bell Frog was identified as likely to occur within the development site for the following reasons:

- The presence of suitable dispersal habitat within the development site.
- According to the BioNet Atlas, the species was recorded within the development site 25 times between 1995 and 2009.
- Green and Golden Bell Frog habitat was created immediately adjacent to the development site as part of the consent conditions for a previous DA located within the development site (DA 11/0665).
- The presence of a Key Population of the species at Kurnell, as identified in the Draft Recovery Plan for the species.

The Green and Golden Bell Frog was included in this assessment and assumed present (Table 11).

Table 11: Species credit species included in the assessment

Species	Common Name	Species presence	Habitat (ha)	Biodiversity Risk Weighting	Species credit species
<i>Litoria aurea</i>	Green and Golden Bell Frog	Yes (Assumed present)	7.53	2	The NSW Survey Guidelines for Threatened Frogs (DPIE 2020c) specify that the species polygon for Green and Golden Bell Frog should incorporate associated PCTs within 200 m radius from the top of bank of aquatic habitats. Based on aquatic habitat identified both within the development site during survey and adjacent to the development site from aerial

Species	Common Name	Species presence	Habitat (ha)	Biodiversity Risk Weighting	Species polygon	credit	species
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images, the species polygon therefore applies to all native vegetation within the development site (Figure 12).



Figure 11: Dams within the development site

**Species Polygon for *Litoria aurea*
(Green Golden Bell Frog)** **Breen Resource Recovery Facility BDAR**

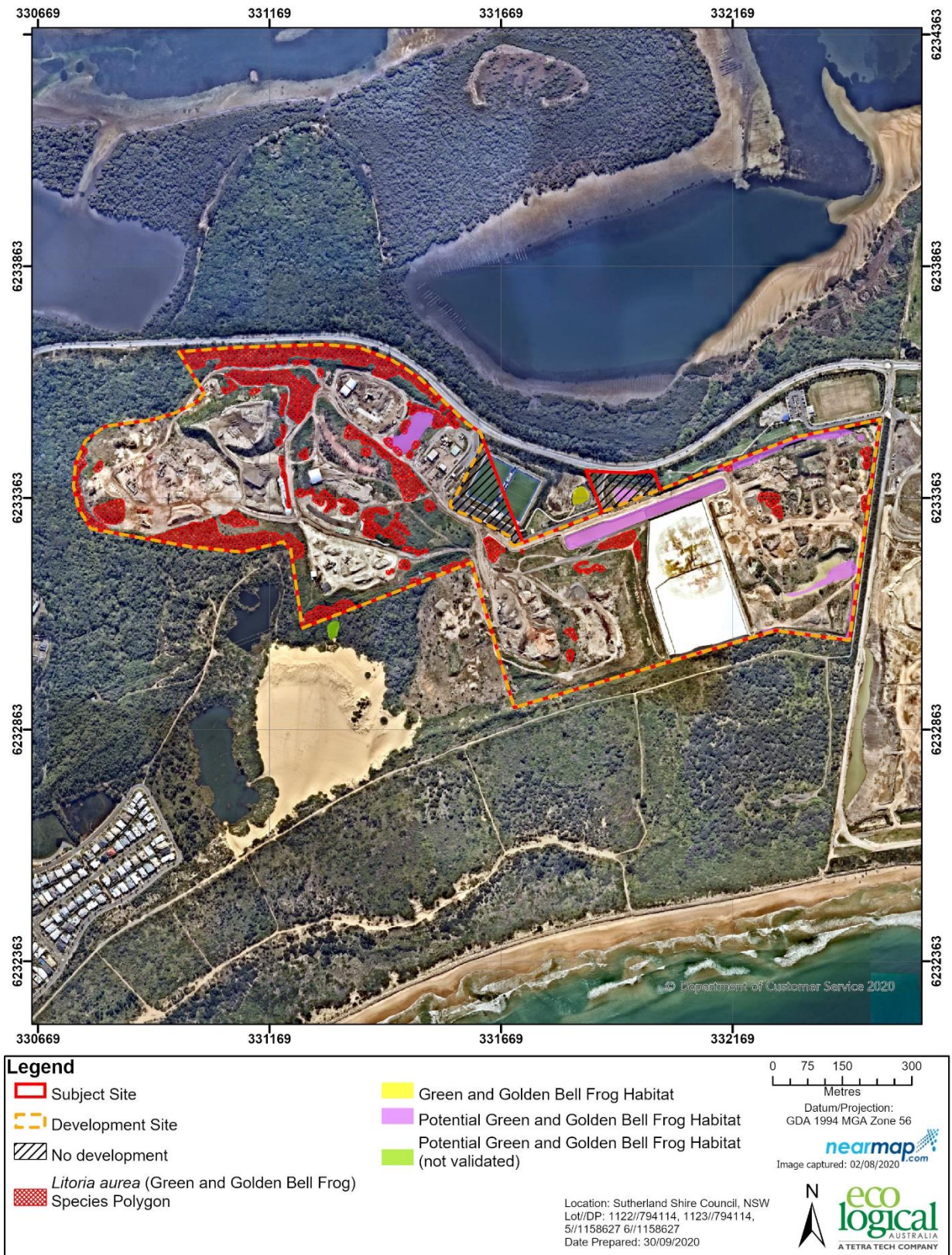


Figure 12: *Litoria aurea* (Green and Golden Bell Frog) species polygon within the development site

5. Impact Assessment (Biodiversity Values)

5.1 Avoiding impacts

5.1.1 Locating a project to avoid and minimise impacts on vegetation and habitat

The removal of all vegetation present within the development site is a requirement of the proponent's Environmental Protection Licence 4608 and Licence Variation No. 1120519. Therefore, refinement of the proposed development site to avoid and minimise impacts on vegetation and habitat is not possible. However, a portion of the development site will be revegetated under the VPA entered into between Breen Holdings Pty Ltd (subsequently novated to Breen Property), Australand Kurnell Pty Ltd (now Frasers Property Australia Limited) and Sutherland Shire Council in June 2010. The measures to avoid impacts are further described in Table 12.

Table 12: Locating and designing a project to avoid and minimise impacts on vegetation and habitat

BAM project location and design principles	How addressed and justification
Locating the project in areas where there are no biodiversity values	The majority of the development site (88.72%) is located on cleared land or land dominated by exotic vegetation, where no native vegetation is present. The removal of 5.88 ha of PCT 661, 1.65 ha of PCT 772 and 7.53 ha of potential Green and Golden Bell Frog habitat is unavoidable given that the entire site must be capped to comply with the proponent's Environmental Protection Licence.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The landscape within the development site has a long history of disturbance and native vegetation is present as a result of opportunistic regeneration. The proposed development would impact 5.88 ha of PCT 661 in low condition (with a vegetation integrity score of 3.2) and 1.65 ha of PCT 772 in low condition (with a vegetation integrity score of 2).
Locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species	The majority of the development site is located on cleared land or land dominated by exotic vegetation. The development site also includes 5.88 ha of highly degraded endangered ecological community Kurnell Dune Forest in the Sutherland Shire and City of Rockdale and 7.53 ha of potential dispersal habitat for the Green and Golden Bell Frog. Impacts to native vegetation and threatened species habitat are unavoidable given that the entire site must be capped to comply with the proponent's Environmental Protection Licence. The endangered ecological community present within the development site is substantially degraded. The potential habitat within the development site is limited to use for potential dispersal, not breeding.
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The development site is predominantly confined to cleared land or land dominated by exotic vegetation. Vegetation and dams within the development site only provide limited stepping-stone habitat. Connectivity between the Ramsar wetlands, dams adjacent to the development site and Bate Bay will still be accessible by highly mobile species, such as migratory birds.
Reducing the clearing footprint of the project	The clearing footprint of the project is approximately 68.34 ha. 88.72% of this is located on cleared land or land dominated by exotic vegetation, where no native vegetation is present. Impacts to native vegetation and threatened species habitat are limited to the existing EPL which applies to the whole of the Breen Site and requires the land to be cleared and capped. Therefore, the clearing footprint cannot be reduced.

BAM project location and design principles	How addressed and justification
Locating ancillary facilities in areas where there are no biodiversity values or threatened species habitat or habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	Not applicable.
Providing structures to enable species and genetic material to move across barriers or hostile gaps	Structures to enable species and genetic materials to move across barriers or hostile gaps are not considered appropriate to this development as nature corridors for movement to the north, west and south of the development site will be retained.
Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site	A portion of the development site will be revegetated as part of the VPA between Breen Resources and Sutherland Shire Council (Figure 3). Native plant species proposed to be used in the revegetation include species representative of Kurnell Dune Forest, Sydney Freshwater Wetlands and Coastal Dune Heath (Clouston Associates 2020).

5.2 Assessment of Impacts

5.2.1 Direct Impacts

The direct impacts of the development on native vegetation and threatened ecological communities are presented in Table 13. Impacts to threatened species habitat are presented in Table 14.

Table 13: Direct impacts to native vegetation and threatened ecological communities

Veg Zone	PCT ID	PCT Scientific name	Vegetation Class	Vegetation Formation	Associated TEC	Condition	Impact (ha)
1	661	Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests (Shrubby sub-formation)	Kurnell Dune Forest in the Sutherland Shire and City of Rockdale (Endangered under the BC Act)	Low	5.88
2	772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	Sydney Coastal Heaths	Heathlands	None	Low	1.65
Total							7.53

Table 14: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact to habitat (ha)	BC Act status	EPBC Act status
<i>Litoria aurea</i>	Green and Golden Bell Frog	7.53	Endangered	Vulnerable

5.2.2 Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 15.

