



**ECOLOGICAL IMPACT ASSESSMENT
FOR HORNSBY PARK EMBELLISHMENTS
HORNSBY SHIRE COUNCIL
LOCAL GOVERNMENT AREA**

Job number: 2436

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Anderson Environmental Pty Ltd 87 164 830 728

Ph: 1300 302 507 Fax: (02) 8580 4731

Suite 19, 103 George Street, Parramatta 2150

www.andenviro.com.au



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Version	Date drafted	Drafted by
1	27/08/2022	Bo Davidson
2	01/04/2023	Bo Davidson
3	20/04/2023	Bo Davidson
4	24/04/2023	Bo Davidson
Version	Date reviewed	Reviewed by
1	29/09/2022	Jason Anderson
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Approved by		Date
Jason Anderson (Director)		24/04/2023

Executive Summary

Introduction

This Ecological Impact Assessment (EIA) has been drafted on behalf of Hornsby Shire Council (Council) to inform a Review of Environmental Factors (REF) assessing the potential ecological impacts of associated ancillary works to support the Hornsby Park project (the Project). The Project involves numerous additional works not included in the original Ecological Impact Statement (EIS) for the Hornsby Park Project. These works comprise:

1. Quarry Road Footpath;
2. Boardwalk from Skywalk to Crusher Plant;
3. Canopy Skywalk and Cable Bridge;
4. Urban Cycle Path;
5. Mountain Bike Tracks;
6. Higgins Link;
7. Quarry Void Precinct;
8. Western Drainage Area;
9. Pathway from Sports Field to Quarry Void;
10. Ancillary Tracks;
11. Drainage upgrades in the east, adjacent to the Sports Fields; and
12. Retaining wall below (west) of the playground area.

Methodology

This EIA was conducted in two phases, a desktop assessment and field surveys. The desktop assessment identified the potential presence of numerous listed threatened species, populations and Threatened Ecological Communities (TECs) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as known or considered likely to occur in the locality. The findings of the desktop assessment were used to inform the scope of the field surveys.

Field surveys were conducted on three occasions, in May, August and September of 2022 by one ecologist from Anderson Environmental. These surveys comprised a complete walk-through survey of the Project Area (with the exception of some minor bushwalking tracks) with Hornsby Shire Council staff and other involved contractors.

Results

The desktop study and field survey identified two Plant Community Types (PCTs) present on the Subject Land, and both occurred within the Project works areas:

1. Sydney Coastal Enriched Sandstone Forest (PCT3592); and
2. Blue Gum High Forest (PCT3136).

PCT3592 occurred as moderate/good – high and moderate/good – poor and PCT3136 only as moderate/good – poor condition. PCT3136 also conformed to the TEC of Blue Gum High Forest in the Sydney Basin Bioregion, listed as critically endangered under the BC Act. As per the Hornsby Park EIS, no PCT3136 vegetation on the Subject Land was assessed as meeting the condition thresholds for protection under the EPBC Act (as Blue Gum High Forest of the

Sydney Basin Bioregion).

No listed threatened flora species were detected during surveys and none are known from the Subject Land, with reference to the Hornsby Park EIS. Numerous threatened bird, gastropod and mammal species were considered to have a moderate or greater likelihood of occurrence, and several are known to occur on the Subject Land (from surveys for the EIS and subsequent Council surveys). The following threatened species have been recorded from the Hornsby Park site:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) – listed as vulnerable under the BC Act;
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – listed as vulnerable under the BC Act and endangered under the EPBC Act;
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) – listed as vulnerable under the BC Act and EPBC Act;
- Grey-headed Flying Fox (*Pteropus poliocephalus*) – listed as vulnerable under the BC Act and EPBC Act;
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – listed as vulnerable under the BC Act;
- Little Bent-winged Bat (*Miniopterus australis*) – listed as vulnerable under the BC Act;
- Powerful Owl (*Ninox strenua*) – listed as vulnerable under the BC Act; and
- Varied Sitella (*Daphoenositta chrysoptera*) – listed as vulnerable under the BC Act.

A pair of Powerful Owls are known to nest on the Subject Land and have been observed to have successfully raised chicks in the past few years, with reference to the Hornsby Park VMP.

Impact Assessment

The impacts of the Project on all known and species considered to have a moderate or greater likelihood of occurrence were consequently assessed through 5-part tests, as per Part 7.3 of the BC Act. These concluded that the Project was not likely to have a significant impact on these entities due to the small size of the impact area, the nature of the impact being primarily along existing tracks or adjacent to cleared areas, primarily removing largely exotic understory vegetation and the areas proposed for works already being frequented by park users.

The majority of impacts within areas of mapped native vegetation occur within weed-dominated understories or along existing tracks and other cleared areas which contain little native understory vegetation. The Canopy Skywalk and Cable Bridge sections would also pass through the canopy of these communities and would not require impact to the underlying vegetation with the exception of minimal limb removal. The impact areas presented in this report are therefore to be considered a “worst case” scenario, much of the calculated impact would not occur in reality due to the nature of the works described above and the condition of vegetation in the impacted areas.

The Project would remove some native vegetation and fauna habitat from the Subject Land. This would primarily involve the removal of three sub-emergent native trees for the Canopy Skywalk route and native understory and shrubs within the pier footprints. However, no high-value habitat items (caves, hollow-bearing trees, large fruiting and flowering trees etc.) would

be removed by the Project.

The majority of works would occur along existing paths and tracks and aside from an increase to pedestrian traffic are not considered likely to further degrade habitat utility for native flora and fauna adjacent to the works areas in the long term. The canopy skywalk will introduce a new interaction point in the canopy which may discourage use of this habitat for native fauna. However, this impact is considered to be minor, with the area proposed for the skywalk located in an already heavily frequented and tracked part of the Subject Land, with the species present already adapted to human visitation.

The long-term impacts of the Project on habitat utility of the local area are considered negligible. The Project is small in scale, would require minimal vegetation removal and would primarily occur within the more disturbed and frequented parts of the Subject Land currently open to public use. Large areas of similar condition native vegetation were present on adjacent lands and connectivity with the wider Berowra Valley National Park to the west would not be disrupted by the Project.

The Project was also assessed for entry into the Biodiversity Assessment Method (BAM), as per Part 6 of the BC Act. This assessment concluded that the Project did not meet either of the two entry requirements for the BAM (for Part 5 developments under the *Environmental Planning and Assessment Act 1979* (EPA Act)). The nearest Area of Outstanding Biodiversity Value (AOBV) is the Little Penguin population in Sydney's North Harbour, located over 20km to the south-east of the Subject Land. Regarding entry pathway 2, no significant impact on any TEC or threatened species assessed through the five-part tests was determined to occur as a result of the Project. Therefore, assessment through the BAM in the form of a Biodiversity Development Assessment Report (BDAR) is not considered necessary.

Recommendations

Numerous mitigation measures could be implemented during and following construction including sediment and weed control measures, limiting noise generating works and avoiding night works (to limit additional light pollution on adjacent areas of fauna habitat) as well as timing of works to avoid sensitive times for key threatened species (i.e., avoiding winter nesting for the Powerful Owl and winter torpor period for microbats).

Matters of National Environmental Significance (MNES)

Assessment of MNES determined that Project would not have a significant impact on any MNES identified within the locality. Tests of significance conducted for the Grey-headed Flying Fox concluded that the Project would not have a significant impact on this species and no referral to the federal Minister of the Environment was considered necessary. The Subject Land was assessed as meeting the definition of critical habitat for this species under the national Recovery Plan; however, the Project would not remove any mature feed trees, isolate or fragment any area of habitat or significantly affect critical life-stage habitat for the species, the impact was assessed as not significant.

Conclusion

Assessments under the BC Act and EPBC Act for the TEC present and threatened species known or considered likely to occur concluded that the Project is unlikely to have a significant impact on these entities.

Further assessment through a BDAR (BC Act) and/or a referral to the federal Minister of the Environment (EPBC Act) are not considered necessary. Residual impact on native vegetation as a result of the Project will be managed through Council's Green Offset Policy, consistent with the offsets policy already enacted for the wider Hornsby Park Project.

Glossary of Acronyms

BAM – Biodiversity Assessment Method

BC Act – *Biodiversity Conservation Act 2016*

BDAR – Biodiversity Development Assessment Report

CEEC – Critically Endangered Ecological Community

DoE – Department of the Environment

DPE – Department of Planning and Environment

EEC – Endangered Ecological Community

EIA – Environmental Impact Assessment

EPA Act – *Environmental Planning and Assessment Act 1979*

EPBC Act – *Environment Protection and Biodiversity Conservation Act 1999*

LGA – Local Government Area

NSW – New South Wales

NSW NPWS – New South Wales National Parks and Wildlife Service

NPW Act – *National Parks and Wildlife Act 1974*

PCT – Plant Community Type

TEC – Threatened Ecological Community

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1. INTRODUCTION

1.1 BACKGROUND

Anderson Environmental Pty Ltd (Anderson Environmental) was engaged by Hornsby Shire Council (Council) to prepare an Ecological Impact Assessment (EIA) for contribution to a Review of Environmental Factors (REF) assessing the potential ecological impacts of works associated ancillary works to support the Hornsby Park project (the Project).

This assessment considered the extent of works required for the construction of the above infrastructure, referred to as the Subject Land.

The purpose of this EIA is to:

- Consider the impact of the Project any threatened species, population or Threatened Ecological Communities (TECs) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Determine whether the Project would have a significant impact on any identified listed entity;
- Make recommendations to prevent, mitigate and/or minimise any potential impacts to native flora, fauna and ecological communities;
- Make recommendations for potential offset strategies.

This EIA also assesses the Project against the entry requirements for assessment through the Biodiversity Assessment Method (BAM) to determine whether the Project requires further assessment through a Biodiversity Development Assessment Report (BDAR).

1.2 DESCRIPTION OF THE PROJECT

The works considered in this EIA comprise:

1. Quarry Road footpath, footpath upgrade to support access to Hornsby Park via Quarry Road;
2. Boardwalk from Skywalk to Crusher Plant, elevated boardwalk path to support pedestrian access between these two locations;
3. Canopy Skywalk and Cable Bridge, elevated treetop walkway consisting of 25 piers and interconnected skywalk;
4. Urban Cycle Path, upgrades to sections of the urban cycleway;
5. Mountain Bike Tracks, upgrades and re-routing of sections of the mountain bike tracks to facilitate flow of traffic between the mountain bike tracks and urban cycle path and to minimise interactions with the pedestrian boardwalk;
6. Higgins Link, short pathway to link Urban Cycle Path to Higgins Cemetery including a bridged creek crossing and birdwatching hide;
7. Quarry Void Precinct;
8. Western Drainage Area;
9. Pathway from Sports Fields to Quarry Void;
10. Ancillary Tracks;
11. Drainage upgrades in the east, adjacent to the Sports Fields; and

12. Retaining wall below (west) of the playground area.

1.3 SITE DESCRIPTION

1.3.1 Location

As above, the Project forms ancillary works to support the wider Hornsby Park rejuvenation project. A description of the Hornsby Park site from the park Master Plan is provided below (Hornsby Shire Council, 2021).

The Hornsby Park site is comprised of 59 hectares of bushland and cleared open land with the principal features of the site today being comprised of:

- Extensive Bushland – the majority of the site is occupied by bushland that connects to the Berowra Valley National Park; the site's bushland also includes the very rare Blue Gum Diatreme Forest, which is listed as a Critically Endangered Ecological Community (CEEC);
- Old Mans Valley (OMV) - an area of cleared land accessed immediately to the west of – and some 50 metres below - the Hornsby Central Business District (CBD). This area has direct vehicle access from Peats Ferry Road;
- The Higgins Family Cemetery – a small heritage-listed cemetery completely surrounded by bushland;
- The Quarry Void – a large, deep and dramatic open cut disused quarry, the principal feature of which is the geologically significant volcanic diatreme, listed on the Heritage Register of the National Estate; and
- The Crusher Plant – a large industrial structure that is suitable for adaptive recreational re-use within the park.

The Subject Land occurs within the larger Hornsby Park project footprint, primarily within the south-east of the park area. **Figure 1.1** below provides the location of the Hornsby Park area within the wider locality. **Table 1.1** below provides the site particulars.

Table 1.1: Site particulars

Attribute	Site particular
Locality	The Hornsby Park area is roughly bordered by Bridge Road in the north, Peats Ferry Road to the east, Quarry Road to the south and Rosemead Trail to the west
LGA	Hornsby Shire Council
Lot and DP	Lots A, B, C and D in Deposited Plan (DP) 318676 Lot 1 DP 962103 Lot 1 DP 926449 Lot 1 DP 114323 Lots 1 and 2 in DP 169188 Lot 7308 DP 1157797 Lot 1 DP 859646 Lot 13 DP 734459 Lot 114 DP 749606 Lot 213 DP 713249 Summers Avenue, Hornsby partly formed Old Mans Valley Trail
Hornsby Park Area (ha)	Approximately 28 ha
Current Land Use	RE1 Public Recreation

Topography	Lucas Heights Gently undulating plateau, 200–1 000 m in width, with level to gently inclined slope gradients of <10%. Local relief is <30 m. Rock outcrop is absent. Hawkesbury Rolling to very steep hills. Local relief varies from 40–200 m. Slope gradients range from 25–70%. Crests and ridges are convex and narrow, at >300 m wide. Slopes are moderately inclined to precipitous. Rock outcrop occurs as horizontal benches and broken scarps up to 10 m high. Boulders and cobbles cover up to 50% of the ground surface. Valleys are narrow and incised. Hornsby Where diatremes are surrounded by Hawkesbury Sandstones, volcanic topography is distinguished by gently inclined valley floors surrounded by steep, colluvial sideslopes. Local relief is up to 80 m and slope gradients range from 3–65%. The Hornsby diatreme is a typical example. Where shales surround diatremes, topography is difficult to distinguish from surrounding landforms, which are gently inclined plateau surfaces. Local relief is <20 m and slopes are <10%. Dundas Valley is a typical example. (NSW Government, 2022)
Geology	Lucas Heights Mittagong Formation–interbedded shale, laminite and fine to medium grained quartz sandstone. The Mittagong Formation is located stratigraphically between the Ashfield Shale and Hawkesbury Sandstone. It is often relatively shallow. Minor areas of Hawkesbury Sandstone and minor areas of Ashfield Shale may occur Hawkesbury Hawkesbury Sandstone consisting of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Sandstones are either massive or cross-bedded sheet facies with vertical or subvertical joint sets. The combination of bedding planes and widely spaced joints gives sandstone outcrops a distinctive blocky appearance Hornsby Jurassic volcanic breccia, remaining from explosive volcanoes. Includes varying amounts of sedimentary breccia, olivine basaltic breccia, metamorphosed sandstone country rock and some volcanic tuffs (NSW Government, 2022)

Figure 1.2 below shows the location of all works associated with the Project within the larger Hornsby Park area. For the purposes of this report, the works areas are collectively referred to as the Subject Land.