Table 15: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	661	Low	5.88	3.2	0	-3.2
2	772	Low	1.65	2	0	-2

5.2.3 Indirect Impacts

The indirect impacts of the development are outlined in Table 16.

Table 16: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Sedimentation and contaminated and/or nutrient rich run-off	Construction / operation	Runoff during construction works and operation	Sedimentation confined to development site with fencing. Nutrient rich run-off treated prior to leaving the site through stormwater management measures.	During heavy rainfall or storm events	During rainfall events	Short-term impacts
Noise, dust or light spill	Construction / operation	Noise and dust created from machinery	Noise and dust likely to carry beyond development site boundary	Daily, during construction works	Sporadic throughout construction period	Short-term impacts
Inadvertent impacts on adjacent habitat or vegetation	Construction / operation	Damage to adjacent wetland habitat or vegetation	Adjacent vegetation and wetland	Daily, during construction works and during heavy rainfall or storm events	Throughout construction period	Short-term impacts
Transport of weeds and pathogens from the site to adjacent vegetation	Construction	Spread of weed seed or pathogens	Potential for spread into adjacent habitat	Daily, during construction works	Sporadic throughout construction period	Potentially long-term impacts
Trampling of non-threatened species	Construction / operation	Potential for flora species to be damaged when working adjacent to	Adjacent vegetation	Daily during construction works	Throughout construction period	Short-term impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
		retained bushland areas				
Vehicle strike	Construction / operation	Potential for native fauna to be struck by working machinery and moving vehicles	Within access roads and development site	Daily, during both construction and operational phases.	Throughout life of project	Short-term impacts
Rubbish dumping	Construction / operation	Illegal dumping by local residents/ construction crews	Potential for rubbish to spread via wind into adjacent vegetation	Potential to occur at any time throughout construction or operational phases	Throughout life of project	Short-term impacts
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	Construction / operation	Runoff during construction works	Confined to development site with sediment fencing	During heavy rainfall or storm events	During rainfall events	Short-term impacts

5.2.4 Prescribed biodiversity impacts

Consideration of prescribed biodiversity impacts in accordance with Section 9.2.1 of the BAM are presented in Table 17.

Table 17: Prescribed biodiversity impacts

BAM Criteria	Assessment
9.2.1.3 The assessment of the impacts of the development on the habitat of threatened species or ecological communities associated with human made structures	
a) identify the human made structures with potential to be habitat for threatened species of ecological communities	The development site contained artificial dams and ephemeral drainage lines created by the operations of the existing waste Facility. These areas may provide dispersal habitat for the Green and Golden Bell Frog.
b) identify the species and ecological communities likely to use the habitat	<i>Litoria aurea</i> (Green and Golden Bell Frog)
c) describe the nature, extent and duration of short and long-term impacts	The development would result in the permanent removal of four artificial dams and ephemeral drainage lines that represent potential habitat for Green and Golden Bell Frog. This is a one-off event which would occur during capping and contouring of Lots 1122 and 1123 and construction a new resource recovery facility on Lot 5. However, the removal of this habitat is considered a short-term impact because the new recover facility will contain two artificial dams.
d) describe, with reference to relevant literature the importance within the bioregion of the habitat of these species or ecological communities	Habitat within the development site is not considered important given that it does not contain known breeding ponds and similar artificial waterbodies and drainage lines, as well as naturally occurring waterbodies, are common within the assessment area and

BAM Criteria	Assessment
	bioregion. For example, a Green and Golden Bell Frog habitat pond is present to the east of the existing playing field.
e) predict the consequences of the impacts for the local and bioregional persistence of the suite of threatened species and communities likely to use these areas as habitat, with reference to relevant literature and other published sources of information.	The habitat to be impacted by the proposed development is not considered suitable breeding habitat. Given the proximity of more suitable habitat within the assessment area, including a pond designed specifically as Green and Golden Bell Frog habitat, the removal of potential habitat is unlikely to impact the persistence of this species within the Sydney Basin Bioregion. The potential habitat would likely serve to supplement foraging and dispersal, although this would be limited due to the large expanses of operational waste recovery areas between the potential habitat.
9.2.1.4 The assessment of the impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation	
a) identify the species and ecological communities likely to use the habitat	Low quality foraging habitat is present for mobile threatened species within exotic vegetation, including Grey-headed Flying Fox and threatened microbats. Non-native vegetation is also potential dispersal habitat for the Green and Golden Bell Frog.
(b) describe the nature, extent and duration of short and long-term impact	The proposed development will result in the permanent removal of less than 60.63 ha of exotic/cleared areas, part of which contains non-native vegetation. Most of this vegetation would be permanently removed, however there is a plan to develop Playing Fields and passive recreation areas, which in the future could also serve as potential foraging and dispersal habitats.
(c) describe, with reference to relevant literature and other reliable published sources of information, the importance within the bioregion of the habitat to these species or ecological communities	The exotic vegetation provides only marginal, low quality foraging or dispersal resources which would be secondary to the large areas of higher quality, native vegetation adjacent to the development site. This habitat is not considered important to the survival of any species in the locality.
(d) predict the consequences of the impacts for the local and bioregional persistence of the suite of threatened species and communities likely to use these areas as habitat, with reference to relevant literature and other published sources of information.	The removal of small areas of exotic vegetation is unlikely to affect the persistence of any threatened species in the locality or bioregion. Large areas of high-quality native vegetation are available adjacent to the development site. These areas are more likely to be used than exotic vegetation or cleared areas.
9.2.1.5 The assessment of the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range must:	
(a) identify the area/s of connectivity joining different areas of habitat that intersect with the subject land and the areas of habitat that are connected according to Paragraph 4.2.1.3	These are identified in Section 4.1.6 and Figure 2.
(b) identify the species and ecological communities likely to benefit from the connectivity	Connectivity within the study area may provide of stepping-stone dispersal habitat for Green and Golden Bell Frog, however this is limited by the operational areas of the waste recovery facility.
(c) describe the nature, extent and duration of short and long-term impacts	The proposed development will result in the permanent removal of 7.53 ha of dispersal habitat for the Green and Golden Bell Frog. Some connectivity will be restored when nearly half of the development site is revegetated (Figure 3).

BAM Criteria	Assessment
d) describe, with reference to relevant literature and other reliable published sources of information, the importance of the area of connectivity within the bioregion	Connectivity within the development site is limited to degraded native vegetation which provides, at most, stepping stone dispersal habitat within the fragmented landscape of the operation waste facility. Large areas of higher quality native vegetation are present adjacent to the development site. This habitat is not considered important to connectivity within the bioregion.
(e) predict the consequences of the impacts for the bioregional persistence of the suite of threatened species and communities currently benefitting from the connectivity with reference to relevant literature and other published sources of information and taking into consideration mobility, abundance, range and other relevant life history factors.	Consequences are considered minimal given that large areas of high-quality native vegetation are available adjacent to the development site. These areas are more likely to be used than the development site itself.
9.2.1.7 The assessment of the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development) must:	
(a) identify water bodies with potential to be habitat for threatened species or threatened ecological communities likely to use the habitat	The development site is located within 400 m of Towra Point Nature Reserve, a Nationally Important Wetland listed under the Ramsar Convention of Wetlands 1971. The development site is separated from the wetland by vegetation, Captain Cook Drive and developed land. The proposed development will not directly affect the wetland but may have indirect effects through changes in water quality. However, MUSIC Modelling by Cardno (2021) has shown that the water quality treatment measures will reduce the volume of flow to the wetland from the development site by an average of 52% and reduce the quantity of pollutants entering the wetland.
(b) identify the threatened species and threatened ecological communities likely to use the habitat.	Migratory birds, water dependent birds and Southern Myotis are likely to use the wetland for foraging.
(c) identify the hydrological processes that sustain threatened species or ecological communities and the species and communities that are dependent on them	Migratory and wading birds rely on or occasionally utilise mangroves and mudflats for foraging. Southern Myotis relies on waterbodies for foraging as they fly over water to catch insects. It is also noted that the threatened ecological communities, Coastal Saltmarsh, Swamp Oak Floodplain Forest, Freshwater Wetlands and Seagrass Meadows have been previously mapped around this wetland (OEH 2016) and rely on its hydrology. However, the proposed development will not directly affect these. Indirect impacts from the proposed development are not considered to be detrimental as the input of pollutants from the development site into the wetland will be reduced and the wetland is estuarine, and thus not solely dependent on ground and surface water flows.
(d) describe, with reference to relevant literature and other reliable published sources of information, the importance within the bioregion of the waterbody or hydrological process to these species or ecological communities.	As a Nationally Important Wetland listed under the Ramsar Convention of Wetlands 1971, the wetland is important habitat for migratory birds within the bioregion. The proposed development will not directly affect the wetland but may have indirect effects through changes in water quality. However, MUSIC Modelling by Cardno (2021) has shown that the water quality treatment measures will reduce the volume of flow to the wetland from the development site by an average of 52% and reduce the quantity of pollutants entering the wetland.