Legend

- Watercourse
- Railway
- Waterbody

Roads

- Dual Carriageway
- Road
- Vehicular Track
- Pathway

- Hornsby Park
- Cadastre
- Berowra Valley National Park



Date: 20/09/2022

1:15,000

0 50 100 200 300 400
Meters

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Figure 1.1: Hornsby Park location



Legend

- Watercourse
- Waterbody
- Hornsby Park

Label

- Area of Vegetation Removal
- Ancillary Tracks
- Boardwalk from Skywalk to Crusher Plant
- Canopy Skywalk

- Canopy Skywalk Pier
- Higgins Link
- Miscellaneous Areas
- Mountain Bike Tracks
- Pathway from Sportsfield to Quarry Void
- Quarry Road Footpath
- Quarry Void
- Urban Cycle Path



Date: 21/09/2022

1:6,000

0 25 50 100 150 200
Meters

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap



Figure 1.2: Location and extent of all works associated with the Project

1.4 LEGISLATIVE REQUIREMENTS

This study and report were undertaken with reference to the requirements of the NSW *Environmental Planning and Assessment Act 1979* (EPA Act), the NSW BC Act and the Commonwealth EPBC Act. Final determinations of the NSW Scientific Committee (NSW NPWS) and the Commonwealth Scientific Committee are current to the time of writing.

Reference was also made to the *National Parks and Wildlife Act 1974* (NPW Act), the *Biosecurity Act 2015* (Bio Act) and the State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Bio SEPP). The Subject Land was also assessed in relation to the ‘improve or maintain principals’ adopted by most local councils.

1.5 LIMITATIONS

No survey can detect all species at any one point in time however allowances were made for species which may occur based on known current research and habitat preferences. The survey recorded species as they were encountered and the survey aimed to detect threatened species or Threatened Ecological Communities (TECs) as listed under state and federal legislation. The survey focussed on the identification of the vegetation communities and any threatened flora or potential habitat for threatened flora. No attempt was made to record every single species on the site and not all specimens are visible in all seasons. Surveys for fauna entailed detailed habitat searches.

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2. METHODOLOGY

2.1 DATABASE SEARCHES AND LITERATURE REVIEW

A desktop review was undertaken to identify current records of threatened flora, fauna and ecological communities, migratory species and Key Threatening Processes (KTPs) within 10 km of the Subject Land. Databases and resources consulted during this phase of works comprised:

- The NSW Department of Planning and Environment (DP&E) BioNet Atlas database, which contains records of threatened species, populations and ecological communities, critical habitat and Key Threatening Processes (KTPs) listed under the BC Act;
- The Threatened Biodiversity Data Collection (TBDC). An online resource for registered users providing credit class information and habitat information for species listed under the BC Act (NSW Department of Planning and Environment, 2021a); and
- Habitat profiles for all threatened, populations and ecological communities, and migratory species that are known to or have potential to occur within the locality.

In addition, the following documents and data sources were reviewed as part of this EIA:

- Hornsby Park Environmental Impact Statement (EIS) including appendices (Hornsby Shire Council and GHD, 2019);
- Hornsby Park Master Plan (Hornsby Shire Council, 2021);
- Hornsby Park Vegetation Management Plan (VMP);
- Hornsby Park Embellishment Skywalk Tree Impacts Comparison report (Clouston Associates, Hornsby Shire Council, 2023);
- Hornsby Park Embellishment Arboricultural Impact Assessment Report (Arterra Consulting and Arboriculture, 2022);
- Hornsby Quarry Park Specialist Lighting Concepts (Hornsby Shire Council, 2022)
- Previous flora and fauna survey data from Hornsby Shire Council. Hornsby Shire Council also has extensive diary and note records pertaining to all aspects of the Project and the Hornsby Park environment. Although these have not been included in this EIA, they have been used to inform the REF; and
- Vegetation mapping, Project footprint and other relevant spatial shapefiles.

2.2 FIELD SURVEY

The assessment of the Subject Land was undertaken on three occasions, in conjunction with Hornsby Shire Council and Clouston Associates staff. The assessment was carried out by Bo Davidson (M. Environment 2013). **Table 2-1** below details the weather conditions on the dates of survey.

Table 2-1: Weather conditions on dates of survey

Date	Minimum temperature (*C)	Maximum temperature (*C)	Rainfall (mm)
06/05/2022	9.7	18.5	0.2
17/08/2022	7.1	18.2	0.0
05/09/2022	7.8	15.9	6.0

Source: Australian Bureau of Meteorology, Terry Hills AWS (Weatherzone, 2022)

Field survey comprised a complete walkthrough survey of all Project impact areas (with the exception of some minor bushwalk track upgrade areas which were not accessible during the survey dates) with Hornsby Shire Council staff guidance. The purpose of this survey was to assess the type, condition and likely impacts on native vegetation within all proposed impact areas. During site surveys, transitions in vegetation condition (e.g. native to weed dominated understory) were documented and recorded on a hand held GPS device. Representative photographs of all impact areas were also taken.

This survey was consistent with a random meander survey, encompassing the Subject Land in accordance with the DP&E NSW Guide to Surveying Threatened Plants (NSW Department of Planning and Environment, 2009). Across the three survey days, a total of 7.5 person hours was dedicated to random meander survey of the Subject Land.

With reference to Table 1 of the above guidelines, traverses of the Subject Land were able to be undertaken at a spacing of five meters throughout all native vegetation areas due to the small size of the Subject Land work areas. This is considered adequate for the detection of diminutive native flora including grasses, orchids and sedges. Table 2 of the guidelines refers to transect lengths per area of suitable habitat. Due to the small areas and dispersed nature of the Subject Land work areas, transect distances from this table are not considered applicable. Table 3 of the guideline specifies minimum survey time per area (ha) of suitable habitat. The total Subject Land works areas is less than 2 ha. Table 3 of the guideline specifies a total survey time of one hour for open vegetation areas of suitable habitat ≤ 2 ha. As above, a total of 7.5 person hours was dedicated to flora survey in the Subject Land. This is considered adequate survey effort to detect potential threatened flora populations.

3. RESULTS

3.1 DESKTOP STUDY

The sections below detail threatened species, populations and TECs identified from the relevant government databases and mapping resources consulted during the desktop study.

3.1.1 *NSW BioNet Atlas*

The NSW BioNet Atlas identified a total of 82 listed flora and fauna entities from within 10 km of the Subject Land (three amphibian, 32 bird, one gastropod, 16 mammal, one reptile and 29 flora species). The details of these entities and their legislative status are provided in **Table A2.2** and **Table A2.3** of **Appendix 2**.

In addition, this database identified a total of 37 TECs as known to occur or possibly occurring within 10 km of the Subject Land. These TECs and their legislative status are provided in **Table A2.2** of **Appendix 2**.

3.1.2 *Commonwealth PMST*

The Commonwealth PMST identified a total of 67 listed flora and fauna entities which may, are likely to or are known to occur from within 10 km of the Subject Land (three amphibian, 14 threatened bird, two fish, nine mammal, one reptile, 15 migratory bird and 23 flora species). These species, their legislative status and type of presence are provided in **Table A2.2** and **Table A2.3** of **Appendix 2**.

In addition, this database identified a total of seven TECs which may, are likely to or are known to occur within 10 km of the Subject Land. These TECs, their legislative presence and type of presence are provided in **Table A2.2** of **Appendix 2**.

3.1.3 *Vegetation Mapping*

Review of the vegetation mapping provided in the Hornsby Park EIS mapped the vegetation within the Subject Land as the following communities:

1. Blackbutt Gully Forest (HN648, Moderate/Good – high;
2. Blackbutt Gully Forest (HN648, Moderate/Good – poor;
3. Blue Gum Diatreme Forest (HN596, Moderate/Good – poor); and
4. Exotic vegetation.

With reference to the current NSW DoPIE BioNet vegetation classification database, these communities are considered to the following PCTS:

1. Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good – high;
2. Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good – poor;
3. Blue Gum High Forest (PCT3136) – moderate/good – poor; and
4. Exotic vegetation.

Blue Gum High Forest (PCT3136) is commensurate with Blue Gum High Forest in the Sydney Basin Bioregion TEC listed as critically endangered under the BC Act. However, as per Section 4.5.1 of the Hornsby Park EIS it did not meet the condition thresholds to qualify as Blue Gum

High Forest of the Sydney Basin Bioregion – listed as critically endangered under the EPBC Act.

Figure 3.1 below shows the mapped vegetation communities within the Subject Land with reference to the proposed Project footprint. **Figure 3.2** provides more detailed impacts on TEC vegetation specifically.

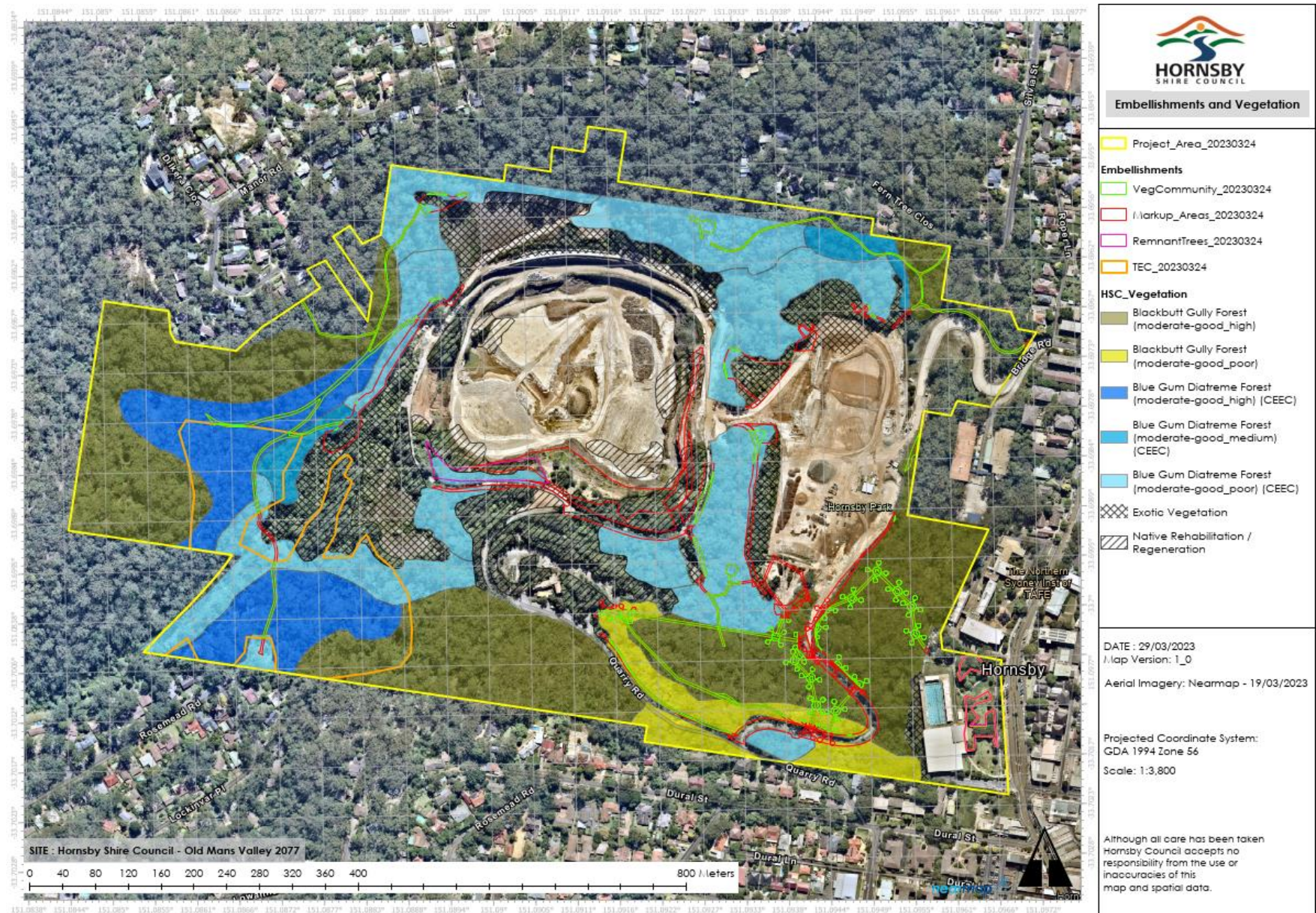


Figure 3.1: Plant Community Types and TECs within the Hornsby Park site with reference to the Subject Land
Vegetation mapping from Kleifelder

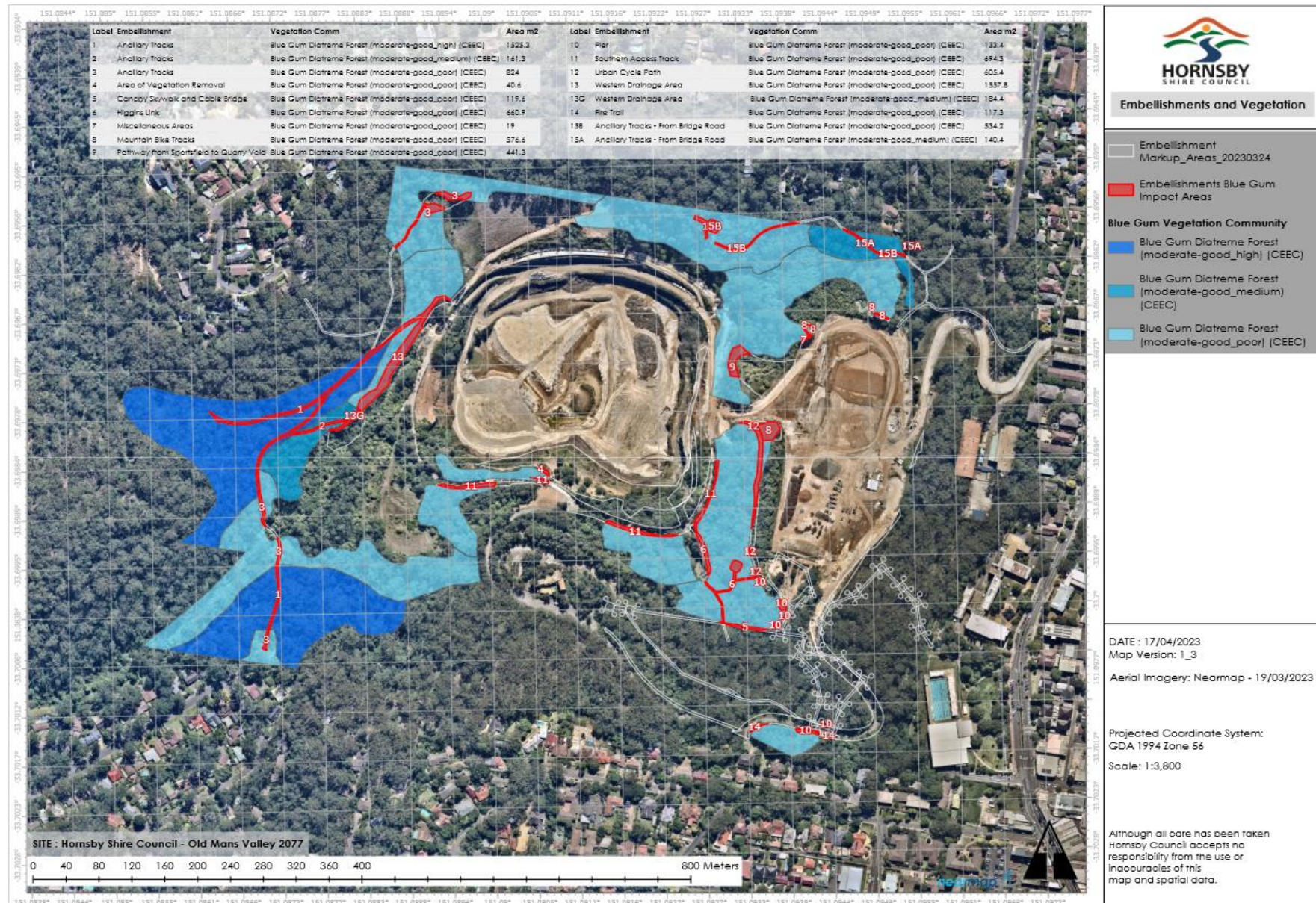


Figure 3.2: TECs within the Hornsby Park site with reference to the Subject Land
Vegetation mapping from Kleifelder

3.2 ASSESSMENT OF ECOLOGICAL VALUES

The Subject Land was observed to contain a diverse range of ecological communities, microhabitats and important fauna habitat. A summary of the key ecological values of all components of the Project are provided below, with reference to the proposed works.

3.2.1 Quarry Road Footpath

The Quarry Road footpath upgrade follows the southern boundary of Quarry Road from the eastern junction with Dural Street to the Crusher Plant in the west. This route is characterised by mixed native and exotic vegetation on the interface with suburban lands. The canopy is predominantly native, dominated by *Angophora costata* (Sydney Red Gum) and *Eucalyptus pilularis* (Blackbutt) with the understory composed largely of the exotic woody weeds, predominantly *Ligustrum lucidum* (Broad-leaved Privet) with occasional *Eriobotrya japonica* (Loquat) and *Jacaranda mimosifolia* (Blue Jacaranda) as well as the invasive nature *Pittosporum undulatum* (Sweet Pittosporum). See **Photograph 3.1** below.



Photograph 3.1: Condition of vegetation within proposed Quarry Road footpath route

The proposed footpath route contains limited native vegetation and fauna habitat value and is exposed to significant existing edge effects from the adjacent road and suburban area (i.e., weed colonisation, sediment and nutrient migration, noise and light impacts etc.).

3.2.2 Boardwalk from Skywalk to Crusher Plant

The elevated boardwalk would run downslope and parallel with Quarry Road to the south, providing a pedestrian link from the Crusher Plant to the southern Skywalk entry and return. It would interact with existing mountain bike tracks at several locations, necessitating elevated portions at these locations to minimise interaction between the two users.

The proposed route traverses through native vegetation comprised of Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – poor with reference to mapping from the Hornsby Park EIS. The vegetation within this route had an understory varying from dense and predominantly exotic in the west (*Ligustrum sinense* (Broad-leaved Privet) predominant) to open and predominantly native in the east. See **Photograph 3.2** and **Photograph 3.3** below for examples of the varying understory condition within this route.



Photograph 3.2: Condition of vegetation within the west of the proposed boardwalk route



Photograph 3.3: Condition of vegetation within the east of the proposed boardwalk route

3.2.3 Canopy Skywalk and Cable Bridge

The Canopy Skywalk will consist of a total of 24 supporting piers and interconnected sky path sections (CS00-CS22). This structure will allow elevated pedestrian travel and access to and from the eastern end of the boardwalk, the Crusher Plant, the southern Sports Field entrance and access to Hornsby Park from Hornsby Aquatic and Leisure Centre. In addition, there will be two piers adjacent to the Crusher Plant to support a long cable bridge from CS17 (SB01 and SB02).

The proposed route passes through several vegetation communities (as shown on **Figure 3.1**). **Table 3.1** below provides a description of the vegetation type and condition within each of the proposed pier locations.

Table 3.1: Description of ecological values within Skywalk pier locations

Pier reference number	Photograph	Vegetation community	Description
CS00		None/exotic	This pier is located on the edge of the Hornsby Leisure Centre. The surrounding vegetation is largely exotic, dominated by <i>Cenchrus clandestinus</i> (Kikuyu) and <i>Vicia sativa</i> (Common Vetch)
CS01		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Partially located within an existing pathway, this location includes a largely native understory including several immature <i>Syncarpia glomulifera</i> (Turpentine)
CS02		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native understory vegetation with minor weeds, <i>Lantana camara</i> (Lantana)

Pier reference number	Photograph	Vegetation community	Description
CS03		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Largely native understory, skybridge section between CS03 and CS04 passes through two immature <i>Syncarpia glomulifera</i>
CS04		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native vegetation with an open shrub layer and diverse ground stratum. Significant exposed sandstone habitat
CS05		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native understory vegetation, primarily <i>Lomandra longifolia</i> (Spiny-head Mat-rush)
CS06		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Disturbed native vegetation and exotic grasslands. Located on edge of existing road cutting

Pier reference number	Photograph	Vegetation community	Description
CS07		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Disturbed native vegetation and exotic grasslands. Located on edge of existing road cutting
CS08		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Mixed native and exotic grasslands, predominantly <i>Imperata cylindrica</i> (Blady Grass)
CS09		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Moderate to good condition native vegetation. Located on the edge of a road cutting with significant weed incursion along road edge
CS10		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native vegetation with minor exotic weed incursion

Pier reference number	Photograph	Vegetation community	Description
CS11		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native vegetation. <i>Xanthorrhoea</i> sp. (Grass Trees) present within pier footprint
CS12a		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – poor	Located on the edge of heavily weed dominated vegetation. No significant native vegetation within proposed pier footprint
CS12b		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – poor	Located on the edge of heavily weed dominated vegetation. No significant native vegetation within proposed pier footprint
CS13		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Located within good condition native vegetation; however, with little shrub cover

Pier reference number	Photograph	Vegetation community	Description
CS14		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Located on the edge of good condition native vegetation. Understory contains significant exotic weeds and a mature <i>Phoenix canariensis</i> (Phoenix palm)
CS15		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native vegetation. Skywalk section to CS16 passes through a small stand of <i>Syncarpia glomulifera</i>
CS16		None/exotic	Predominantly exotic grassland (<i>Chloris gayana</i> (Rhodes Grass))
CS17		Sydney Coastal Enriched Sandstone Forest (PCT3592) moderate/ good – high	Good condition native vegetation

Pier reference number	Photograph	Vegetation community	Description
CS18		None/exotic	Largely disturbed by current mountain bike use. Scattered exotic grasses and forbs (<i>Chloris gayana</i> and <i>Lactuca serriola</i> (Prickly Lettuce))
CS19		Blue Gum High Forest (PCT3136)	Located on the edge of the Blue Gum High Forest community; however, vegetation within proposed footprint is largely exotic and the fast growing native <i>Pittosporum undulatum</i> (Sweet Pittosporum)
CS20		None/exotic	Located within lands disturbed by existing mountain bike tracks. Vegetation present is largely exotic

Pier reference number	Photograph	Vegetation community	Description
CS21		None/exotic	Largely disturbed by current mountain bike use. Scattered exotic grasses and forbs (<i>Plantago lanceolata</i> (Lambs Tongues) and <i>Trifolium sp.</i> (Clover))
CS22		None/exotic	Located within exotic grasslands, primarily <i>Cenchrus clandestinus</i> , <i>Chloris gayana</i> and <i>Plantago lanceolata</i> . Pier location falls within existing Ditchfield disturbance extent
SB01		None/exotic	Located on the edge of native vegetation within a largely exotic understory. Skybridge section to CS17 would pass through the location of several <i>Casuarina cunninghamiana</i> (River Oak)

Pier reference number	Photograph	Vegetation community	Description
SB02		None/exotic	Located on the edge of native vegetation within a largely exotic understory

Each pier will require a central 2.5m² column and four anchor points to support the pier. **Section 4** discusses the direct and indirect impacts on the ecological values at each pier location discussed above as well as indirect impacts of the elevated skyway.

3.2.4 Urban Cycle Path

The Project includes upgrades to sections of the Urban Cycle Path within the western Mountain Bike Track corridor to the west of the Sports Field. This route traverses through native vegetation with a predominantly exotic understory (*Ligustrum lucidum*), see **Photograph 3.4**.



Photograph 3.4: Condition of vegetation within the proposed upgrade section of the Urban Cycle Path

3.2.5 Mountain Bike Tracks

The Project includes upgrades and route changes to the existing Mountain Bike Track in several locations:

1. To the west of the Sports Field near the road connecting the Quarry Void to the Sports Fields and playground area;
2. A diversion route along a section of the Boardwalk from Skywalk to Crusher Plant to remove an interaction point with pedestrian traffic on the boardwalk; and
3. Two small upgrade sections within the existing mountain bike track network north of the playground.

Item 1 will include the changing of the existing middle track from a down to an up track and insertion of a set of switch-backs in the north around an existing small patch of trees. This patch comprised endemic species including *Eucalyptus saligna* (Sydney Blue Gum) as well as several non-endemic native *Lophostemon confertus* (Queensland Brush Box) and a mixed native and exotic understory, see **Photograph 3.5**.



Photograph 3.5: Small patch of vegetation within proposed new Mountain Bike Track switchback section

The new diversion track adjacent to the boardwalk would pass through good condition native vegetation, see **Photograph 3.6** below.



Photograph 3.6: Vegetation within proposed mountain bike diversion track

Item 3 would occur within largely exotic understory, primarily *Ligustrum lucidum* with little native understory present.

3.2.6 Higgins Link

This portion of the Project will entail a small pathway linking the Urban Cycle Path with Higgins Cemetery. This route will pass over a small unnamed creek with a small bridge and allow access to a hide for birdwatching. The proposed route will pass through mapped Blue Gum High Forest vegetation; however, the understory is almost exclusively exotic, predominantly *Ligustrum lucidum*, see **Photograph 3.7.**



Photograph 3.7: Vegetation within proposed Higgins Link route

3.2.7 Quarry Void Precinct

The impact areas within the Quarry Void Precinct comprise:

1. Upgrade and slope stabilisation along road from Crusher Plant to Quarry Void; and
2. Stairway and path from Higgins Cemetery to Quarry Void.

Item 1 would occur largely within the existing road corridor and adjacent weed dominated understory, primarily *Ligustrum lucidum* as well as *Asparagus aethiopicum* (Sprenger's Asparagus), *Cinnamomum camphora* (Camphor Laurel), *Senna pendula* var *glabrata* (Easter Cassia) and *Solanum mauritanum* (Wild Tobacco) see **Photograph 3.8**.



Photograph 3.8: Existing road linking Crusher Plant to Quarry Void

Item 2 would connect Higgins Cemetery and pathway through the road discussed in item 1 above before descending via a stairway to a path along the eastern edge of the Quarry Void, linking to tracks following the outer edge of the void. This section could not be directly accessed during surveys; however, with reference to **Photograph 3.9** below, the stairway would be located within a portion of quarry wall already disturbed by a small land slip and the path would follow the centre tier of the quarry wall.



Photograph 3.9: Stairway and path route from Higgins Cemetery to Quarry Void

The vegetation along this proposed pathway route is sparse and appeared to be dominated by a mixture of native *Acacia sp.* as well as exotic forbs and grasses. The route appeared to contain no significant woody vegetation.

3.2.8 Western Drainage Line and Bird Hide

This area occurs to the west of the Quarry Void, on the edge of Blue Gum High Forest. The proposed drainage line passes through an ephemeral drainage line dominated by the weeds *Cortaderia selloana* (Pampas Grass), *Cyperus eragrostis* (Umbrella Sedge), *Ligustrum lucidum* and *Ligustrum sinense* (Small-leaved Privet), see **Photograph 3.10**.



Photograph 3.10: Proposed Western Drainage Line

3.2.9 Pathway From Sports Field to Quarry Void

As shown in **Figure 3.1** above, this area is located to the north of the junction connecting the Sports Field and playground area to the Quarry Void. This is located in a small roughly triangular patch of previously disturbed, largely exotic vegetation. A screen of *Eucalyptus saligna* is present to the west of this area, but these trees would fall outside of the proposed route, see **Photograph 3.11**.

Dominant weeds in this area comprise *Chloris gayana*, *Cinnamomum camphora*, *Cytisus scoparius* (Scotch Broom), *Ligustrum lucidum* and *Senna pendula* var *glabrata*.



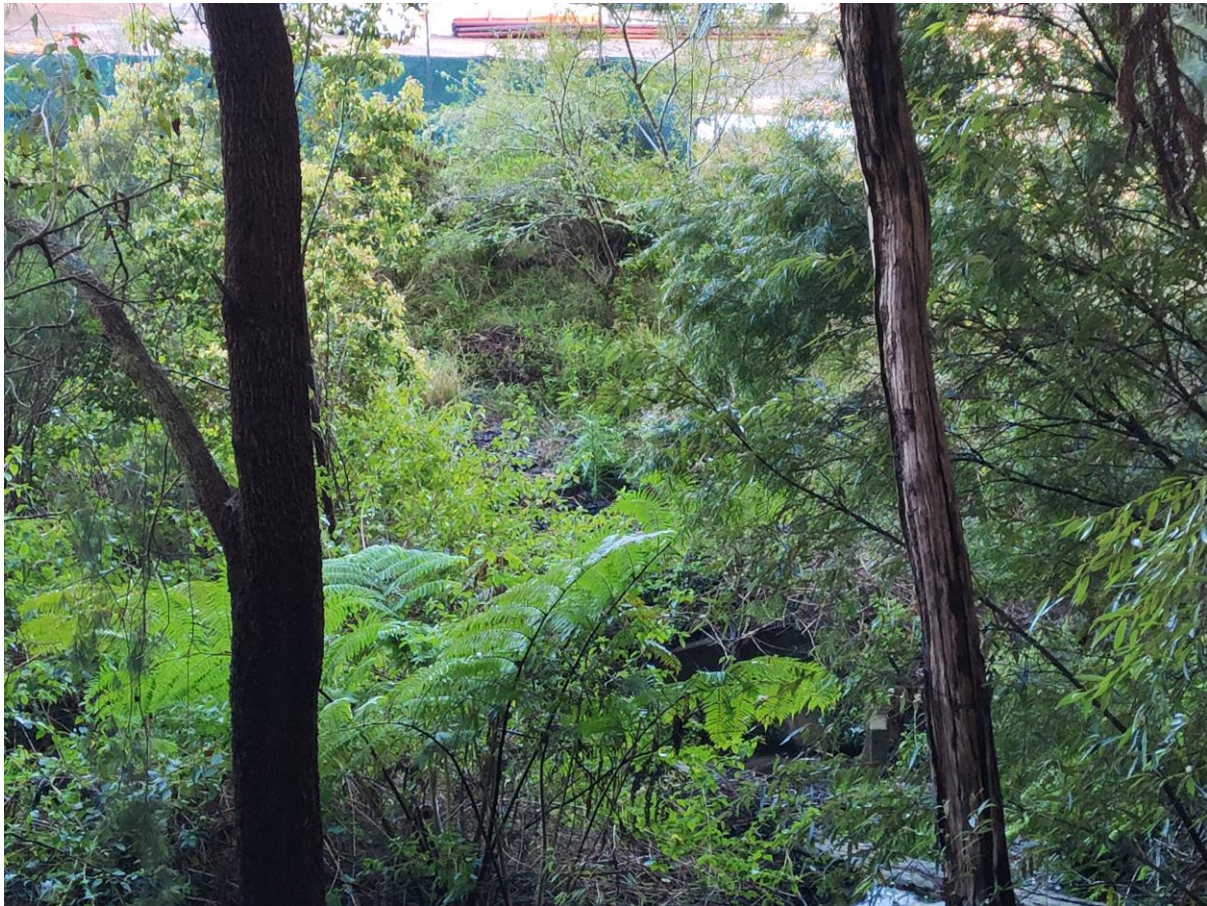
Photograph 3.11: Proposed pathway from Sports Field to Quarry Void

3.2.10 Ancillary Tracks

As shown in **Figure 3.1**, these tracks are located in the west and north-east of the Subject Land and would comprise upgrades of existing bushwalking tracks and creation of new connecting sections. The full extent of these routes could not be accessed during surveys for this report, with reference to the Hornsby Park EIS, these routes would pass through poor and high condition native vegetation as well as areas of exotic vegetation, see **Figure 3.1**.