BAM Criteria	Assessment
(e) describe the nature, extent and duration of short-term impact and long-term impacts on water quality.	Controls should be implemented during construction and operation to prevent unnecessary runoff and sedimentation which could be detrimental to water quality in the short or long term.
(g) predict the consequences of the impacts for the bioregional persistence of the suite of threatened species and communities likely to use these areas as habitat, with reference to relevant literature and other published sources of information.	Consequences are considered minimal given that direct impacts are not proposed and MUSIC Modelling results (Cardno 2021) indicate that pollutants entering the wetland from the development site will be reduced.
(h) predict the nature, extent and duration of short and long-term impacts on the habitat and life cycle of species using the natural features of any water dependent plant community	Southern Myotis and birds may use the water and mudflats within the water dependent plant community for foraging. Indirect impacts from the proposed development will be ongoing and long-term, but are not considered to be detrimental as the input of pollutants from the development site into the wetland will be reduced and the wetland is estuarine, and thus not solely dependent on ground and surface water flows.
(i) justify predictions of impact on any water dependent plant communities, with appropriate modelling and with reference to relevant literature and other published sources of information	The input of pollutants from the development site into the wetland will be reduced and the volume of flow from the wetland to the development site will be reduced by an average of 52% (Cardno 2021), however the wetland is estuarine, and thus not solely dependent on ground and surface water flows. Therefore, indirect impacts from the proposed development are not considered detrimental.
(j) predict the cumulative impacts of the project together with existing mining operations mining underneath the same water dependent plant communities	N/A
(k) based on predictions of impacts on water dependant plant communities and the species they support, calculate the maximum predicted offset liability in accordance with the Upland Swamp Policy	N/A
(l) justify any prediction of 'nil' or 'negligible' environmental consequences for any impact on water dependent plant communities and the species they support.	N/A

5.2.5 Mitigating and Managing Impacts

Measures proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in Table 18.

Table 18: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Minor	Negligible	Appropriate controls will be utilised and maintained to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways	Erosion and sedimentation will be controlled	For the duration of construction works	Project Manager
Daily construction hours mandated for construction and operational activities to reduce impacts of noise	Minor	Negligible	Daily timing of construction activities is recommended in accordance with Table 1 of Interim Noise Guidelines (2009)	Noise will be controlled as described in Wilkinson Murray report 18132-AN	For duration of construction and operational phase of the project	Project Manager
Adaptive dust monitoring programs to control air quality	Minor	Negligible	Dust suppression measures will be implemented during construction works to limit dust on site	Mitigate dust created during construction activities	For the duration of construction works	Project Manager
Temporary fencing to protect significant environmental features such as riparian zones	High	Minor	Install fencing prior to commencement of any works	Access to retained vegetation restricted	For the duration of construction works	Project Manager
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Minor	Vehicles, machinery and building refuse associated with the development construction should remain only within construction footprint areas, avoiding weed or pathogen related impacts to vegetation outside of the development site. <i>Phytophthora cinnamomi</i> (Myrtle Rust) and chytrid fungus control measures must be undertaken from the	Prevent spread of weeds or pathogens	For the duration of construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			commencement of the project to minimise the risk of spread. The following guidelines should be followed: • https://www.rbgsyd.nsw.gov.au/science/plants/pests-diseases/phytophthora-dieback/disinfection-procedures • http://www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation • https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/saving-our-species-hygiene-guidelines-200164.pdf Vehicles, machinery and building refuse should remain only within the development site and be disposed of at an appropriate waste management facility. Weed management to be undertaken where required. Off road earth moving and excavation plant should be inspected before entering and exiting the site and washed down if required to prevent the spread of weeds to or from the development site and adjacent vegetation. In particular, machinery working on or nearby dams are required to be washed down in order to prevent the spread of chytrid fungus into or from the development site . If water trucks are being used for dust control, implement procedures to manage pathogens such as daily cleaning of the water truck and equipment.			
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	All staff working on the development will undertake an environmental induction as part of their site familiarisation. This induction will include items such as: • avoiding indirect impacts to offsite adjacent vegetation • correct storage of chemicals to prevent runoff into adjacent vegetation	All staff entering the development site are fully aware of the presence of native	To occur for all staff entering/working at the development site. Site briefings should be updated	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
				vegetation adjacent to the site and what to do in case of any environmental emergencies	based on phase of the work and when environmental issues become apparent.	
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site.	Minor	Negligible	Any landscape plantings in the development site are to use locality derived native species and those found within the region.	Areas within the development site will be landscaped using appropriate species	Following completion of construction activities.	Project Manager
Pre-clearing surveys of areas of potential refuge habitat and protocol for the management of Green and Golden Bell Frogs detected in construction areas	Moderate	Minor	Pre-clearance surveys should be undertaken by a suitably qualified ecologist. If tadpoles are observed in areas of pooled water, an ecologist should be contacted to confirm the species of the tadpoles. If a Green and Golden Bell Frog is detected during the works, a qualified ecologist should be contacted. If the frog needs to be collected from the works area prior to the ecologist arriving on-site they can be captured using disposable gloves and placed in a suitable container/plastic bag with a small amount of distilled water or small handful of moistened grass/leaves and then moved to the designated relocation site by the project ecologist only after consultation with DPIE.	Potential harm to Green and Golden Bell Frogs minimised	Prior to and for the duration of construction works	Project Manager

5.2.6 Serious and Irreversible Impacts (SAIL)

The proposed development would not impact on any candidate entities for Serious and Irreversible Impacts (SAIL).

5.3 Impact Summary

Following implementation of the BAM and the BAMC, the following impacts have been determined.

5.3.1 Impacts Requiring Offsets

The impacts of the development requiring offset for threatened species habitat are outlined in Table 19 and displayed in Figure 13.

Table 19: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact (ha)	NSW listing status	EPBC status	Listing	Rationale
<i>Litoria aurea</i>	Green and Golden Bell Frog	7.53	Endangered	Vulnerable		Native vegetation within the development site represents potential dispersal habitat for this species.

5.3.2 Impacts Not Requiring Offsets

The impacts of the development not requiring offset for native vegetation are outlined in Table 20 and shown on

Figure 14. The impacts of the development not requiring offset for threatened species and threatened species habitat is also outlined in Table 20 and shown on

Figure 14.

Table 20: Impacts to native vegetation that do not require offsets

PCT ID	PCT Scientific name	Vegetation Class	Vegetation Formation	Direct impact (ha)	Rationale
661	Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests (Shrubby sub-formation)	5.88	Vegetation integrity score was below the minimum threshold (15) above which an offset is required where the PCT is representative of an endangered ecological community
772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	Sydney Coastal Heaths	Heathlands	1.65	Vegetation integrity score below the minimum threshold (20) above which an offset is required where the PCT is not representative of a threatened ecological community

PCT ID	PCT Scientific name	Vegetation Class	Vegetation Formation	Direct impact (ha)	Rationale
Total				7.53	

5.3.3 Areas Not Requiring Assessment

In accordance with Section 10.4 of the BAM, 'areas not requiring assessment' are those which do not contain native vegetation. These areas were surveyed and found to have been cleared of vegetation as part of the Recovery Facility's operations, or are dominated by exotic vegetation and do not contain habitat for threatened species, therefore they do not require further assessment under the BAM (Figure 15).

5.3.4 Credit Summary

The number of ecosystem credits required for the development are outlined in Table 21. The number of species credits required for the development are outlined in Table 22. A biodiversity credit report is included in Appendix C.

Table 21: Ecosystem credits required

PCT ID	PCT Scientific Name	Vegetation Formation	Direct impact (ha)	Credits required
661	Bangalay – Smooth-barked Apple – Swamp Mahogany low open forest of southern Sydney, Sydney Basin Bioregion	Wet Sclerophyll Forests (Shrubby sub-formation)	5.88	0
772	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion	Heathlands	1.65	0
Total			7.53	0

Table 22: Species credit summary

Species	Common Name	Direct impact to habitat (ha)	Credits required
<i>Litoria aurea</i>	Green and Golden Bell Frog	7.53	11