3.2.11 Drainage Upgrades in the East, Adjacent to the Sports Fields

This area is located within largely exotic vegetation, on the edge of the Ditchfield works area. It is located within an existing drainage sump dominated by a collection of woody and soft weeds including *Cirsium vulgare* (Spear Thistle), *Lantana camara*, *Ligustrum lucidum* and *Ligustrum sinense*, see **Photograph 3.12**.



Photograph 3.12: Drainage sump upgrade area adjacent to Sports Field and Detention Basin 3

3.2.12 Retaining Wall Below (West) of the Playground Area

This area is located on the edge of an almost exclusively exotic understory vegetation zone, primarily the woody Privets *L. lucidum* and *L. sinense*.

3.2.13 TECs and Threatened Flora

As described above, the floral composition of the Subject Land comprised a diverse assemblage of two distinct PCTs of varying condition, one TEC (under the BC Act) as well as large areas of disturbance dominated by exotic species.

The TEC of Blue Gum High Forest in the Sydney Basin Bioregion occurs within parts of the Subject Land, including within areas assessed in this EIA. This community is listed as critically endangered under the NSW BC Act. As detailed in **Section 3.1.3** above, this vegetation did not meet the thresholds required for protection under the EPBC Act (as Blue Gum High Forest of the Sydney Basin Bioregion).

The Hornsby Park EIS did not identify any threatened flora populations within the Hornsby Park area and none were considered likely to occur (see Section 4.5.2 of the EIS). No threatened species were

identified on the Subject Land during surveys for this EIA and based on analysis of local occurrence records from state and federal databases and the timing of survey, no threatened flora species was considered likely to occur.

The Likelihood of Occurrence Tables (LOO) in **Appendix 2** provides an assessment of all TECs and threatened flora known to occur within the locality.

3.2.14 Priority Weeds

Priority weeds are classified under specific Biosecurity Duties under the NSW *Biosecurity Act 2015* (Bio Act) for the respective Local Land Services (LLS) area. All plants have a general biosecurity duty under the act. **Table 3.2** below identifies the priority weeds for the LLS area of the Greater Sydney Region (which includes the Hornsby LGA) documented on the Subject Land (both from survey for this EIA as well as from the Hornsby Park EIS and VMP).

Table 3.2: Priority weeds identified on the Subject Land

Scientific name	Common name	Biosecurity duty	Duty description
<i>Anredera cordifolia</i>	Madeira Vine	Regional Recommended Measure	Land managers should mitigate the risk of new weeds being introduced to land used for grazing livestock. Land managers should mitigate spread from their land. Plant should not be bought, sold, grown, carried or released into the environment
<i>Asparagus aethiopicus</i>	Sprenger's Asparagus	Prohibition on certain dealings	Must not be imported into the state, sold, bartered, exchanged or offered for sale
<i>Cortaderia selloana</i>	Pampas Grass	Regional Recommended Measure	Land managers should mitigate the risk of new weeds being introduced to land used for grazing livestock. Land managers should mitigate spread from their land. Plant should not be bought, sold, grown, carried or released into the environment
<i>Genista monspessulana</i>	Cape Broom	Prohibition on certain dealings	Must not be imported into the state, sold, bartered, exchanged or offered for sale
<i>Lantana camara</i>	Lantana	Prohibition on certain dealings	Must not be imported into the state, sold, bartered, exchanged or offered for sale
<i>Ligustrum lucidum</i>	Broad-leaved Privet		No movement import or sale
<i>Ligustrum sinense</i>	Small-leaved Privet		No movement import or sale
<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	Regional Recommended Measure	Exclusion zone is established for all lands in Blue Mountains City Council local government area and in Penrith local government area west of the Nepean River. Core area: The remainder of the region. Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment. Exclusion zone: The plant is eradicated from the land and the land kept free of the plant. Core infestation area: Land managers

Scientific name	Common name	Biosecurity duty	Duty description
			prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets
<i>Rubus fruticosus</i> agg	Blackberry	Prohibition on certain dealings	Must not be imported into the state, sold, bartered, exchanged or offered for sale. All species in the <i>Rubus fruticosus</i> species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree
<i>Senecio madagascariensis</i>	Fireweed	Prohibition on dealings	Must not be imported into the State or sold

3.2.15 Fauna

A diverse range of fauna were observed throughout the Subject Land, predominantly birds. Suitable habitat for a variety of species was present including native eucalypt forests containing hollows, open grasslands, minor creeklines and rock outcroppings. Refer to the REF for details of the Hornsby Park habitat tree locations and data.

No threatened fauna species were encountered during surveys for this EIA. The Hornsby Park EIS identified the following threatened fauna species as known or considered likely to occur within the Study Area:

Known:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) – listed as vulnerable under the BC Act;
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – listed as vulnerable under the BC Act and endangered under the EPBC Act;
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) – listed as vulnerable under the BC Act and EPBC Act;
- Grey-headed Flying Fox (*Pteropus poliocephalus*) – listed as vulnerable under the BC Act and EPBC Act;
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – listed as vulnerable under the BC Act;
- Little Bent-winged Bat (*Miniopterus australis*) – listed as vulnerable under the BC Act;
- Powerful Owl (*Ninox strenua*) – listed as vulnerable under the BC Act; and
- Varied Sitella (*Daphoenositta chrysoptera*) – listed as vulnerable under the BC Act.

Likely:

- Barking Owl (*Ninox connivens*) – listed as vulnerable under the BC Act;
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) – listed as vulnerable under the BC Act;
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*) – listed as vulnerable under the BC Act and EPBC Act (as South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*);

- Masked Owl (*Tyto novaehollandiae*) – listed as vulnerable under the BC Act;
- Rosenberg’s Goanna (*Varanus rosenbergi*) – listed as vulnerable under the BC Act;
- Sooty Owl (*Tyto tenebricosa*) – listed as vulnerable under the BC Act;
- Spotted-tailed Quoll (*Dasyurus maculatus*) – listed as vulnerable under the BC Act and endangered under the EPBC Act (as *Dasyurus maculatus maculatus* (SE mainland population)); and
- Yellow-bellied Sheath-tailed Bat (*Saccolaimus flaviventris*) – listed as vulnerable under the BC Act.

Of these, impacts from the Project on habitat were considered likely and assessments of significance (BC Act) and/or tests of significance (EPBC Act) were conducted for the Eastern Coastal Free-tailed Bat, Greater Broad-nosed Bat, Powerful Owl, Varied Sitella and Yellow-bellied Sheath-tailed Bat. All threatened species known or considered to have potential to occur within 5km of the Subject Land are assessed in the LOO table in **Appendix 2**.

Surveys by Gecko Environment Management have identified a total of 201 habitat trees within the Hornsby Park site. None of which would be removed by the Project. The location, condition and discussion of the direct and indirect impacts on these resources as a result of the Project is discussed in the REF.

4. IMPACT ASSESSMENT

4.1 INTRODUCTION

All projects have an impact on the biodiversity values of a site. These consist of:

- Direct impacts such as the clearing of vegetation, waterbodies and other habitat features; and
- Indirect impacts through mechanisms such as increased surface and sediment runoff, introduction of exotic species and diseases, increased disturbances through greater pedestrian and traffic utilisation, increased noise and light pollution and introduction of exotic domestic herbivores (sheep, cattle etc.) and predators (cats and dogs).

These impacts are associated with all phases of a project, from initial land clearing through to use by patrons and staff and by operation of facilities etc. A biodiversity sensitive approach can lead to a substantial decrease in impacts of any development. In addition, a variety of techniques and technologies are available to reduce the potential impacts of a development throughout all stages.

4.1.1 *Direct Impacts*

Activities required for all proposed areas of works would comprise one or more of the following direct impacts:

- Clearing of vegetation, both native and exotic for required infrastructure;
- Changes to hydrological processes through new stormwater infrastructure;
- Recontouring of the land surface; and
- Additional vegetation clearing for construction staff access.

As described in **Section 3.2** above, the Subject Land was assessed as containing several PCTs, with one conforming to a TEC under the BC Act. **Table 4.1** below details the extent of direct impact on these native vegetation communities as a result of the Project. Note that **Table 4.1** considers the highest clearing impact possible, with these areas calculated based on Project footprint overlay with mapped vegetation communities. However, as described in **Section 3.2**, much of this impact will be along existing tracks within these vegetation communities (Mountain Bike Tracks, Urban Cycle Path, Ancillary Tracks) or within almost exclusively exotic understories of these communities (Higgins Link, Pathway from Sports Field to Quarry Void Precinct, Drainage Upgrades, Retaining Wall and parts of the Boardwalk from Skywalk to Crusher Plant and Canopy Skywalk).

Table 4.1: Summary of impact on native vegetation present on the Subject Land

Area of works	PCTs present	Associated TEC	BC Act*	Projected impact (ha)
Quarry Road Footpath	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.04
Boardwalk from Skywalk to Crusher Plant	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.03
	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good – high	N/A		0.04
Canopy Skywalk (skywalk sections)	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.16
	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good – high	N/A		0.02
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.01
	Exotic vegetation	N/A		0.01
Canopy Skywalk (piers)	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.06
	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good – high	N/A		0.32
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.01
	Exotic vegetation	N/A		0.01
Urban Cycle Path	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.05
	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - high	N/A		0.11
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.06
	Exotic vegetation	N/A		0.09
Mountain Bike Tracks	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.001

Area of works	PCTs present	Associated TEC	BC Act*	Projected impact (ha)
	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - high	N/A		0.004
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.06
	Exotic vegetation	N/A		0.02
Higgins Link	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - poor	N/A		0.01
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.07
	Exotic vegetation	N/A		0.01
Quarry Void Precinct and Western Drainage Area	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.16
	Blue Gum High Forest (PCT3136) – moderate/good - medium	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.02
Pathway from Sports Field to Quarry Void	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.04
	Exotic vegetation	N/A		0.24
Ancillary Tracks	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - high	N/A		0.07
	Blue Gum High Forest (PCT3136) – moderate/good – high	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.15
	Blue Gum High Forest (PCT3136) – moderate/good – medium	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.03
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.21
	Exotic vegetation	N/A		0.17
Miscellaneous Areas (eastern drainage upgrades and retaining wall)	Sydney Coastal Enriched Sandstone Forest (PCT3592) – moderate/good - high	N/A		0.01
	Blue Gum High Forest (PCT3136) – moderate/good - poor	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	0.002

Area of works	PCTs present	Associated TEC	BC Act*	Projected impact (ha)
	Exotic vegetation	N/A		0.03
Total				2.34
Total impact on native vegetation				1.76
Total impact on TEC vegetation			E4B	0.83

*BC Act Status: E4B=Critically Endangered

4.1.1.1 Direct Impacts from Canopy Skywalk Piers

As detailed in **Section 3.2.3** above, the canopy skywalk would consist of a total of 26 piers provided an elevated route between several major locations within the Hornsby Park complex. As shown in **Figure 4.1** below, each pier would have an impact area of 2.5m radius from the centre of each pier for the pier footing, a further 2.5m radius cleared area for installation around the pier, four (or three, depending on terrain at each location) anchor points for support cables with a 2.5m radius impact area and a 1m wide access path for construction staff and equipment between the central pier construction area and the cable anchor points.

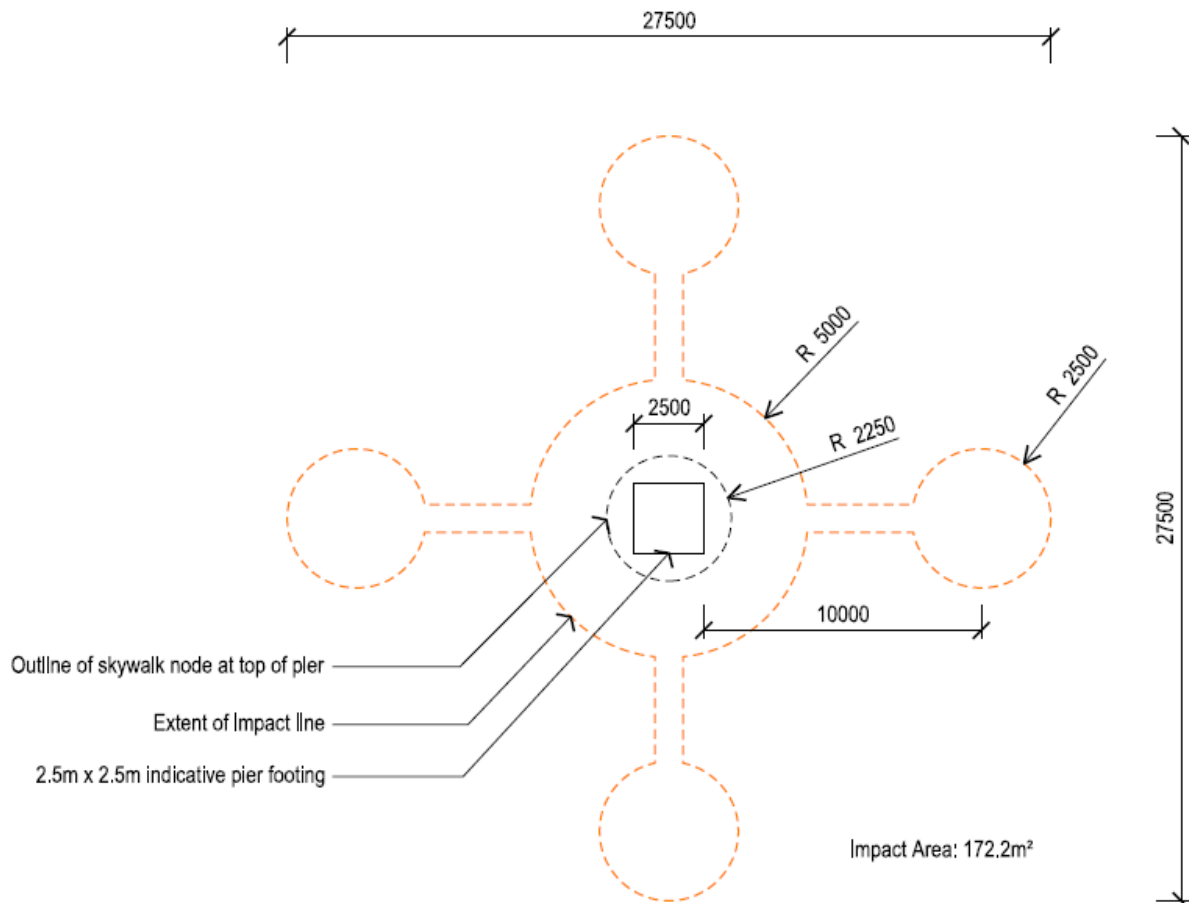


Figure 4.1: Proposed skywalk pier design and total impact footprint (Hornsby Council)

As shown in **Figure 4.1**, this gives a total direct footprint of 172.2m², and this is represented in the total impact for this works item shown in **Table 4.1** above. However, only the central pier construction will result in permanent loss of native vegetation, with the remaining impact footprint to be rehabilitated following works.

In conjunction with the project engineers and arborists, Hornsby Shire Council has selected suitable pier locations which will avoid the removal of any mature trees (see **Table 3.1** above). A total of three immature trees will need to be removed for the connecting skywalks (two immature *Syncarpia glomulifera* (Turpentine) for the span between CS3 and CS4 and one immature *S. glomulifera* for the span between CS15 and CS16). Remaining impacts to native trees would be selective pruning of branches encroaching into the pier or skywalk paths.

This is stated within the Hornsby Park Embellishment – Skywalk Tree Impacts Comparison report, “*If the tree has encroachment with the linkage bridge above ground, selective pruning of canopy or branches is required. The foreseeable pruning at this early stage of design is likely to be acceptable and not result in serious negative impacts to the trees*” (Clouston Associates, Hornsby Shire Council, 2023).

As per the Hornsby Park Embellishment – Skywalk Tree Impacts Comparison report, trees are only to be considered impacted if the trunk falls within the 5m impact zone of the central pier or is located within a skywalk section between two piers (Clouston Associates, Hornsby Shire Council, 2023). **Figure 4.2** below provides a visualisation of this impact assessment method, from Page 3 of the Skywalk Tree Impacts Comparison report.

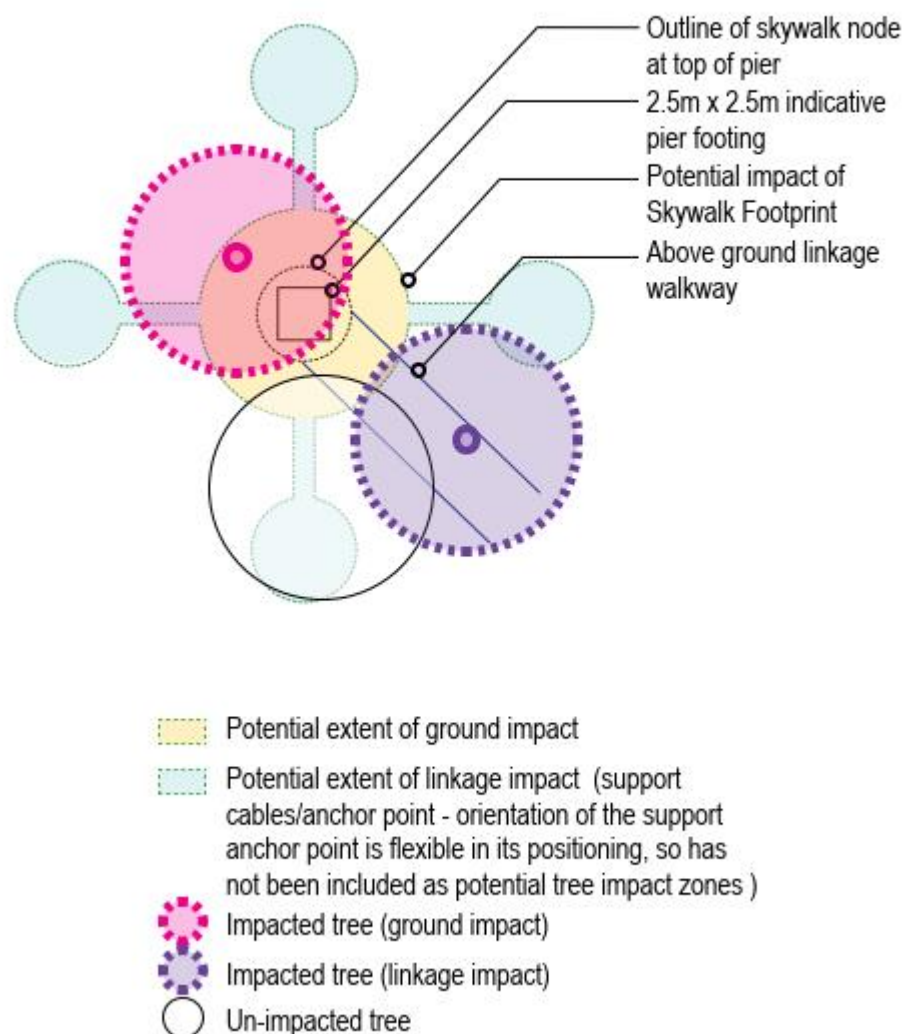


Figure 4.2: Skywalk pier impact footprint

(Clouston Associates, Hornsby Shire Council, 2023)

As per Page 8 (Skywalk Tree Impact Plan – REF Alignment (Current)), 13 trees would be impacted by ground impacts and a further 29 by linkage impacts. These include the three trees discussed above,

which require removal for the skywalk sections. The remainder of the directly impacted trees would not be removed but would require works within their TPZs. Methods to manage the impact to these trees are discussed in **Section 5.3.1** below.

4.1.1.2 Direct Impacts on TECs, Threatened Flora and their Habitats

As detailed in **Section 3.2.2** above, no threatened flora species are considered likely to occur on the Subject Land. A Five-part test of significance as per Part 7.2A of the BC Act was undertaken for the above TEC and is provided in **Appendix 3. Table 4.2** below summarises the outcomes of this test.

Table 4.2: Results of five-part tests for TECs present or considered to have potential to occur

Entity	BC Act*	Significant/ not significant impact	Justification
Blue Gum High Forest in the Sydney Basin Bioregion	E4B	Not significant	Project not assessed to trigger any of the relevant five-part test criteria. The Project would impact on approximately 0.82 ha of this TEC. However, this impact would remove exotic vegetation from the understory, with no canopy trees to be removed. Works within the Quarry Void Precinct and Western Drainage Line would occur within existing cleared areas under the canopy cover of this TEC and would not require removal of native vegetation. Similarly, the Canopy Skywalk and Cable Bridge sections would pass through the canopy of this TEC and would not require removal of native vegetation. The Project is not considered likely to substantially alter retained patches of this TEC on adjacent lands. This vegetation supports significant weed infestations and sediment and nutrient runoff stressors are already present. The Project would not isolate or increase fragmentation of any part of this TEC

*BC Act Status: E4B= Critically Endangered

4.1.1.3 Direct Impacts on Threatened Fauna and their Habitats

As described in **Section 3.2.4** above the Subject Land contains suitable habitat for numerous threatened fauna species in the form of native vegetation, mature foraging trees, large woody debris, old structures, and hollow-bearing trees. Similar vegetation is present on lands to the north and east.

An assessment of the likely impacts on all threatened fauna species known or considered to have potential to occur within 5 km of the Subject Land is provided in **Appendix 2**. Assessments of Significance (AoS) under the BC Act are provided in **Appendix 3** for the species identified as having a moderate or greater likelihood of occurrence as assessed in **Appendix 2**. These assessments are summarised in **Table 4.3** below.

Table 4.3: Results of five-part tests for threatened fauna present or considered to have potential to occur

Entity	BC Act*	Significant/ not significant impact	Justification
Gang-gang Cockatoo	V	Not significant	Project not assessed to trigger any of the relevant five-part test criteria. The Project would impact

Entity	BC Act*	Significant/ not significant impact	Justification
(<i>Callocephalon fimbriatum</i>)			approximately 2.34 ha of suitable habitat for this species (including approximately 1.76 ha of native vegetation); however, direct clearing of native vegetation would be limited to immature, sub-canopy trees. The majority of this impact would be along existing disturbance corridors in heavily weed infested understory. The Project would not remove any known potential hollow-bearing tree resources for this species. The Project would not create a barrier for the dispersion of this species through the local area
Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	V	Not significant	Project not assessed to trigger any of the relevant five-part test criteria. The Project would impact approximately 2.34 ha of suitable habitat for this species (including approximately 1.76 ha of native vegetation); however, direct clearing of native vegetation would be limited to immature, sub-canopy trees. The majority of this impact would be along existing disturbance corridors in heavily weed infested understory. The Project would not create a barrier for the dispersion of this species through the local area
Powerful Owl (<i>Ninox strenua</i>)	V	Not significant	Project not assessed to trigger any of the relevant five-part test criteria. The Project would impact approximately 2.34 ha of suitable habitat for this species (including approximately 1.76 ha of native vegetation); however, direct clearing of native vegetation would be limited to immature, sub-canopy trees. The majority of this impact would be along existing disturbance corridors in heavily weed infested understory. The Project would not remove any known potential hollow-bearing tree resources for this species. The Project would not create a barrier for the dispersion of this species through the local area
Varied Sitella (<i>Daphoenositta chrysoptera</i>).	V	Not significant	Project not assessed to trigger any of the relevant five-part test criteria. The Project would impact approximately 2.34 ha of suitable habitat for this species (including approximately 1.76 ha of native vegetation); however, direct clearing of native vegetation would be limited to immature, sub-canopy trees. The majority of this impact would be along existing disturbance corridors in heavily weed infested understory. The Project would not create a barrier for the dispersion of this species through the local area

Entity	BC Act*	Significant/ not significant impact	Justification
Tree-dwelling Microchiropteran bats Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>); Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>); Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>); and Yellow-bellied Sheath-tail-bat (<i>Saccolaimus flaviventris</i>).	V	Not significant	Project not assessed to trigger any of the relevant five-part test criteria. The Project would impact approximately 2.34 ha of suitable habitat for this species (including approximately 1.76 ha of native vegetation); however, direct clearing of native vegetation would be limited to immature, sub-canopy trees. The majority of this impact would be along existing disturbance corridors in heavily weed infested understory. The Project would not remove any known potential hollow-bearing tree resources for these species. The Project would not create a barrier for the dispersion of these species through the local area

*BC Act Status: V=Vulnerable

4.1.2 Indirect Impacts

In addition to direct impacts associated with the development of lands through removal of native vegetation, fauna habitat, changes to surface drainage patterns etc., developments also have a variety of secondary impacts on the wider locality. Indirect impacts likely to arise as a result of the Project comprise:

- Increased shading and interaction with canopy from elevated sections of the canopy skywalk;
- Sediment migration from areas of unconsolidated, exposed soil during construction works into downslope areas of native vegetation;
- Introduction of new weed species and pathogens into downslope and downstream areas due to runoff from unconsolidated, exposed soil during development as well as in stormwater following development;
- Increased noise and light pollution on nearby areas of retained native vegetation, reducing fauna utility of this habitat;
- Entrapment of fauna in trenching works;
- Increased dust generation during construction works, reducing fauna utility of areas of nearby retained habitat;
- Vegetation clearing, noise and dust impacts on Powerful Owl breeding success and microbat winter torpor. A breeding pair of the threatened Powerful Owl is known to use the Subject Land for nesting with potential nesting trees located within 100m of the Project works areas. These hollow-bearing trees are also potential roosts for microbats during winter torpor (hibernation);
- Increased risk of vehicle collision with fauna following development;
- Hydrological impacts on nearby drainage and creeklines;

- Edge effects; and
- Altered fire regimes.

Section 5 below details measures which may be implemented throughout all stages of future development to mitigate the effects of the above indirect impacts.

4.1.2.1 Indirect Impacts on Threatened Flora, TECs and Their Habitats

Indirect impacts on threatened flora values within the Subject Land are considered to be limited. The impact areas are small and impacts of most works are limited to the clearing of mostly exotic understory vegetation along existing tracks. Secondary impacts would be largely limited to the development stage and can be mitigated as detailed in **Section 5** below.

4.1.2.2 Indirect Impacts on Threatened Fauna and Their Habitats

Indirect impacts on threatened fauna known to occur in the locality would consist of the following:

- Increased noise and light pollution during and following development;
- Increased dust generation during works discouraging use of adjacent vegetation; and
- Increased risk of vehicle collision with fauna.

The Project is not considered likely significantly exacerbate the existing state of these impacts in the locality. The works areas considered in this EIA are largely located within or adjacent to existing tracks and other areas already frequented by users of the Subject Land.

The canopy skywalk will create new, elevated interaction points with fauna habitat within the elevated portions of this infrastructure. This has the potential to discourage foraging, nesting and other behaviours in the vicinity of the skywalk. However, as with the other portions of infrastructure considered in this EIA, the proposed route does not pass near to any known threatened species breeding resources (hollow-bearing trees, cave entrances etc.) and occurs within an area with an established track network. The construction and use of this structure is not considered likely to significantly increase the existing indirect impacts on fauna habitat in the Subject Land.

Due to the small size of the impact area, the Project is not considered likely to increase these impacts to the extent that local habitat for these species would be significantly degraded.

4.1.3 Key Threatening Processes

Table 4.4 below details the KTPs which could arise from the Project, as well as an assessment of the extent to which these KTPs would be exacerbated. This list is drawn from the Hornsby Park EIS and VMP, and applied to impacts likely to arise from the works considered in this EIA (Hornsby Shire Council and GHD, 2019), (Hornsby Shire Council and Gecko Environment Management, 2020).

Table 4.4: Key Threatening Processes assessment

KTP (BC Act)	KTP (EPBC Act)	Extent of KTP exacerbation
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	-	None The Project would not include alterations to natural flow regimes of creeks within the Subject Land

KTP (BC Act)	KTP (EPBC Act)	Extent of KTP exacerbation
Anthropogenic Climate Change	Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases	The Project will contribute to greenhouse gas emissions through construction activities and removal of vegetation. Due to the small size of the Project footprint, the Project is not considered likely to significantly exacerbate this KTP and would be largely limited to the construction phase
Bush rock removal	-	The Project would require removal of some bushrock for the installation of the Canopy Skywalk infrastructure. However, this habitat can be relocated to nearby areas and would not be removed from the Subject Land
Clearing of native vegetation	Land clearance	The Project will result in the removal of a small portion of native vegetation. This would be limited to several sub-emergent canopy trees for the Canopy Skywalk and minor understory vegetation for the Canopy Skywalk pads, track widening etc. This impact is not considered a significant exacerbation of this KTP on the locality scale
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Infection of amphibians with chytrid fungus resulting in chytridiomycosis	There is a low risk that this pathogen could be introduced in contaminated footwear and equipment, unclean fill and untreated water running offsite. This is not considered a significant risk provided appropriate mitigation measures are enacted
Infection of native plants by <i>Phytophthora cinnamomi</i>	Dieback caused by the root-rot fungus (<i>Phytophthora cinnamomi</i>)	This pathogen may be introduced by contaminated shoes and equipment by site users, in unclean fill used on site and untreated water running offsite. This is not considered a significant risk provided appropriate mitigation measures are enacted as detailed in the Hornsby Park VMP

KTP (BC Act)	KTP (EPBC Act)	Extent of KTP exacerbation
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	-	This pathogen may be introduced by contaminated shoes and equipment by site users, in unclean fill used on site and untreated water running offsite. This is not considered a significant risk provided appropriate mitigation measures are enacted as detailed in the Hornsby Park VMP
Invasion and establishment of exotic vines and scramblers	-	Exotic weed vine and scrambler species may be introduced as seed in unclean fill. This is not considered a significant risk provided appropriate mitigation measures are enacted
Invasion of native plant communities by African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif	-	This species may be introduced as seed in unclean fill. This is not considered a significant risk provided appropriate mitigation measures are enacted
Invasion of native plant communities by exotic perennial grasses	-	Exotic perennial grass species may be introduced as seed on contaminated equipment and unclean fill. However, significant exotic perennial grass populations already present. Future development is not considered likely to significantly exacerbate this KTP in the locality
Invasion, establishment and spread of Lantana (<i>Lantana camara</i> L. sens. Lat)	-	This species may be introduced as seed on contaminated equipment and unclean fill. However, populations are already known from the Subject Land. This is not considered a significant risk provided appropriate mitigation measures are enacted as per the Hornsby Park VMP
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Garden plant species may be introduced as seed on contaminated equipment and unclean fill and by greenwaste dumping. The Subject Land currently supports populations of escaped garden plants. This is not considered a significant risk provided appropriate mitigation measures are enacted as per the Hornsby Park VMP

KTP (BC Act)	KTP (EPBC Act)	Extent of KTP exacerbation
Loss of hollow-bearing trees	-	None The Project would not require the removal of any hollow-bearing trees from the Subject Land
Predation by the European Red Fox, <i>Vulpes vulpes</i>	Predation by European Red fox	The Project is not considered likely to exacerbate predation by the European Red Fox, provided appropriate waste management practices are enacted
Predation by the Feral Cat, <i>Felis catus</i>	Predation by Feral Cats	The Project is not considered likely to exacerbate predation by the Feral Cat, provided appropriate waste management practices are enacted
Removal of dead wood and dead trees	-	The Project would require removal of some dead wood for the installation of the Canopy Skywalk infrastructure, path widenings etc. However, this habitat can be relocated to nearby areas and would not be removed entirely from the Subject Land

4.1.4 Prescribed biodiversity impacts

Prescribed biodiversity impacts are detailed in the BAM and are defined as impacts to biodiversity values not associated with native vegetation. As per Section 6.1 of the Biodiversity Conservation Regulation 2017 (the Regulation), prescribed biodiversity impacts comprise:

- a) The impacts of development on the following habitat of threatened species or ecological communities:
 - i. Karst, caves, crevices, cliffs and other geological features of significance;
 - ii. Rocks;
 - iii. Human made structures; and
 - iv. Non-native vegetation.
- b) 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;
- c) The impacts of development on movement of threatened species that maintains their lifecycle;
- d) The impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development);
- e) The impacts of wind turbine strikes on protected animals; and
- f) The impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

Although this report does not constitute a BDAR, prescribed impacts as detailed in the BAM and the Regulation have been considered in this EIA to supplement the assessment of indirect impacts of the Project. **Table 4.5** below assesses the Project against the above listed prescribed biodiversity impacts.