Impacts Requiring Species Credits

Breen Resource Recovery Facility BDAR



Figure 13: Impacts requiring offset in the form of species credits

Impacts Not Requiring Ecosystem Credits Breen Resource Recovery Facility BDAR



Figure 14: Impacts not requiring offset in the form of ecosystem credits

Areas Not Requiring Assessment Breen Resource Recovery Facility BDAR

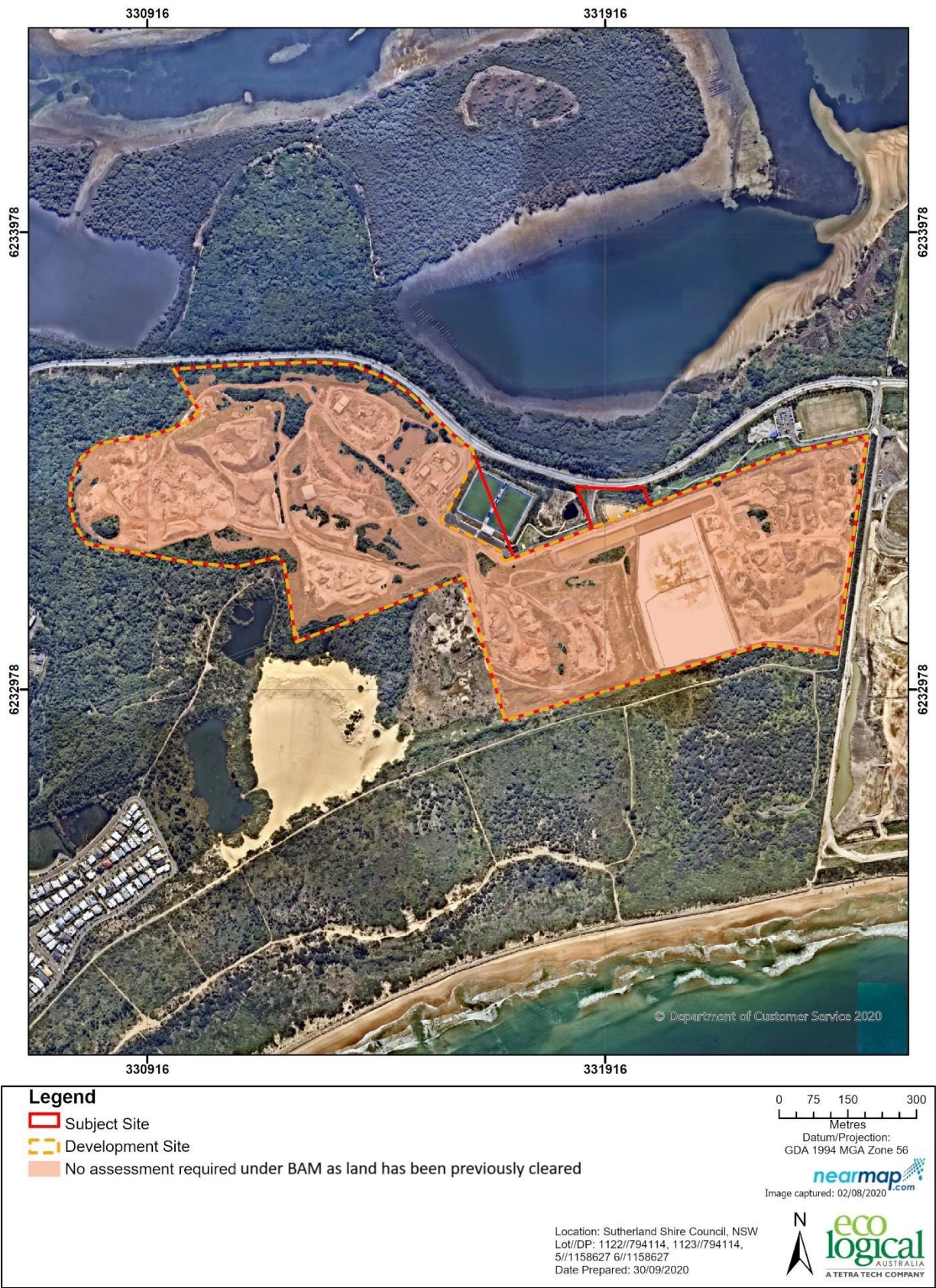


Figure 15: Areas not requiring assessment

6. Consistency with Legislation and Policy

6.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act establishes a regime for assessing and regulating the environmental impact of activities (including development) where a Matter of National Environmental Significance (MNES) may be affected. Under the EPBC Act, any action which has, will have, or is likely to have a significant impact on a matter of MNES is defined as a “controlled action”, and requires approval from the Minister. The Commonwealth Department of Agriculture, Water and the Environment (DAWE), is responsible for administering the EPBC Act.

The process includes undertaking an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action. The Significant Impact Guidelines 1.1 – Matter of National Environmental Significance’ published by DAWE (2009a) provide overarching guidance on determining whether an action is likely to have a significant impact on a MNES.

The following three MNES were assessed in accordance with the Significant Impact Guidelines 1.1:

- Green and Golden Bell Frog
- Grey-headed Flying-Fox
- Towra Point Nature Reserve.

6.1.1 *Litoria aurea* (Green and Golden Bell Frog)

The Green and Golden Bell Frog is listed as vulnerable under the EPBC Act. The distribution and habitat associations for this threatened species are presented in Appendix D. This species was not identified within the development site during survey, however targeted survey was not undertaken as the site assessment was outside of calling periods for Green and Golden Bell Frog. A Key Population of the species exists at Kurnell and dams within the development site may be used as dispersal habitat. No breeding habitat was identified within the development site. Significant Impact Criteria for this species are applied, with consideration of the Significant impact guidelines for the vulnerable green and golden bell frog published by DAWE (2009b), in Table 23.

Table 23: Application of the Significant Impact Criteria to the Green and Golden Bell Frog

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	Lead to a long-term decrease in the size of an important population of a species <i>Note: Because of the continued decline of the green and golden bell frog, the restricted nature of all known populations in New South Wales and the uncertainty about the current status of the Victorian populations, all current populations of green and golden bell frog are regarded as an ‘important population’ (DAWE 2009b).</i>	The proposed action will impact 7.53 ha of native vegetation that represent potential dispersal habitat for the Green and Golden Bell Frog in the form of substantially degraded occurrences of PCTs 661 and 772. A Key Population of Green and Golden Bell Frog has been identified at Kurnell, which incorporates the Kurnell Peninsula (including the development site). The habitat to be impacted by the proposed development is not considered suitable breeding habitat and is subject to the Key Threatening Process ‘invasion of native plant communities by bitou bush and boneseed’. Given the degraded nature of habitat within the development site, proximity of more suitable habitat in

Criterion	Question	Response
		connective vegetation within the assessment area and proximity of a pond designed specifically as Green and Golden Bell Frog habitat, the proposed action would not lead to the long-term decrease in the size of an important population of Green and Golden Bell Frog.
2)	Reduce the area of occupancy of an important population	The action would reduce the potential area of occupancy available for this species by removing 7.53 ha of native vegetation, identified as potential dispersal habitat. However, suitable habitat will still be available adjacent to the site of the proposed action and part of the development site will be revegetated for use as parklands.
3)	Fragment an existing important population into two or more populations	The proposed action is within an area identified as a known location for a key population of this species (Kurnell population). The portion of potential Green and Golden Bell Frog habitat to be removed (7.53 ha of native vegetation) are substantially degraded and located on the fringes of a larger area of connective habitat provided by native vegetation and established habitat. Therefore, it is unlikely that the action will fragment an existing population into two or more populations.
4)	Adversely affect habitat critical to the survival of a species <i>Note: 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:</i> • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long-term evolutionary development, or • for the reintroduction of populations or recovery of the species or ecological community.	The proposed action would impact 7.53 ha of native vegetation that represent potential dispersal habitat. The area of potential habitat to be impacted represents a marginal portion of the habitat available for the species in the development site because it is located within a highly degraded waste facility. The proposed action includes revegetating part of the development site for use as parklands. Therefore, it is unlikely that the proposed action will adversely affect potential habitat to the detriment of the survival of the species.
5)	Disrupt the breeding cycle of an important population	The proposed action will not disrupt the breeding cycle of the Green and Golden Bell Frog given that no breeding habitat will be affected by the proposed action and suitable habitat is available adjacent to the development site.
6)	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will remove 7.53 ha of native vegetation and associated dams, which represent potential dispersal habitat for the Green and Golden Bell Frog. It is unlikely that the extent of this impact will cause the species to decline because the potential habitat is degraded and located within the existing waste Facility. More suitable habitat is available

Criterion	Question	Response
		adjacent to the development site and part of the development site will be revegetated for use as parklands.
7)	Result in an invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	A number of invasive fish species, especially <i>Gambusia holbrooki</i> (Eastern Mosquitofish), and <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> (Bitou Bush) have been identified as main threats to the Green and Golden Bell Frog. The proposed action is unlikely to result in harmful invasive species becoming established in existing habitat for the Green and Golden Bell Frog and will instead remove existing infestations of Bitou Bush which currently dominate the development site.
8)	Introduce disease that may cause the species to decline	Infection with <i>Batrachochytrium dendrobatidis</i> (Chytrid Fungus) is listed as a main threat to the Green and Golden Bell Frog. The proposed action is unlikely to introduce the Chytrid Fungus.
9)	Interfere substantially with the recovery of the species	The proposed action will remove potential dispersal habitat for this species in substantially degraded condition. However, the action will also remove invasive weeds, including <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> (Bitou Bush), which are an identified threat to the Kurnell Key Population. More suitable habitat for the species is present in connective vegetation within the assessment area and the pond designed specifically as Green and Golden Bell Frog habitat to the north of the development site. Therefore, the action will not interfere substantially with the recovery of the species.
There is a possibility of a significant impact on the green and golden bell frog, and a referral under the EPBC Act should be considered, if the action results in (DAWE 2009b):		
1)	The removal or degradation of aquatic or ephemeral habitat either where the green and golden bell frog has been recorded since 1995 or habitat that has been assessed as being suitable according to these guidelines. This can include impacts from chytrid, <i>Gambusia</i> originating off-site	The proposed action will remove four waterbodies that represent potential habitat for this species. According to the BioNet Atlas, the species was recorded within the development site 25 times between 1995 and 2009. Three other waterbodies that represent potential habitat for this species are located directly adjacent to the development site and will not be affected by the proposed action.
2)	The removal or degradation of terrestrial habitat within 200 metres of habitat identified in threshold 1	The proposed action will impact 7.53 ha of native vegetation that represent potential dispersal habitat for the Green and Golden Bell Frog in the form of substantially degraded occurrences of PCTs 661 and 772.
3)	Breaking the continuity of vegetation fringing ephemeral or permanent waterways or other vegetated corridors linking habitats meeting the criteria in threshold 1	The vegetation proposed to be removed is degraded and fragmented. Vegetation corridors linking habitat are available adjacent to the development site and part of the development site will be revegetated for use as parklands.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Green and Golden Bell Frog for the following reasons: The potential Green and Golden Bell Frog habitat to be removed (7.53 ha of native vegetation) is

Criterion	Question	Response
		substantially degraded, fragmented by the operational waste facility and surrounded of a larger area of connective habitat provided by native vegetation and purpose-designed habitat. • No breeding habitat will be removed by the proposed action.

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

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act. The distribution and habitat associations of this threatened species are presented in Appendix D. This species was not identified within the development site during surveys, however native vegetation within the development site is considered to potentially provide marginal foraging habitat. No camps were identified within the development site and the nearest Nationally Important Flying-fox Camp is located approximately 8 km west of the development site at Kareela. Significant Impact Criteria for this species are applied in Table 24.

Table 24: Application of the Significant Impact Criteria to the Grey-headed Flying-fox

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	Lead to a long-term decrease in the size of an important population of a species <i>Note: An 'important population' is a population that is necessary for a species' long-term survival and recovery.</i>	No roosting habitat (camps) will be affected by the proposed action. The proposed action will affect 7.53 ha of native vegetation, some of which comprises marginal foraging habitat for the Grey-headed Flying-fox. The Grey-headed Flying-fox is recorded as travelling long distances (up to 50 km) on feeding forays. Given the proximity of more suitable habitat in connective vegetation within the assessment area, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox.
2)	Reduce the area of occupancy of an important population	The proposed action would affect 7.53 ha of potential foraging habitat for this species. The Grey-headed Flying-fox is not known to occupy the development site in the form of a camp but may occasionally forage within the development site. The Grey-headed Flying-fox is recorded as travelling long distances on feeding forays and would likely utilise the potential foraging habitat outside of the development site.
3)	Fragment an existing important population into two or more populations	According to the Draft Recovery Plan for the Grey-headed Flying-fox 2017, "the Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT." The proposed action will not fragment an existing important population into two or more populations. No camps will be affected by the proposed action and other areas of foraging habitat are available for this highly mobile species within the region.
4)	Adversely affect habitat critical to the survival of a species <i>Note: 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:</i> <i>for activities such as foraging, breeding, roosting, or dispersal</i> <i>for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of</i>	The Draft Recovery Plan for the Grey-headed Flying-fox 2017 identifies 'a continuous temporal sequence of productive foraging habitats, linked by migration corridors or stopover habitats, and suitable roosting habitat within nightly commuting distance of foraging areas' as habitat critical to the survival of the species. The proposed action will affect 7.53 ha of native vegetation, some of which may represent habitat critical survival to this species. However, this impact is considered unlikely to have an adverse effect given that the species is recorded as travelling long

Criterion	Question	Response
	<i>the species or ecological community, such as pollinators)</i> <i>to maintain genetic diversity and long-term evolutionary development, or</i> <i>for the reintroduction of populations or recovery of the species or ecological community.</i>	distances (50 km) on feeding forays and similar habitat is available adjacent to the development site.
5)	Disrupt the breeding cycle of an important population	The proposed action will not disrupt the breeding cycle of the Grey-headed Flying-fox given that no camps will be affected by the proposed action and suitable foraging habitat is available adjacent to the development site.
6)	Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will remove 7.53 ha of vegetation, including marginal foraging habitat for the Grey-headed Flying-fox. It is unlikely that the extent of this vegetation removal will cause the species to decline because suitable habitat is available adjacent to the development site.
7)	Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the Grey-headed Flying-fox.
8)	Introduce disease that may cause the species to decline, or	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus, Hendra Virus and Menangle virus which can cause clinical disease and mortality in Grey-headed Flying-fox. The proposed action would not increase the incidence of this disease.
9)	Interfere substantially with the recovery of the species.	The proposed action will remove suitable foraging habitat for this species; however this will not interfere substantially with recovery objectives listed in the Draft National Recovery Plan for the Grey-headed Flying-fox 2017. The proposed action will not affect any camps and suitable foraging habitat is available adjacent to the development site.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Grey-headed Flying-fox for the following reasons: - No camps will be removed by the proposed action. - More suitable foraging habitat for this highly mobile species is available adjacent to the development site and throughout the region.

6.1.3 Towra Point Nature Reserve

The proposed development has been designed to ensure that any stormwater runoff is captured by proposed treatment measures on site and is then discharged through infiltration ponds or detention basins, following appropriate water quality treatment. To mitigate potential impacts associated with stormwater management, a number of management measures are proposed such as:

- vegetated swales to capture and treat surface runoff;
- infiltration basins to collect flows from the vegetated swales and storm events;
- bioretention basins to treat surface water runoff;
- proprietary cartridge filters to capture and contain sediments and nutrients from sealed pavements and roof areas;
- hydrodynamic separators to capture and contain oil and grease runoff from sealed pavements;
- wheel washing of trucks and other vehicles to contain contaminated materials and dust on site; and
- dust suppression of stockpiles on site to contain dust materials.

To aid in the assessment of potential impacts to the nearby Coastal Wetlands and Littoral Rainforests, Cardno (2021) has undertaken MUSIC Modelling to predict the quantity and quality of surface and groundwater flows both pre and post-development. The results are summarised in Table 25 and Table 26 below.

Table 25: MUSIC Model results pre and post development (Cardno, 2021)

Parameter	Current Landform				Post-Development			
	North	South	South-East	West	North	South	South-East	West
Flow (ML/yr)	263	95.8	82.6	21.5	88.1	45.5	56.6	9.25
Total Suspended Solids (kg/yr)	154,000	102,000	66,300	24,100	14,100	2,600	2,040	574
Total Phosphorus (kg/yr)	88.7	48.8	34.7	11.4	38.2	7.09	6.23	1.43
Total Nitrogen (kg/yr)	528	211	175	48.6	389	71.1	59.4	14.1
Gross Pollutants (kg/yr)	430	2,410	0	568	14.6	31.2	7.8	8.31

Table 26: MUSIC Model change (%) in parameters (Cardno, 2021)

Parameter	Change (%)			
	North	South	South-East	West
Flow (ML/yr)	-67%	-53%	-31%	-57%
Total Suspended Solids (kg/yr)	-91%	-97%	-97%	-98%
Total Phosphorus (kg/yr)	-57%	-85%	-82%	-87%
Total Nitrogen (kg/yr)	-26%	-66%	-66%	-71%
Gross Pollutants (kg/yr)	-97%	-99%	-	-99%

The results indicate that both water quantity and quality exiting the development site will decrease significantly from all directions with the exception of gross pollutants in the south-east. Currently, there

is approximately 2,170kg/yr of gross pollutants within the existing catchment, that is being captured by the existing storage ponds and therefore not exiting the site. As the proposed development will result in the construction of sealed surfaces in this area, gross pollutants may increase.

The development site is located directly south of the Towra Point Nature Reserve, a Nationally Important Wetland listed as Australian Ramsar site number 23 under the Ramsar Convention of Wetlands 1971 (Figure 4). The proposal does not include impacts to these wetlands; however a precautionary approach was adopted and Significant Impact Criteria for this Ramsar wetland were applied in Table 27.

Table 27: Application of the Significant Impact Criteria to the Towra Point Nature Reserve

Criterion	Question	Response
An action is likely to have a significant impact on the ecological character of a declared Ramsar wetland if there is a real chance or possibility that it will result in:		
1)	Areas of the wetland being destroyed or substantially modified	The proposed action does not include destroying or modifying the Towra Point Nature Reserve. The location of the action is limited to the development site (as displayed in Figure 2) which is separated from the wetland by vegetation, Captain Cook Drive and developed land. Potential indirect effects of the proposed action on the Ramsar wetland would be limited to changes in water quality. However, MUSIC Modelling by Cardno (2021) has shown that the water quality treatment measures will reduce the quantity of pollutants entering the wetland
2)	A substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing duration and frequency of ground and surface water flows to and within the wetland	At present, the hydrological regime of the wetland is affected by the operation of the Breen Resource Management Facility. MUSIC Modelling indicates that the proposed action would reduce the volume of flow to the wetland from the development site by an average of 52%. Therefore, the proposed action would change surface water flow. However, this change is not considered detrimental as it will reduce the input of pollutants from the development site into the wetland. Furthermore, the Coastal Wetlands are estuarine, and thus not dependent on ground and surface water flows.
3)	The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected	The proposed action will not directly impact the habitat or lifecycle of native invertebrate fauna and fish species dependent upon the wetland. Indirect effects of the proposed action on species dependent upon the Ramsar wetland would be limited to changes in water quality. However, MUSIC Modelling by Cardno (2021) has shown that such effects would reduce the number of pollutants entering the wetland rather than seriously affecting it to the detriment of native invertebrate fauna and fish species.
4)	A substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or	At present, the water quality of the wetland is affected by the operation of the Breen Resource Management Facility. MUSIC Modelling indicates that the proposed action would significantly reduce the amount of total suspended solids, phosphorous, nitrogen and gross pollutants flowing into the wetland (Cardno 2021). Therefore, the proposed action

Criterion	Question	Response
		would not result in a substantial and measurable change in the water quality of the wetland.
5)	An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to the ecological character of the wetland.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Towra Point Nature Reserve for the following reasons: • The wetland will not be directly impacted by the proposed action. • MUSIC Modelling (Cardno 2021) indicates that the proposed action would improve water quality of the wetland through a significant reduction in the volume of surface runoff and infiltration.

6.2 State Environmental Planning Policy (Coastal Management) 2018

As shown in Figure 5, the study area contains areas mapped as 'Proximity to Coastal Wetlands and Littoral Rainforests' under the Coastal Management SEPP. The development site is also mapped as being within the Coastal Use Area and Coastal Environment Area.

Clause 11 (1) of the Coastal Management SEPP states:

Development consent must not be granted to development on land identified as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on:

- *the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or*
- *the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.*

Clause 13 (1) and (2) of the Coastal Management SEPP state:

1. *Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—*
 - *the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*
 - *coastal environmental values and natural coastal processes,*
 - *the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,*
 - *marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*
 - *existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
 - *Aboriginal cultural heritage, practices and places,*
 - *the use of the surf zone.*
2. *Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that—*
 - a. *the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1).*

Clause 14 (1) of the Coastal Management SEPP states:

1. *Development consent must not be granted to development on land that is within the coastal use area unless the consent authority—*

- a. *has considered whether the proposed development is likely to cause an adverse impact on the following—*
- *existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
 - *overshadowing, wind funnelling and the loss of views from public places to foreshores,*
 - *the visual amenity and scenic qualities of the coast, including coastal headlands,*
 - *Aboriginal cultural heritage, practices and places,*
 - *cultural and built environment heritage, and*
- b. *is satisfied that—*
- *the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or*
 - *if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
 - *if that impact cannot be minimised—the development will be managed to mitigate that impact, and*
 - *has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.*

Consideration of the proposed works in accordance with the clauses of the Coastal Management SEPP are addressed in Table 28.