Table 4.5: Assessment of potential prescribed biodiversity impacts of the Project

Prescribed biodiversity impact	Relevant works	Assessment of impacts	Likely significant impact (y/n)
The impacts of development on the following habitat of threatened species or ecological communities: Karst, caves, crevices, cliffs and other geological features of significance	All	The canopy skywalk and Pathway from Sports Field to Quarry Void will require the movement of some rocky areas containing crevices for the installation of piers etc. The remaining works areas would pass over or near to similar rock areas containing small crevices. Rocks removed by works can be relocated to nearby areas or replaced following works. This impact would be small and localised	n
The impacts of development on the following habitat of threatened species or ecological communities: Rocks	All	The canopy skywalk and Pathway from Sports Field to Quarry Void will require the movement of some rocky areas for the installation of piers etc. The remaining works areas would pass over or near to similar rock areas. Rocks removed by works can be relocated to nearby areas or replaced following works. This impact would be small and localised	n
The impacts of development on the following habitat of threatened species or ecological communities: Human-made structures	Boardwalk from Skywalk to Crusher Plant Canopy Skywalk	These two works areas include portions located near to the existing Crusher Plant structure. Noise, dust and light generated during these works may affect habitat utility of this structure for resident fauna (i.e., microbats). Works can be timed to avoid the most sensitive periods for these species (winter torpor)	n
The impacts of development on the following habitat of threatened species or ecological communities: Non-native vegetation	All	Non-native vegetation comprises the majority of vegetation required to be removed by the Project. All portions of the Project would remove some non-native vegetation. This vegetation was not identified as important habitat for any threatened flora or fauna species on the Subject Land. In places it may form part of the dense understory habitat for the Powerful Owl; however, the areas to be impacted are largely along existing tracks or adjacent to cleared areas. These areas are considered to be less suitable habitat for the local Powerful Owl population	n
The impacts of development on the connectivity of different areas of habitat of	All	The Project will remove vegetation within fauna movement corridors within the Subject Land. However, these impacts would largely be located along existing	n

Prescribed biodiversity impact	Relevant works	Assessment of impacts	Likely significant impact (y/n)
threatened species that facilitates the movement of those species across their range		trackways or adjacent to existing cleared areas. Overall connectivity of vegetation on the Subject Land to adjacent native vegetation and the wider Berowra Valley National Park would not be significantly reduced for threatened and other native flora and fauna as a result of the Project	
The impacts of development on movement of threatened species that maintains their lifecycle	All	The Project will create new physical structures as well as noise, lights and dust generation during both the construction and operational phases (primarily during construction). This has the potential to disrupt the breeding cycle of the known breeding pair of Powerful Owls on the Subject Land. Appropriate construction timing will avoid impacts during the breeding season (April-October)	n
The impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)	All	All components of the Project will affect surface water drainage through the creation of new impermeable surfaces, land recontouring, vegetation clearing and exposure of unconsolidated soil. This has the potential to impact sediment and contamination loads entering local waterways. This can be managed with effective sediment control devices and protocols	n
The impacts of wind turbine strikes on protected animals	None	Not relevant, the Project does not include the construction or operation of wind turbines	n
The impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community	All	All works will involve additional vehicles for construction and materials transport etc. This could increase vehicle interactions with native fauna on local roads. Following development, increased traffic in, out and around the site could also increase the risk of vehicle strikes on native fauna. However, all speeds within the Subject Land and adjacent road network are low (max 50kph) and in well-lit areas. The Project is not considered likely to significantly exacerbate the risk of vehicle strike on local native fauna	n

4.2 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

This section details the assessment of potential Matters of National Environmental Significance (MNES) which may be impacted as a result of the Project. These MNES are as listed under the Commonwealth EPBC Act and encompass:

- World heritage properties;
- National heritage properties;
- Wetlands of national importance;
- The Great Barrier Reef Marine Park;
- Commonwealth Marine Area;
- Listed Threatened Ecological Communities;
- Listed threatened species; and
- Listed migratory species.

Assessment for the presence of these entities was conducted through the Protected Matters Search Tool (PMST) with a 10 km buffer around the Subject Land (Commonwealth of Australia, 2021).

4.2.1 World Heritage Properties

Based on the desktop search, no World Heritage Property listed under the EPBC Act occurs within the search area. No impact to any world heritage properties is considered likely as a result of the Project.

4.2.2 National Heritage Properties

Based on the desktop search, no National Heritage Property listed under the EPBC Act occurs within the search area. No impact to any national heritage properties is considered likely as a result of the Project.

4.2.3 Wetlands of International Importance

Based on the desktop search, no wetlands of international importance listed under the EPBC Act occur within the search area. No impact to any wetlands of international importance is considered likely as a result of the Project.

4.2.4 The Great Barrier Reef Marine Park

The Subject Land is not part of or near the Great Barrier Reef Marine Park. Therefore, the Project will not impact on the Great Barrier Reef Marine Park.

4.2.5 Commonwealth Marine Area

The Subject Land is not part of or near the Commonwealth Marine Area. Therefore, the Project will not impact on the Commonwealth Marine Area.

4.2.6 Listed Threatened Ecological Communities

The BC Act TEC of Blue Gum High Forest in the Sydney Basin Bioregion is commensurate with Blue Gum High Forest of the Sydney Basin Bioregion – listed as critically endangered under the EPBC Act. However, as per Section 4.5.1 of the Hornsby Park EIS it did not meet the condition thresholds to qualify as this TEC. It has therefore not been considered further under the EPBC Act in this EIA.

4.2.7 Listed Threatened Species

Appendix 2 assesses the likelihood of occurrence of all EPBC Act listed threatened species identified in the PMST report. This analysis identified numerous species as having a moderate or greater likelihood of occurrence on the Subject Land.

The impact of the Project on these species was assessed through tests of significance under the EPBC Act, in **Appendix 7**. These assessments are summarised in **Table 4.6** below.

Table 4.6: Results of ToS for EPBC Act threatened fauna present or considered to have potential to occur

Entity	EPBC Act*	Significant/ not significant impact	Justification
Gang-gang Cockatoo (<i>Callocephalon fimbriatum</i>)	E	Not significant	Project not assessed to trigger any of the relevant test criteria. Based on the native tree species present, the habitat of the Subject Land met the definition of critical habitat for the species. However, the Project would remove understory vegetation and sub-emergent trees of low foraging value for this species and would not remove any hollow-bearing resources. The Project was not assessed as likely to place a local population of this species at risk of extinction
Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	V	Not significant	Project not assessed to trigger any of the relevant test criteria. Based on the vegetation present and the proximity of a known breeding camp within 20 km, the habitat of the Subject Land met the definition of critical habitat for the species. However, the Project would remove understory vegetation and sub-emergent trees of low foraging value for this species. The Project was not assessed as likely to place a local population of this species at risk of extinction

*V = Vulnerable, E = Endangered

4.2.8 Listed Migratory Species

Appendix 6 assesses the likelihood of occurrence of all EPBC Act listed migratory species identified in the PMST report. No listed migratory species is considered to have a moderate or greater likelihood of occurrence on the Subject Land.

5. RECOMMENDATIONS

5.1 INTRODUCTION

When assessing the biodiversity impacts of a project there are three key considerations. These three approaches are listed in a descending order of best biodiversity outcomes:

- **Avoid:** modify the proposed development so no significant impact on resident biodiversity values would occur. This is typically impractical but can help guide mitigation measures;
- **Mitigate:** modify the proposed development to reduce the significant impacts on biodiversity values to the maximum extent possible. This is typically achieved through measures such as modification of proposed dwelling envelopes to avoid removing vegetation etc.; and
- **Compensate:** include measures in the proposed development to compensate for the biodiversity values lost. This can be achieved through an on-site offset which reserves a portion of the subject site in perpetuity for conservation and rehabilitation purposes. It can also be achieved through an off-site offset under the NSW Biodiversity Offsets Scheme (BOS). This allows for the proponent of a proposed development to purchase biodiversity credits of an equal value to the credit value of the biodiversity assets present on a subject site. These credits will then be used to preserve an area of equivalent biodiversity value off-site.

This section makes recommendations to reduce or to provide suitable compensation for the impacts on flora and fauna values detailed in **Section 4** above.

5.2 AVOIDING IMPACTS

As detailed in **Section 4.1.1** above, the Project would remove vegetation largely from weed-dominated understory along existing tracks and cleared areas. This would avoid removal of any native vegetation for the majority of works considered in this EIA. A total of three sub-adult native trees would be removed for the canopy skywalk; however, the majority of the pier locations and skywalk sections have been deliberately located to avoid removal of entire trees with the three to be removed considered the lowest possible impact of all feasible routes. Remaining impacts on trees within the route of the Canopy Skywalk (as detailed in **Section 4.1.1.1**) would entail limb removal but would retain the impacted tree.

Further, as discussed in **Section 4.1.1.1** above, the canopy skywalk piers have been designed for the smallest impact area feasible, with the central 5m diameter pier area constituting the only permanent loss of vegetation within the impact footprint of each pier. The remaining impact area is for construction staff access and equipment laydown and would be rehabilitated following construction works.

The construction for the Boardwalk from the Skywalk to the Crusher Plant would be contained entirely within the boardwalk footprint. Construction would commence from one or both ends of the boardwalk and extend in sections, with materials stockpiles and staff access being located on adjacent roads or within constructed sections of the boardwalk. This will avoid the need for additional vegetation clearing for material stockpiles and other staging areas. All bike and walking track routes upgrades would also follow the same methodology.

The Project would not isolate or fragment any area of native vegetation. Clearing would primarily occur along existing tracks or on the edge of existing cleared areas and would largely consist of woody, © Anderson Environmental Pty Ltd – Document 2436 – Hornsby Park Embellishments – Ecological Impact Assessment – Version 4

exotic understory vegetation. The current level of connectivity throughout the Subject Land would be retained and connectivity with the adjacent Berowra Valley National Park to the west would not be reduced by the Project.

5.3 MITIGATING IMPACTS

The Project would enact a variety of mitigation measures and procedures to further reduce the unavoidable impacts on native flora and fauna values. These measures would include timing of works to avoid sensitive times for key threatened fauna (i.e., avoiding winter breeding period for the Powerful and winter torpor for microbats), installation of sediment control devices, fauna sensitive lighting plan etc.

The remaining potential impacts on biodiversity associated with the Project are considered to be indirect. As detailed in **Section 4.1.2** above, a variety of indirect impacts may arise without adequate safeguards as a result of the Project. Appropriate mitigation measures for these impacts are described in **Table 5.1** below.

Table 5.1: Appropriate mitigation measures for likely indirect impacts of the Project

Impact	Action	Outcome	Timing	Responsibility
Increased shading and interaction with canopy from elevated sections of the canopy skywalk	Open skywalk path design to minimise full shading thrown by structures. Use of low power lighting on the canopy skywalk to allow safe use by patrons at night but to limit light throw into adjacent vegetation	Minimisation of disturbance to sensitive native flora and fauna receptors	Operational phase	Skywalk designer, construction staff and park management
Sediment migration from areas of unconsolidated, exposed soil during development works into downslope areas of native vegetation	Sediment fencing is to be installed below all areas of exposed soil during works	Prevention of migration of unconsolidated soil into areas of adjacent native vegetation	Construction phase. Maintained and repaired as required. Retained until soil is stabilised by another mechanism (regeneration)	Contractor(s) responsible for works Bush regenerators
Introduction of new weed species and pathogens, turbidity and suspended sediment into downslope and downstream areas due to runoff from unconsolidated, exposed soil during development as well as in stormwater following development	Appropriate runoff controls such as sediment fencing can be installed prior to any soil disturbance works. Any exogenous soil and water used on site (e.g., for dust suppression) is to be appropriately treated to minimize the rise of the introduction of new pests and diseases. Conduct all works in line with Council's Bushland Hygiene Protocols for Phytophthora and Preventing spread of Myrtle Rust in bushland (Hornsby Shire Council, 2014) (NSW Department of Industry and Investment, 2010)	Mitigation of the risk of introduction of new pests and diseases into downslope areas of native vegetation	Construction and operational phases	Contractor(s) responsible for works/park management
Increased noise and light pollution on nearby areas of retained native vegetation, reducing fauna utility of this habitat	Restricting works to daylight hours and minimising the use of loud machinery whenever possible or containing such machinery within noise barriers.	Minimal disturbance to sensitive fauna using habitat within the Subject Land and adjacent lands	Construction and operational phases	Contractor(s) responsible for works

Impact	Action	Outcome	Timing	Responsibility
	Timing of works to avoid sensitive life stage periods for known threatened fauna (Powerful Owl and microbats). Sensitive internal lighting plan to avoid throwing excessive light onto adjacent bushland areas			
Entrapment of fauna in trenching works This can result in fauna death or injury through drowning, burial and compaction or through interaction with excavation plant	Carry out excavation and backfilling works within a single day. If sections of trench are required to be left overnight cover with metal plates or heavy wooden boards to prevent fauna access. Inspect open trenches each morning for potentially trapped fauna prior to commencing works. If fauna is observed within trench, contact a suitably training and qualified wildlife handler to carry out rescue and relocation. Injured or juvenile fauna are to be taken to a local veterinarian for assessment and treatment. Works within the trench are not to resume until any fauna present have been rescued	Minimal risk of fauna injury or death during trenching works	Construction phase	Contractor(s) responsible for works
Increased dust generation during development works, reducing fauna utility of areas of nearby retained habitat	Dust minimisation through water suppression, avoiding works on high wind days and limiting dust generating activities to the extent possible.	Minimal disturbance to sensitive fauna using habitat within the Subject Land and adjacent lands	Construction phase	Contractor(s) responsible for works

Impact	Action	Outcome	Timing	Responsibility
	Timing of works to avoid sensitive life stage periods for known threatened fauna (Powerful Owl and microbats)			
Vegetation clearing, noise and dust impacts on Powerful Owl breeding success and microbat winter torpor. A breeding pair of the threatened Powerful Owl is known to use the Subject Land for nesting with potential nesting trees located within 100m of the Project works areas. These hollow-bearing trees are also potential roosts for microbats during winter torpor (hibernation)	Avoid clearing and construction works within the breeding period of Powerful Owl (April-October) and winter torpor period for microbats (June-August)	Minimise disruption to breeding activity for the Powerful Owl and winter torpor behaviour for tree-roosting microbats	Construction and operational phases	Contractor(s) responsible for works
Increased risk of vehicle collision with fauna	Limiting speeds within the Hornsby Park area. Warning signage. Adequate lighting along vehicle roads within Subject Land and adjacent roads	Minimisation of the risk of vehicle strike	Construction and operational phases	Contractor(s) responsible for works/park management

5.3.1 Mitigating Artificial Light Impacts

The Hornsby Quarry Park Specialist Lighting Concepts document has considered the impacts of new artificial light sources on areas of native vegetation (Hornsby Shire Council, 2022). As shown on Page 6 of this document, there are seven “layers of light” concepts applying to different use areas within the park. Stronger lighting is proposed within the human-use oriented areas (Quarry Void, Sports Field, vehicular access roads, building etc).