Table 28: Response to Coastal Management SEPP Clauses

Coastal Management Zone	Development Control	Relevance to the Proposed Works
Proximity to Coastal Wetland and Littoral Rainforest	11 (1)(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest	The proposed works will not be carried out in or immediately adjacent to the vegetation considered (through field validation and BAM floristic plots) to be Coastal Wetland or Littoral Rainforest. No vegetation within the mapped Coastal Wetlands or Littoral Rainforests is proposed for removal therefore, the biophysical and ecological integrity of these areas will remain unchanged. Changes in hydrological integrity are discussed below.
	11(1)(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest	The MUSIC Modelling undertaken by Cardno (2021) for the study area identified that the degree of flow (MG/yr) will decrease due to proposed stormwater management measures described above. However, this change is not considered detrimental as it will reduce the input of pollutants from the development site into the Coastal Wetlands and Littoral Rainforests. Furthermore, the Coastal Wetlands are estuarine, and thus not dependent on ground and surface water flows and Littoral Rainforests are known to occur within 2 km of the coast, and sometimes on headlands therefore, changes to the groundwater flow are unlikely to significantly impact this community. As summarised in Table 25, Suspended Soils, Phosphorus, Nitrogen and Gross Pollutants levels will all significantly decrease post-development to the west and north of the development site, where the Coastal Wetlands and Littoral Rainforests are located therefore, improving overall water quality entering these areas .
Coastal Environment Area	13 (1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following— the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,	No vegetation within the mapped Coastal Wetlands or Littoral Rainforests is proposed for removal therefore, the biophysical and ecological integrity of these areas will remain unchanged. The MUSIC Modelling undertaken by Cardno (2021) concluded that the quality of water exiting the development site will significantly improve due to the proposed stormwater management initiatives. Although the amount of flow exiting the development site will decrease, this is not considered likely to significantly impact the hydrological integrity of the surrounding environment.
	coastal environmental values and natural coastal processes	The proposed redevelopment of the site is not located within the beach or dune area of the coastal environment and is therefore not going to impact on coastal environmental values and natural coastal processes.
	the water quality of the marine estate (within the meaning of the <i>Marine Estate Management Act 2014</i>), in particular, the cumulative impacts of the	In accordance with Section 6 of the <i>Marine Estate Management Act 2014</i> , ‘Marine Estate’ is defined as: a. <i>the coastal waters of the State within the meaning of Part 10 of the Interpretation Act 1987,</i>

Coastal Management Zone	Development Control	Relevance to the Proposed Works
	proposed development on any of the sensitive coastal lakes identified in Schedule 1,	b. <i>estuaries (being any part of a river whose level is periodically or intermittently affected by coastal tides) up to the highest astronomical tide,</i> c. <i>lakes, lagoons and other partially enclosed bodies of water that are permanently, periodically or intermittently open to the sea,</i> d. <i>coastal wetlands (including saltmarsh, mangroves and seagrass),</i> e. <i>lands immediately adjacent to, or in the immediate proximity of, the coastal waters of the State that are subject to oceanic processes (including beaches, dunes, headlands and rock platforms),</i> f. <i>any other place or thing declared by the regulations to be the marine estate.</i> As discussed above and presented in Table 25, the overall water quality exiting the development site will significantly improve therefore, creating a beneficial outcome for the mapped Coastal Wetlands and in proximity to the development site.
	marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,	The study area is located upstream from marine environments and does not contain any habitat features for marine fauna or any marine vegetation.
	existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	The proposed development is located solely on Breen Resources Land, part of which is proposed to be dedicated to Sutherland Shire Council as part of a VPA. Once complete, the proposed development will provide increased safe public access to the proposed parklands.
	Aboriginal cultural heritage, practices and places,	Aboriginal and cultural heritage has not been assessed as part of this scope of works.
	the use of the surf zone.	The study area is located inland from the surf zone and therefore there is not considered to be an impact to the use of the surf zone of this beach as a result of the proposed works.
Coastal Use Area	14 (1) Development consent must not be granted to development on land that is within the coastal use area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following— existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	The proposed development is located solely on Breen Resources Land, part of which is proposed to be dedicated to Sutherland Shire Council as part of a VPA. Once complete, the proposed development will provide increased safe public access to the proposed parklands.

Coastal Management Zone	Development Control	Relevance to the Proposed Works
	overshadowing, wind funnelling and the loss of views from public places to foreshores,	The proposed development is to take place inland from foreshore areas and within an area already subject to significant clearing and development through the operation of the existing waste facility. As part of the proposed development, a public reserve will be reinstated in turn, improving views in the long-term.
	the visual amenity and scenic qualities of the coast, including coastal headlands,	The proposed development is located upstream from coast and foreshore areas and therefore any additional buildings would not affect the visual amenity of coastal areas. Regardless, as part of the proposed development, a public reserve will be reinstated in turn, improving the visual amenity of the headland.
	Aboriginal cultural heritage, practices and places,	Aboriginal heritage has not been assessed as part of this scope of works.
	cultural and built environment heritage.	Cultural heritage has not been assessed as part of this scope of works.

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Appendix A Definitions

Terminology	Definition
Assessment area	The area of land in the 1500m buffer zone around a development site.
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the Atlas of NSW Wildlife) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Breen	Breen Resources Pty Ltd
Condition	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
DA269/90	A consent applying across the land which provides for the establishment of a depot including selected recycling facilities to receive excavated materials and selected demolition materials (including bricks, tiles and concrete spall), and for the restoration of the land by application of the materials to the land.
DA11-0665	A consent applying across part of the land which provides for the construction of playing fields in accordance with VPA. DA11-0665 is a Staged Development Consent, and subsequent detailed approvals are provided under the following related consents: • DA11-0941 for bulk earthworks. • DA12-0083 for Stage 2 playing fields and the roads, services and landscaping for Stage 1B. • DA12-0439 for Stage 3 playing fields. • DA12-1066 for Stage 1A skate park.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development site	An area of land that is impacted by a proposed development that is under the EP&A Act. Specifically, the part of the Subject Site impacted by the Development. The development site is located at 330 Captain Cook Drive, Kurnell and is within the Sutherland Shire local government area (LGA). It comprises the following lots: • Lot 1122 DP794114 (Lot 1122) • Lot 1123 DP79411 (Lot 1123); • Lot 5 DP1158627 (Lot 5); • Lot 6 DP1158627 (Lot 6). As displayed in Figure 2.

Terminology	Definition
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
Embellished Marang Parklands	The Marang Parkland as now proposed to be delivered as part of this SSDA, which contain a range of improvements and embellishments over and above the 2010 Voluntary Planning Agreement commitments.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Key Fish Habitat	Aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. A list of habitats included and not included under this definition is available at: https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps#Policy
Key Populations of Green and Golden Bell Frog	Populations considered to have significant measures of viability (regularly sighted at a locality, 10 or more adult individuals having been detected on more than one occasion over the last 5 years, breeding events having been observed over the last 10 years) and/or have a regional distribution considered essential or vital to the state-wide conservation of the species.
Landfill	A landfill is an engineered, in-ground facility for the safe and secure disposal of waste by applying the waste to the land.
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site.
Percent cleared	The percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the BioNet Vegetation Classification.
Playing Fields	The playing fields and associated works approved under: • DA11-0665; • DA11-0941; • DA12-0083; • DA12-0439; and • DA12-1066.

Terminology	Definition
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Proposal	The Proposal is comprised of the delivery of the Embellished Marang Parklands, the continuation of landfilling on the residual parts of Lot 5 and the construction of the New Resource Recovery Facility. Specifically, the Proposal involves the following key integrated components: • Construction and operation of a resource management facility, comprising: • A New Resource Recovery Facility on the eastern part of the development site (Lot 5), including consolidation of existing waste management activities within this part of the development site; and • A waste disposal facility, being the continuation of current land restoration, landfilling and contouring operations at the development site by permanent application of some of the residual waste materials from the New Resource Recovery Facility to land on Lot 5; • Use of suitable material processed by the New Resource Recovery Facility to cap, contour and re-profile areas of the development site and to construct the Embellished Marang Parklands on Lots 1122, 1123 and Lot 6; • Re-profiling of parts of the Proposal Site within Lots 1122, 1123 and 6, with some existing waste materials from those lots; • Delivery of an activated and integrated community space in the form of the Embellished Marang Parklands on Lots 1122, 1123 and Lot 6, to provide a superior parkland to that proposed under the Volunteer Planning Agreement (VPA) as detailed in Section 4.4.3 of this Environment Impact Statement. This will include, among other things, integrated water usage and management and utilising personnel, plant, material and infrastructure across the whole of the site.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject site	The entirety of the Existing Breen Resources Facility, being Lot 1122 and Lot 1123, and Lot 5 and Lot 6.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by E and accessible from the BioNet website.