Within areas adjacent to or within native vegetation (Canopy Skywalk, Pathway from Sports Field to Quarry Void), referred to as “connecting elements” in this document, low level lighting is proposed. This is described in this document as “*integrated low level controllable lighting within handrails*” and would comply with Australian Standard (AS) 1158 Lighting for Roads and Public Spaces (Standards Australia, 2020). As detailed on Page 8 and depicted in concept images in Page 19 of the Hornsby Quarry Park Specialist Lighting Concepts, this would comprise lighting of 1-10 Luminous Flux per Unit Area (lux) mounted within handrails. Light would be projected down and into the pathway to provide illumination for pedestrians while minimising light thrown into adjacent bushland.

This lighting would also be dynamic, allowing brightness to be adjusted in response to pedestrian demand.

5.3.2 Mitigating Impacts on Trees Adjacent to Canopy Skywalk Piers

With reference to the Hornsby Park Embellishment – Skywalk Tree Impacts Comparison report, the skywalk is designed to be modular, allowing sections to be installed with a minimum disturbance to adjacent native vegetation (Clouston Associates, Hornsby Shire Council, 2023). Methods from this report intended to be employed to achieve this low impact are listed below:

- Craned over top of forest;
- Dropped vertically down through forest - Threaded and rotated down to drop through canopy until level on the forest floor;
- Laid on forest floor flat;
- Use of mountain bike tracks where possible;
- Temporary scaffolding to support on uneven terrain; and
- Lifted back up into the canopy horizontally to final position.

If works are required adjacent to retained trees for the Canopy Skywalk Piers (for material stockpiling etc.), the following tree protection measures are to be implemented (as per (AS) 4970 – 2009 (+A1) Protection of Trees on Development Sites (Standards Australia, 2009).

The primary protection measure is the erection of boundary fencing and signage around the calculated Tree Protection Zone (TPZ). See **Figure 5.1** below.

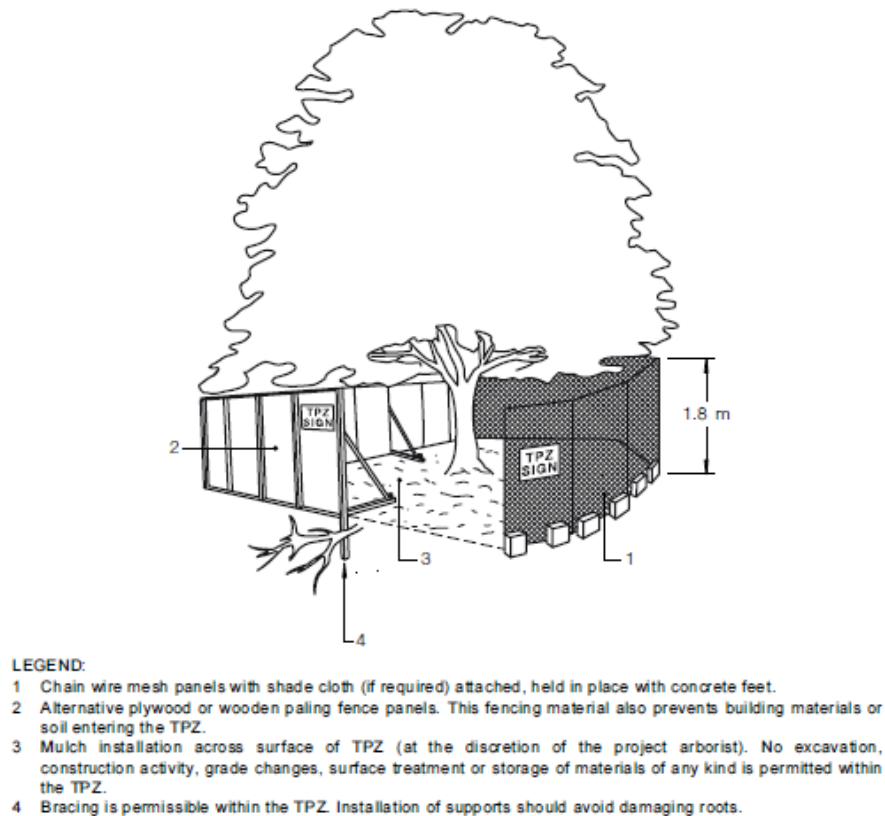


Figure 5.1: Example of TPZ fencing and signage design from Section 4.4 of AS4970 – 2009 (+A1)

Typically, this fencing and signage will prevent any intrusion within the TPZ during works and would be removed following the completion of works. However, works such as the installation of underground services or scaffolding to support construction for a nearby structure may be required to intrude within a TPZ, if no alternatives are practicable.

Intrusion within a TPZ is considered to be minor (less than 10% of the TPZ and outside of the Structural Root Zone (SRZ)) or major (greater than 10% or within the SRZ). Minor encroachment typically does not require further assessment; however, under the standard an arborist is required to be consulted prior to any TPZ encroachment, to certify that no significant impact on the tree is likely. A major encroachment will require additional works such as root mapping to determine the location of all portions of the tree within the proposed works area. Any such works must be approved by an arborist and it must be demonstrated that the tree will remain viable following these works.

Any intrusion within a TPZ must be compensated for through the extension of the TPZ on another face, commensurate with the area impacted. For example, if a minor encroachment (10%) is required on one face, then the TPZ is to be extended by 10% on the opposite face. AS4970 – 2009 (+A1) also lists tree protection measures for such works. These include:

- Branch protection for trunks and limbs within the swing range of machinery;
- Ground mulching and placement of ground pads to protect the upper root zone;
- Hand digging of trenches within the TPZ to minimise damage to any roots present; and
- Acceptable pruning of trees within areas required for the erection of scaffolding.

All works within a TPZ are to be supervised and certified by an arborist. The measures described above are not exhaustive and all protection requirements described in AS4970 – 2009 (+A1) must be considered prior to the carrying out of any such works.

With reference to the Hornsby Park Embellishment Arboricultural Impact Assessment Report, the following TPZ and SRZ measures will be employed when assessing the impacts of works adjacent to affected trees (Arterra Consulting and Arboriculture, 2022):

- Minor encroachments of less than 10% would generally be readily acceptable but they should typically involve compensatory areas applied elsewhere that are contiguous to the remaining TPZ wherever possible;
- Major encroachments will usually necessitate the need for a much more in depth inspection of the particular tree(s) and potentially the use of non-destructive investigations of root zone to review and justify the proposed incursion;
- Above ground encroachments may also need to be considered to assess the impact and loss of any major branches and foliage; and
- Incursions into the Structural Root Zone will typically not be allowed as is usually extremely difficult to justify that level of incursion without extraordinary building techniques being employed and/or very rigorous investigation of the tree root zone. In such situations it may be better to either re-design or reposition the proposed impacting element, or remove the tree.

As discussed in **Section 5.3** above, the Hornsby Quarry Park Specialist Lighting Concepts document has considered the impacts of new artificial light sources on areas of native vegetation (Hornsby Shire Council, 2022). **Figure 5.2** below provides a representation of the proposed lighting to be used in the Canopy Skywalk as well as other pedestrian areas passing through or near to areas of native vegetation (referred to as Connecting Elements in this plan).



Figure 5.2: Representation of proposed lighting impacts from Canopy Skywalk and pedestrian pathways

Hornsby Quarry Park Specialist Lighting Concepts (Hornsby Shire Council, 2022)

5.4 COMPENSATION

As detailed in the Hornsby Park EIS, the residual impacts of the Hornsby Park project are to be offset through the Hornsby Council's Green Offsets Code (Hornsby Shire Council and GHD, 2019). As detailed in Section 11.4.2 of the Hornsby Park EIS, an offset package was developed for the Hornsby Park project in line with Council's Green Offsets Code and recommendations from the Office of Environment and Heritage (OEH) (now DP&E).

Impacts on native vegetation as a result of the Project assessed in this EIA are to follow the same assessment methodology detailed in the Hornsby Park EIS, using the data collected for the Hornsby Park EIS under the former BioBanking Assessment Method (BBAM) with the offset area calculations as detailed in **Table 4.1** of this EIA for the two PCTs present.

5.5 ADDITIONAL ASSESSMENT REQUIREMENTS (BIODIVERSITY CONSERVATION ACT 2016)

Under the BAM, there are two entry pathways for a Part 5 development (under the NSW EPA Act):

1. Will it be carried out in a declared Area of Outstanding Biodiversity Value (AOBV; and/or
2. Is it likely to significantly affect threatened species or ecological communities or their habitats, according to the threatened species Test of Significance?

With regards to the Subject Land, the Project does not meet either of these conditions.

The nearest AOBV is the Little Penguin population in Sydney's North Harbour, located over 20km to the south-east of the Subject Land. Regarding entry pathway 2, no significant impact on any TEC or threatened species assessed through the five-part tests in **Appendix 3** was determined to occur as a result of the Project.

Based on this assessment, the Project is not required to be assessed through a BDAR in accordance with the BAM.

6. CONCLUSIONS

This EIA has been drafted on behalf of Hornsby Shire Council to inform a Review of Environmental Factors (REF) assessing the potential ecological impacts of works associated ancillary works to support the Hornsby Park project (the Project). The Project involves numerous additional works not included in the original EIS. These works include a boardwalk, elevated canopy skywalk, route changes and new sections of the urban cycleway, mountain bike tracks and bushwalking tracks, a new zig-zag stairway, bird hides, lookouts and other minor areas.

This EIA was conducted in two phases, a desktop assessment and field surveys. The desktop assessment identified the potential presence of numerous listed threatened species, populations and TECs, known or considered likely to occur in the locality from state and local threatened species databases. The desktop study also included a review of the Hornsby Park EIS, master plan, VMP and other supporting documents and datasets. The findings of the desktop assessment were used to inform the scope of the field surveys.

Field surveys were conducted on three occasions, in May, August and September of 2022 by one ecologist from Anderson Environmental. These surveys comprised a complete walk-through survey of the Project Area (with the exception of some minor bushwalking tracks) with Hornsby Shire Council staff and other involved contractors.

The desktop study and field survey identified two PCTs present on the Subject Land, and both occurred within the Project works areas:

1. Sydney Coastal Enriched Sandstone Forest (PCT3592); and
2. Blue Gum High Forest (PCT3136).

PCT3592 occurred as moderate/good – high and moderate/good – poor and PCT3136 only as moderate/good – poor condition. PCT3136 also conformed to the TEC of Blue Gum High Forest in the Sydney Basin Bioregion, listed as critically endangered under the BC Act. As per the Hornsby Park EIS, no PCT3136 vegetation on the Subject Land was assessed as meeting the condition thresholds for protection under the EPBC Act (as Blue Gum High Forest of the Sydney Basin Bioregion).

No listed threatened flora species were detected during surveys and none are known from the Subject Land, with reference to the Hornsby Park EIS. Numerous threatened bird, gastropod and mammal species were considered to have a moderate or greater likelihood of occurrence, and several are known to occur on the Subject Land (from surveys for the EIS and subsequent Council surveys):

- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Grey-headed Flying Fox (*Pteropus poliocephalus*);
- Powerful Owl (*Ninox strenua*); and
- Varied Sitella (*Daphoenositta chrysoptera*).

A pair of Powerful Owls are known to nest on the Subject Land and have been observed to have successfully raised chicks in the past few years, with reference to the Hornsby Park VMP.

The impacts of the Project on all known and species considered to have a moderate or greater likelihood of occurrence were consequently assessed through 5-part tests, as per Part 7.3 of the BC Act. These concluded that the Project was not likely to have a significant impact on these entities due to the small size of the impact area, the nature of the impact being primarily along existing tracks or adjacent to cleared areas, primarily removing largely exotic understory vegetation and the areas proposed for works already being frequented by park users.

The Project would remove some native vegetation and fauna habitat from the Subject Land. This would primarily involve the removal of three sub-emergent native trees for the Canopy Skywalk route and native understory and shrubs within the pier footprints. However, no high-value habitat items (caves, hollow-bearing trees, large fruiting and flowering trees etc.) would be removed by the Project.

Numerous mitigation measures could be implemented during and following construction including sediment and weed control measures, limiting noise generating works and avoiding night works (to limit additional light pollution on adjacent areas of fauna habitat) as well as timing of works to avoid sensitive times for key threatened species (i.e., avoiding winter nesting for the Powerful Owl and winter torpor period for microbats).

The majority of works would occur along existing paths and tracks and aside from an increase to pedestrian traffic are not considered likely to further degrade habitat utility for native flora and fauna adjacent to the works areas in the long term. The canopy skywalk will introduce a new interaction point in the canopy which may discourage use of this habitat for native fauna. However, this impact is considered to be minor, with the area proposed for the skywalk located in an already heavily frequented and tracked part of the Subject Land, with the species present already adapted to human visitation.

The long-term impacts of the Project on habitat utility of the local area are considered negligible. The Project is small in scale, would require minimal vegetation removal and would primarily occur within the more disturbed and frequented parts of the Subject Land currently open to public use. Large areas of similar condition native vegetation were present on adjacent lands and connectivity with the wider Berowra Valley National Park to the west would not be disrupted by the Project.

Assessment of MNES determined that Project would not have a significant impact on any MNES identified within the locality. Tests of significance conducted for the Grey-headed Flying Fox concluded that the Project would not have a significant impact on this species and no referral to the federal Minister of the Environment was considered necessary. The Subject Land was assessed as meeting the definition of critical habitat for this species under the national Recovery Plan; however, the Project would not remove any mature feed trees, isolate or fragment any area of habitat or significantly affect critical life-stage habitat for the species, the impact was assessed as not significant.

Assessments under the BC Act and EPBC Act for the TEC present and threatened species considered likely to occur concluded that the Project is unlikely to have a significant impact on these entities.

Further assessment through a BDAR (BC Act) and/or a referral to the federal Minister of the Environment (EPBC Act) are not considered necessary. Residual impact on native vegetation as a result of the Project will be managed through Council's Green Offset Policy, consistent with the offsets policy already enacted for the wider Hornsby Park Project.