Terminology	Definition
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix B Vegetation plot data

Table 29: Species matrix (species recorded by plot)

Stratum	Form	Scientific name	Exotic (*)	High Threat Weed (*)	Cover % Plot 1 (PCT 661)	Cover % Plot 2 (PCT 772)	Cover % Plot 3 (PCT 661)	Cover % Plot 4 (PCT 661)
M	SG	<i>Acacia baileyana</i>			0.5			
U	TG	<i>Acacia decurrens</i>			3			
M	SG	<i>Acacia falcata</i>			1	2	20	10
G	SG	<i>Acacia longifolia</i>				3		
G		<i>Ageratina adenophora</i>	*	*		0.2		
G		<i>Asparagus aethiopicus</i>	*	*		0.1	0.1	
G		<i>Avena fatua</i>	*			0.1		
U	TG	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>				0.5		
G		<i>Bidens subalternans</i>	*	*	0.5	0.1	0.1	0.1
G		<i>Brassica oleracea</i>	*				0.1	0.1
U	TG	<i>Casuarina glauca</i>					5	
G		<i>Cenchrus pennisetiformis</i>	*	*	5	20	5	1
G		<i>Chloris gayana</i>	*	*			80	2
M		<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	*	*	60			
G		<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	*	*		1	3	0.3
G		<i>Cirsium vulgare</i>	*		0.1		0.1	
G		<i>Conyza bonariensis</i>	*		0.1		0.1	
G		<i>Cortaderia selloana</i>	*	*		0.2	0.1	
M		<i>Cotoneaster glaucophyllus</i>	*		0.5			
G		<i>Cynodon dactylon</i>	*		0.1	15		95
G		<i>Ehrharta erecta</i>	*	*	1			
G		<i>Foeniculum vulgare</i>	*		0.2	0.1		

Stratum	Form	Scientific name	Exotic (*)	High Threat Weed (*)	Cover % Plot 1 (PCT 661)	Cover % Plot 2 (PCT 772)	Cover % Plot 3 (PCT 661)	Cover % Plot 4 (PCT 661)
G		<i>Gamochaeta</i> spp.	*				0.1	
G		<i>Eragrostis curvula</i>	*	*				0.1
G	FG	<i>Hypericum gramineum</i>					0.1	
G		<i>Lactuca serriola</i> f. <i>serriola</i>	*			0.1		
M		<i>Lantana camara</i>	*	*	2	1	0.2	
M	SG	<i>Leptospermum laevigatum</i>				0.5	0.5	
G		<i>Leucojum aestivum</i>	*			0.1		
G	GG	<i>Lomandra longifolia</i>				0.1		
G		<i>Medicago sativa</i>	*				0.2	
G		<i>Hydrocotyle bonariensis</i>	*			1		0.1
G		<i>Modiola caroliniana</i>	*		0.1			
G		<i>Narcissus</i> spp.	*			0.1		
M		<i>Olea europaea</i> subsp. <i>cuspidata</i>	*		3			
G		<i>Olea europaea</i> subsp. <i>cuspidata</i>	*			3		
G		<i>Panicum capillare</i> var. <i>capillare</i>	*		0.5			
G		<i>Ipomoea indica</i>	*	*				0.1
G		<i>Pavonia hastata</i>	*			0.1		
M	SG	<i>Pittosporum undulatum</i>				0.5		
G		<i>Lupinus cosentinii</i>	*					0.1
M		<i>Lupinus luteus</i>	*				0.1	0.1
G		<i>Polygala virgata</i>	*	*			0.1	
G		<i>Melilotus albus</i>	*			0.2	1	0.1
G		<i>Senecio pterophorus</i>	*		0.1			
G		<i>Senecio vulgaris</i>	*		0.1			
G		<i>Setaria parviflora</i>	*		0.1			
G		<i>Sida rhombifolia</i>	*				0.1	
G		<i>Solanum nigrum</i>	*		0.1	0.1	0.1	
G		<i>Paspalum dilatatum</i>	*	*		0.2	0.1	0.1
G		<i>Plantago lanceolata</i>	*		0.1	0.1	0.1	0.1

Stratum	Form	Scientific name	Exotic (*)	High Threat Weed (*)	Cover % Plot 1 (PCT 661)	Cover % Plot 2 (PCT 772)	Cover % Plot 3 (PCT 661)	Cover % Plot 4 (PCT 661)
G		<i>Stenotaphrum secundatum</i>	*	*		30		
G	OG	<i>Stephania japonica</i> var. <i>discolor</i>					0.2	
M		<i>Ricinus communis</i>	*	*	0.1			
G		<i>Ricinus communis</i>	*	*		0.1		0.1
G		<i>Trifolium repens</i>	*			0.1		
G		<i>Sonchus oleraceus</i>	*		0.1	0.1	0.1	0.1
G		<i>Vicia sativa</i> subsp. <i>sativa</i>	*			0.1	0.2	
G		<i>Stellaria media</i>	*			1		0.1
G		<i>Trifolium dubium</i>	*			0.1		0.1
G		<i>Verbena bonariensis</i>	*			0.1	0.3	0.1

Key: U = Upper, M= Middle, G = Ground. EG = Fern, FG = Forb, GG = Grass & grasslike, OG = Other, SG = Shrub, TG = Tree.

Table 30: Plot location data

Plot no.	PCT	Vegetation Zone	Condition	Zone	Latitude	Longitude	Bearing (°)
1	661	1	Low	56	-34.02471	151.17237	276
2	772	2	Low	56	-34.02751	151.16932	80
3	661	1	Low	56	-34.02562	151.17324	107
4	661	1	Low	56	-34.0278709	151.1764469	63

Table 31: Vegetation integrity data (Composition, Structure and function)

Composition (number of species)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	1	2	0	0	0	0
2	1	4	1	0	0	0
3	1	2	0	1	0	1
4	0	1	0	0	0	0

Structure (Total cover %)						
Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
1	3.0	1.5	0.0	0.0	0.0	0.0
2	0.5	6.0	0.1	0.0	0.0	0.0
3	5.0	20.5	0.0	0.1	0.0	0.2
4	0.0	10.0	0.0	0.0	0.0	0.0

Function												
Plot no.	Large Trees (DBH > 50 cm)	Hollow trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stem 5-9 cm	Tree Stem 10-19 cm	Tree Stem 20-29 cm	Tree Stem 30-49 cm	Tree Stem 50-79 cm	Tree Stem 80+ cm	Tree Regen	High Threat Weed Cover (%)
1	0	0	20.4	4	1	1	0	0	0	0	0	68.6
2	0	0	17.2	0	0	1	0	0	0	0	0	52.9
3	0	0	54.6	0	1	1	1	0	0	0	1	88.7
4	0	0	3	0	0	0	0	0	0	0	0	3.8

Note: For stem size classes: 0 = Absence, 1 = Presence.



Figure 16: Start (left) and end (right) of Plot 1

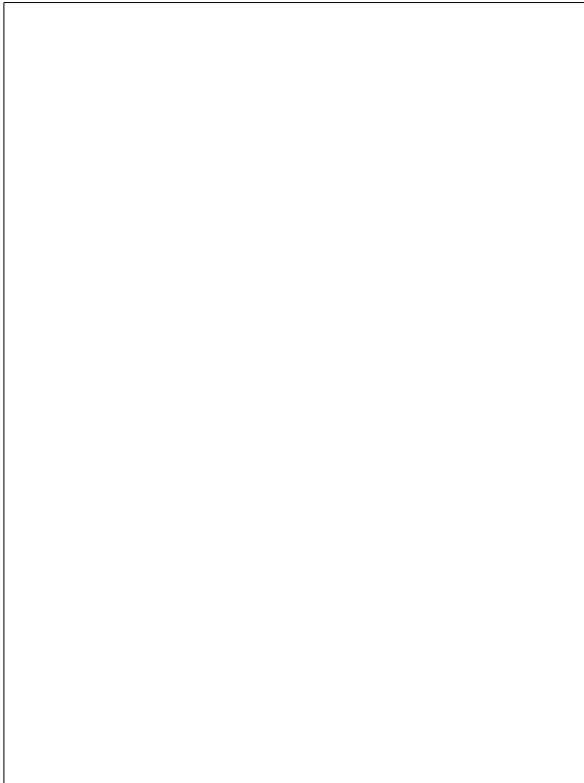


Figure 17: Start (left) and end (right) of Plot 2



Figure 18: Start (left) and end (right) of Plot 3



Figure 19: Start (left) and end (right) of Plot 4

Appendix C Biodiversity credit report (to be finalised)



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021613/BAAS18162/20/00021616	Breen Resources	20/08/2020
Assessor Name	Report Created	BAM Data version *
Mike Lawrie	14/10/2020	30
Assessor Number	BAM Case Status	Date Finalised
BAAS18162	Open	To be finalised
Assessment Revision	Assessment Type	
3	Part 4 Developments (General)	

* 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.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
Coastal foredune wattle scrub								
	2 772_Low	2.0	1.6	0.25	High Sensitivity to Potential Gain	1.75		0
Subtotal								0

Assessment Id	Proposal Name
00021613/BAAS18162/20/00021616	Breen Resources

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BAM Credit Summary Report

Coastal sand littoral forest						
1	661_Degraded	3.2	5.9	0.25	High Sensitivity to Potential Gain	2.00
					Subtotal	0
					Total	0

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAI	Species credits
<i>Litoria aurea</i> / Green and Golden Bell Frog (Fauna)						
661_Degraded	3.2	5.9	0.25	2	False	9
772_Low	2.0	1.6	0.25	2	False	2
					Subtotal	11

Assessment Id
00021613/BAAS18162/20/00021616

Proposal Name
Breen Resources

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Appendix D EPBC Act Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Only species listed under the EPBC Act were included in the assessment. Species listed only under the BC Act were assessed as part of determining credit species included in the BAMC. Five key terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

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

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

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

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

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
FAUNA						
<i>Actitis hypoleucos</i>	Common Sandpiper	M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also, estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	11	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of Casuarina cunninghamiana (River Oak).	0	Unlikely – The development site is substantially degraded and does not contain the preferred foraging items of this species, such as eucalypt or mistletoe species.	No
<i>Apus pacificus</i>	Fork-tailed Swift	M	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	10	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Ardea alba</i>	Great Egret	M	Widespread, occurring across all states/territories. Also, a vagrant on Lord Howe and Norfolk Island. Swamps and marshes, grasslands, margins of rivers and lakes, salt pans, estuarine mudflats and other wetland habitats.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Ardea ibis</i>	Cattle Egret	M	Widespread and common across NSW. Grasslands, wooded lands and terrestrial wetlands.	267	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (bullrushes) and <i>Eleocharis</i> spp. (spikerushes).	3	Unlikely – the development site does not contain suitable habitat for this species.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	1264	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Calidris alba</i>	Sanderling	M	Occur along the NSW coast, with occasional inland sightings. Arrives from September and leaves by May (some may overwinter in Australia). Coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and lagoons; rarely recorded in near-coastal wetlands.	39	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Calidris canutus</i>	Red Knot	M	Summer migrant to Australia. In NSW, widespread in suitable habitat along the coast. Occasionally recorded inland in all regions. Intertidal mudflats, sandflats sheltered sandy beaches, estuaries, bays, inlets, lagoons, harbours, sandy ocean beaches, rock platforms, coral reefs, terrestrial saline wetlands near the coast, sewage ponds and saltworks. Rarely inland lakes or swamps.	114	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	158	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Calidris melanotos</i>	Pectoral Sandpiper	M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Calidris ruficollis</i>	Red-necked Stint	M	Summer migrant to Australia, widespread coastal and inland NSW. Tidal mudflats, saltmarshes, sandy and shelly beaches, saline and freshwater wetlands, saltfields, sewage ponds.	12837	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
<i>Calidris subminuta</i>	Long-toed Stint	M	Summer migrant to Australia. Widely scattered irregular records in NSW. Coastal and inland shallow wetlands, sewage ponds, tidelines, tidal mudflats.	0	Unlikely – the development site is substantially degraded, more suitable habitat is present to the north and south of the development site, no local records.	No
<i>Calidris tenuirostris</i>	Great Knot	CE, M	In NSW, recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	14	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	0	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Charadrius leschenaultii</i>	Greater Sand-plover	V, M	In NSW, recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	10	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Charadrius mongolus</i>	Lesser Sand-plover	E, M	Summer migrant to Australia. Found around the entire coast but in NSW most common on north coast. Rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, using sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, sandy beaches, coral reefs and rock platforms.	137	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Charadrius veredus</i>	Oriental Plover	M	Regular summer migrant to Australia, recorded all states including coastal NSW. Open plains, ploughed land, inland swamps, tidal mudflats, claypans, coastal marshes, grassy airfields, playing fields, lawns.	0	Unlikely – the development site is substantially degraded and forms part of an active waste facility, more suitable habitat is present to the north	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
					and south of the development site, no local records	
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Gallinago hardwickii</i>	Latham's Snipe	M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	5	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Grantiella picta</i>	Painted Honeyeater	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Hirundapus caudacutus</i>	White-throated Needle-tail	M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	116	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	V	Largely confined to Triassic and Permian sandstones within the coast and ranges in an area within approximately 250 km of Sydney. Dry and wet sclerophyll forests, riverine forests, coastal heath swamps, rocky outcrops, heaths, grassy woodlands.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Isoodon obesulus obesulus</i>	Southern Brown	E	Found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River. Heath or open forest with a heathy understorey on sandy or friable soils.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
	Bandicoot (eastern)					
<i>Lathamus discolor</i>	Swift Parrot	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Limosa lapponica</i>	Bar-tailed Godwit	M	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also, numerous scattered inland records. Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	21932	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Limosa limosa</i>	Black-tailed Godwit	M	Arrives in August and leaves in March. In NSW, most frequently recorded at Kooragang Island, with occasional records elsewhere along the coast, and inland in the Murray-Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state. Usually sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found around muddy lakes and swamps.	8	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region. Marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas.	614	Likely – the development site contains potential dispersal habitat for this species.	Yes
<i>Litoria raniformis</i>	Southern Bell Frog	V	In NSW, only known to exist in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few recent unconfirmed records have also been made in the Murray Irrigation Area. Permanent or ephemeral Black Box/Lignum/Nitre	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
			Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. Also found in irrigated rice crops.			
<i>Merops ornatus</i>	Rainbow Bee-eater	M	Distributed across much of mainland Australia, including NSW. Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	0	Unlikely – the development site is substantially degraded, more suitable habitat is present to the north and south of the development site, no local records.	No
<i>Monarcha melanopsis</i>	Black-faced Monarch	M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Motacilla flava</i>	Yellow Wagtail	M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	Unlikely – the development site is substantially degraded, more suitable habitat is present to the north and south of the development site, no local records.	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily vegetated gullies.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	Breeds in Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern SA and southern Victoria. Occasional reports from NSW, most recently Shellharbour and Maroubra in May 2003. Winter habitat is mostly within 3 km of the coast in sheltered bays, lagoons, estuaries, coastal dunes and saltmarshes. Also, small	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
			islands and peninsulas, saltworks, golf courses, low samphire herb land and taller coastal shrubland.			
<i>Numenius madagascariensis</i>	Eastern Curlew	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	13220	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Numenius minutus</i>	Little Curlew	M	Summer migrant to Australia. In NSW, most records scattered east of the Great Dividing Range, from Casino, south to Greenwell Point with a few scattered records west of the Great Dividing Range. Dry grasslands, open woodlands, floodplains, margins of drying swamps, tidal mudflats, airfields, playing fields, crops, salt fields, sewage ponds.	1	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Numenius phaeopus</i>	Whimbrel	M	Summer migrant to Australia. Found along almost the entire coast of NSW; scattered inland records. Estuaries, mangroves, tidal flats, coral cays, exposed reefs, flooded paddocks, sewage ponds, grasslands, sports fields, lawns.	3899	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Plegadis falcinellus</i>	Glossy Ibis	M	Recorded over much of NSW. Spring/summer breeding migrant to southern Murray-Darling region and Macquarie Marshes. Edges of lakes and rivers, lagoons, floodplains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Occasionally estuaries, deltas, saltmarshes and coastal lagoons.	3	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Pluvialis fulva</i>	Pacific Golden Plover	M	Regular widespread summer migrant to Australia, including coastal NSW, Lord Howe and Norfolk Island. Estuaries, mudflats, saltmarshes, mangroves, rocky reefs, inland swamps, ocean shores, paddocks, sewage ponds, ploughed land, airfields, playing fields.	1619	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
<i>Pluvialis squatarola</i>	Grey Plover	M	Regular summer migrant to coastal Australia, including NSW. Rarely inland, on passage. Mudflats, saltmarsh, tidal reefs and estuaries.	10	Unlikely – the development site does not contain suitable habitat for this species.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	36950	Potential – the development site contains marginal foraging habitat for this species.	Yes
<i>Rhipidura rufifrons</i>	Rufous Fantail	M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	Unlikely – the development site does not contain suitable habitat for this species, no local records.	No
<i>Rostratula australis</i>	Australian Painted Snipe	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	1	Unlikely – the development site does not contain suitable habitat for this species.	No
<i>Tringa nebularia</i>	Common Greenshank	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also, widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	407	Unlikely – the development site is substantially degraded; more suitable habitat is present to the north and south of the development site.	No
FLORA						
<i>Acacia bynoeana</i>	Bynoe's Wattle	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No

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<i>Acacia pubescens</i>	Downy Wattle	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Acacia terminalis</i> subsp. <i>terminalis</i>	Sunshine Wattle	E	Limited mainly to near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay. Coastal scrub and dry sclerophyll woodland on sandy soils.	6	No – suitable habitat not recorded within the development site; species not observed during surveys.	No
<i>Allocasuarina glareicola</i>		E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> .	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Caladenia tessellata</i>	Thick Spider Orchid	Lip V	Currently known from two disjunct areas; one population near Braidwood on the Southern Tablelands and three populations in the Wyong area on the Central Coast. Grassy sclerophyll woodland on clay loam or sandy soils, or low woodland with stony soil.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton." "Coastal heathlands, margins of coastal swamps and sedgeland, coastal forest, dry woodland, and lowland forest."	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley. Dry rainforest; littoral rainforest; <i>Leptospermum laevigatum</i> - <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> (Coastal Tea-tree–Coastal Banksia) coastal scrub; <i>Eucalyptus tereticornis</i> (Forest Red Gum) or <i>Corymbia maculata</i> (Spotted Gum) open forest and woodland; and <i>Melaleuca armillaris</i> (Bracelet Honey myrtle) scrub.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No

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<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Pericaria elatior</i>	Tall Knotweed	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Persoonia hirsuta</i>	Hairy Geebung	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Prostanthera densa</i>	Villous Mint-bush	V	Currarong area in Jervis Bay, Royal National Park, Cronulla, Garie Beach and Port Stephens (Gan Gan Hill, Nelson Bay). Sclerophyll forest and shrubland on coastal headlands and near-coastal ranges, chiefly on sandstone.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No

Scientific name	Common name	EPBC Act	Distribution and Habitat	BioNet records within 5 km	Likelihood of occurrence within development site	Impact Assessment Required
<i>Pterostylis Botany Bay</i>	sp. Botany Bay Bearded Orchid	E	Restricted to the Sydney region where it is known from a small number of sites within Botany Bay National Park on the Kurnell Peninsula. Coastal heath dominated by <i>Melaleuca nodosa</i> and <i>Baeckea imbricata</i> on skeletal sandy soils derived from sandstone.	160	No – suitable habitat not recorded within the development site; species not observed during surveys.	No
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	105	No – suitable habitat not recorded within the development site; species not observed during surveys.	No
<i>Thesium australe</i>	Austral Toadflax	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	0	No – suitable habitat not recorded within the development site, species not observed during surveys, no local records.	No