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8. APPENDIX 1: DISCLAIMER AND LIMITATION OF LIABILITY

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9. APPENDIX 2: LIKELIHOOD OF OCCURRENCE TABLES

Threatened flora and fauna, and migratory species (listed under the BC Act and EPBC Act) that have been gazetted and are known, or have potential, to occur within a 10 km radius of the Subject Land have been considered in this section. TECs known from the broader area have also been considered. The likelihood of occurrence within the Subject Land of each species and TEC was assessed using the criteria described in **Table A2-1** and the findings presented in **Table A2-2** (flora species and TECs) and **Table A2-3** (fauna species).

Table A2-1: Likelihood of occurrence criteria

Likelihood Rating	Criteria
Known	The species was recorded within the Subject Land during the field surveys
High	It is likely that a species would inhabit or utilise habitat within the Subject Land. Criteria for this category may include: • Species recently and/or regularly recorded in contiguous or nearby habitat; • High quality habitat or resources present within the Subject Land; • Species is known or likely to maintain a resident population surrounding the Subject Land; and • Species is known or likely to visit during migration or in response to seasonal availability of resources present on site.
Moderate	Potential habitat for a species occurs within the Subject Land. Criteria for this category may include: • Species previously recorded in contiguous habitat albeit not recently (>10 years); • Habitat present, but poor quality, depauperate or modified types and/or resources; • Species has potential to utilise habitat during migration or seasonal availability of resources; and • Cryptic flora species with potential habitat within the Subject Land that have not been targeted by surveys (for example, surveys were not undertaken within the flowering season).
Low	It is unlikely that the species inhabits the area, if it did, it would likely be a transient visitor. Criteria for this category may include: • The Subject Land does not support the specific habitat types or resources required by the species; • The Subject Land is beyond the current distribution of the species or is isolated from known populations; and • Non cryptic flora species not observed during targeted surveys.
None/ absent	The habitat within the Subject Land is unsuitable for the species

Table A2-2: TECs and flora species

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Agnes Banks Woodland in the Sydney Basin Bioregion (BC Act) Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (EPBC Act)	Occurs in western Sydney and originally extended over about 615 hectares, but now has only 98 hectares remaining intact, mostly near Agnes Banks on the east bank of the Hawkesbury River, in the Penrith local government area. A good example can be seen at the Agnes Banks Nature Reserve, near Richmond. The community occurs on areas of wind-blown sand which overlay Tertiary Alluvium deposits from ancient river systems. Depending on drainage conditions, there is great variation within the community, from low woodland on higher ridges to sedge-type vegetation in low lying depressions.	E4A	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions (BC Act)	Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions is currently known from parts of the Local Government Areas of Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. It is known to occur within a number of conservation reserves, including Royal, Seven Mile Beach, Conjola, Meroo, Murramarang, Eurobodalla and Biamanga National Parks, though these areas are often exposed to degradation by visitor overuse due to their proximity to popular beaches and camping areas	E3	-	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Blue Gum High Forest in the Sydney Basin Bioregion (BC Act) Blue Gum High Forest of the Sydney Basin Bioregion (EPBC Act)	Originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000 there was less than 200 hectares remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is less than 20 hectares. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas. An example of Blue Gum High Forest can be seen at the Dalrymple-Hay Nature Reserve, St Ives. Occurs only in areas where rainfall is high (above 1100 millimetres per year) and the soils are relatively fertile and derived from Wianamatta shale. In lower rainfall areas, it grades into Sydney Turpentine-Ironbark Forest	E4A	CE	Known	Vegetation mapping and survey of the Subject Land confirmed this TEC is present within the Subject Land A portion of the proposed works would occur within the understory of this TEC

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion (BC Act) Turpentine-Ironbark Forest of the Sydney Basin Bioregion (EPBC Act)	Characteristic tree species of this ecological community are Mountain Blue Gum (<i>Eucalyptus deanei</i>), Monkey Gum (<i>E. cypellocarpa</i>) and Turpentine (<i>Syncarpia glomulifera</i>). Other tree species include Sydney Red Gum (<i>Angophora costata</i>), Rough-barked Apple (<i>A. floribunda</i>), Mountain Mahogany (<i>E. notabilis</i>), Sydney Peppermint (<i>E. piperita</i>) and Grey Gum (<i>E. punctata</i>). Tree species composition varies between sites depending on geographical location and local conditions (e.g., topography, rainfall exposure)	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion (BC Act) Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (EPBC Act)	Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is to occur within the local government areas of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith, but may occur elsewhere within the Sydney Basin Bioregion. Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. Often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. The boundary with these units appears to be a function of the localised drainage conditions and the thickness of the tertiary alluvium mantle.	V	E	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) Subtropical and Temperate Coastal Saltmarsh (EPBC Act)	Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include <i>Baumea juncea</i> , Sea Rush (<i>Juncus kraussii</i> subsp. <i>australiensis</i>), Samphire (<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>), Marine Couch (<i>Sporobolus virginicus</i>), Streaked Arrowgrass (<i>Triglochin striata</i>), Knobby Club-rush (<i>Ficinia nodosa</i>), Creeping Brookweed (<i>Samolus repens</i>), Swamp Weed (<i>Selliera radicans</i>), Seablite (<i>Suaeda australis</i>) and Prickly Couch (<i>Zoysia macrantha</i>). Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans	E3	V	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Coastal Upland Swamp in the Sydney Basin Bioregion (BC Act) Coastal Upland Swamps in the Sydney Basin Bioregion (EPBC Act)	The Coastal Upland Swamp is endemic to NSW and confined to the Sydney Basin Bioregion. It occurs in the eastern Sydney Basin from the Somersby district in the north to the Robertson district in the south. Coastal Upland Swamps occur primarily on impermeable sandstone plateaux with shallow groundwater aquifers in the headwaters and impeded drainage lines of streams, and on sandstone benches with abundant seepage moisture	E3	V	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (BC Act) Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (EPBC Act)	Occurs in western Sydney, and the extent of intact remnants is now reduced to 1011 hectares, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Good examples can be seen at the Castlereagh and Windsor Downs Nature Reserves. Has a very restricted natural distribution and mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)	The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest lies in a coastal valley rain shadow that occupies the driest part of the Cumberland Plain. It typically occurs on flat to undulating or hilly terrain, at elevations up to about 350 m above sea level, and on clay soils (derived from Wianamatta Group shales), with some occurrences on other soils. Annual rainfall in the region typically lies within the range of 700–900 mm. This ecological community has several vegetation layers in its natural state. The tree canopy is typically dominated by <i>Eucalyptus moluccana</i> (grey box), <i>E. tereticornis</i> (forest red gum), and/or <i>E. fibrosa</i> (red ironbark)	E4B	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Duffys Forest Ecological Community in the Sydney Basin Bioregion (BC Act)	Occurs in association with shale lenses and lateritic soils in Hawkesbury Sandstone. Rock outcrops are usually absent from this community, except on the fringes, where it adjoins typical sandstone vegetation, generally characterised by extensive sandstone outcrops. Situated on ridgetops, plateaus and upper slopes, but may also occur on mid-slopes or benches downslope of Sydney Sandstone Ridgetop Woodland.	E3	-	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion (BC Act)	Once occupied around 5,300 hectares of land between North Head and Botany Bay in Sydney's eastern suburbs. Surviving stands totalling approximately 146 hectares have been recorded from the local government areas of Botany, Randwick, Waverley, and Manly. Occurs on disjunct patches of nutrient poor aeolian (wind blown) dune sand.	E4A		None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Elderslie Banksia Scrub Forest (BC Act)	Occurs only in the Elderslie area, near Camden, in Sydney's south-west. Remaining remnants are 15 ha in total. Unique as includes plants, such as coastal Banksia and other sandstone region species, which do not occur in the surrounding Cumberland Plain communities	E4B	-	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act)	Known from along the majority of the NSW coast. However, it is distinct from Sydney Freshwater Wetlands which are associated with sandplains in the Sydney Basin bioregion. Extensively cleared and modified. In the 1990s the extent remaining were: 3% in the NSW North Coast bioregion, 66% in the lower Hunter – Central coast region, 40% on the Cumberland Plain, 70% in the Sydney – South Coast region, and 30% in the Eden region	E3	-	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (EPBC Act)	Littoral Rainforest is very rare and occurs in many small stands. In total, it comprises less than one percent of the total area of rainforest in NSW. The largest known stand occurs in Iluka Nature Reserve, which is about 136 hectares in size. Occurs on sand dunes and on soil derived from underlying rocks. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (BC Act) Lowland Rainforest of Subtropical Australia (EPBC Act)	The Hawkesbury River notionally marks the southern limit of Lowland Rainforest in the NSW North Coast and Sydney Basin bioregions. South of the Sydney metropolitan area, Lowland Rainforest is replaced by Illawarra Subtropical Rainforest of the Sydney Basin Bioregion, which is listed as an endangered ecological community. Milton Ulladulla Subtropical Rainforest is also a related rainforest endangered ecological community that occurs still further south in the South East Corner Bioregion	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Moist Shale Woodland in the Sydney Basin Bioregion (BC Act) Western Sydney Dry Rainforest and Moist Woodland on Shale (EPBC Act)	Similar to Cumberland Plain Woodland. It differs in having a shrub understorey that contains plants from moist habitats. Dominant canopy trees include Forest Red Gum <i>Eucalyptus tereticornis</i> , Grey Box <i>E. moluccana</i> , Narrow-leaved Ironbark <i>E. crebra</i> and Spotted Gum <i>Corymbia maculata</i> . Small trees, such as Hickory Wattle <i>Acacia implexa</i> and Sydney Green Wattle <i>A. parramattensis</i> subsp. <i>parramattensis</i> are also common. The shrub layer includes <i>Breynia oblongifolia</i> , Hairy Clerodendrum <i>Clerodendrum tomentosum</i> and Indian Weed <i>Siegesbeckia orientalis</i> subsp. <i>orientalis</i>	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion (BC Act)	Occurs entirely within the Pittwater Local Government Area, on the Barrenjoey Peninsula and Western Pittwater Foreshores. Occurs in association with shale derived soils with high rainfall on lower hillslopes on the Narrabeen Group - Newport Formations on the Barrenjoey Peninsula and western Pittwater Foreshores	E3		None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (EPBC Act)	It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include <i>Eucalyptus tereticornis</i> (forest red gum), <i>E. amplifolia</i> (cabbage gum), <i>Angophora floribunda</i> (rough-barked apple) and <i>A. subvelutina</i> (broad-leaved apple)	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act) Shale Sandstone Transition Forest of the Sydney Basin Bioregion (EPBC Act)	Has an open forest structure with a canopy dominated by Broad-leaved Ironbark <i>Eucalyptus fibrosa</i> , with Grey Box <i>E. moluccana</i> and Forest Red Gum <i>E. tereticornis</i> occurring less frequently. Paperbark <i>Melaleuca decora</i> is common in the small tree layer. A sparse shrub layer is usually present which includes Blackthorn <i>Bursaria spinosa</i> , <i>Daviesia ulicifolia</i> and Peach Heath <i>Lissanthe strigosa</i> .	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Shale Sandstone Transition Forest in the Sydney Basin Bioregion (BC Act) Shale Sandstone Transition Forest of the Sydney Basin Bioregion (EPBC Act)	Before European settlement, this community was extensive around the edges of the Cumberland lowlands throughout western Sydney, most particularly in the southern half. Today, only 9,950 ha remains intact (22.6% of its original extent) and the bulk of this occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. Good examples can be seen at Gulguer Nature Reserve, in the Wilton area and in the Sackville - Maroota area	E4B	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion (BC Act)	Southern Sydney sheltered forest on transitional sandstone soils is an open forest dominated by eucalypts with scattered subcanopy trees, a diverse shrub layer and a well-developed groundcover of ferns, forbs, grasses and graminoids. The dominant trees include <i>Angophora costata</i> , <i>Eucalyptus piperita</i> and occasionally <i>Eucalyptus pilularis</i> , particularly around Helensburgh. <i>Corymbia gummifera</i> occurs frequently within the community, although generally at lower abundance than the other eucalypts. Features that distinguish Southern Sydney sheltered forest on transitional sandstone soils from vegetation more typical of sandstone gullies in the eastern Sydney basin include the occurrences of <i>Eucalyptus pilularis</i> , <i>Acacia binervata</i> , <i>Elaeocarpus reticulatus</i> , <i>Pittosporum undulatum</i> and its relatively dense groundcover of ferns, grasses, rushes, lilies and forbs	E3	-	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community (EPBC Act)	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which <i>Casuarina glauca</i> (swamp oak) is the dominant species northwards from Bermagui. Other trees including <i>Acmena smithii</i> (lilly pilly), <i>Glochidion spp.</i> (cheese trees) and <i>Melaleuca spp.</i> (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and <i>Melaleuca ericifolia</i> is the only abundant tree in this community south of Bermagui	E3	E	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (EPBC Act)	Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Generally occurs below 20 m (though sometimes up to 50 m) elevation. The composition of the community is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil, and latitude. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic grasses, vines and forbs	E3	-	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Sydney Freshwater Wetlands in the Sydney Basin Bioregion (BC Act)	Largely restricted to freshwater swamps in swales and depressions on sand dunes and low nutrient sandplains such as those of the Warriewood and Tuggerah soil landscapes. Swampy areas on alluvium with a saline influence do not fall within this community	E3		None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (BC Act) Turpentine-Ironbark Forest of the Sydney Basin Bioregion (EPBC Act)	Occurs in Sydney and is heavily fragmented, with only 0.5 percent its original extent remaining intact. Remnants mostly occur in the Baulkham Hills, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Hurstville local government areas. Good examples can be seen in small reserves such as Wallumatta Nature Reserve and Newington Nature Reserve. A similar form of the community occurs more widely (particularly in the Wollondilly and Hawkesbury areas)	CE	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
<i>Themeda</i> grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions (BC Act)	The community is found on a range of substrates, although stands on sandstone are infrequent and small. Larger stands are found on old sand dunes above cliffs, for example at Cape Banks and Henry Head in Botany Bay National Park, and on metasedimentary are rarely adamellite headlands on the north coast	E3		None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion (BC Act)	Occurs on sandy soils (iron podzols) of the Woy Woy Soil Landscape which are distinguished from the humus podzols generally associated with foothill talus slopes further away from the coast on which <i>Angophora costata</i> predominates.	E3		None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project
Western Sydney Dry Rainforest in the Sydney Basin Bioregion (BC Act) Western Sydney Dry Rainforest and Moist Woodland on Shale (EPBC Act)	The dry rainforest form is a low, closed forest dominated by non-eucalypts—notably prickly-leaved paperbark (<i>Melaleuca styphelioides</i>), hickory wattle (<i>Acacia implexa</i>) and native quince (<i>Alectryon subcinereus</i>), while white euodia (<i>Melicope micrococca</i>) may also be common. The moist woodland form has a more open canopy dominated by eucalypts, notably forest red gum (<i>Eucalyptus tereticornis</i>) and coastal grey box (<i>E. moluccana</i>)	E3	CE	None/ absent	Vegetation mapping and survey of the Subject Land confirmed this TEC is not present on the Subject Land. No significant impact on this TEC is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Bynoe's Wattle (<i>Acacia bynoeana</i>)	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple	E1	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Downy Wattle (<i>Acacia pubescens</i>)	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland	V	V	None / absent	Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Allocasuarina glareicola</i>	Grows in 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> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>Acacia brownei</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i>	E1	E	None / absent	Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Asterolasia elegans</i>	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest	E1	E	Low	Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Thick-lipped Spider Orchid (<i>Caladenia tessellata</i>)	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil	E1	V	None / absent	Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Netted Bottle Brush (<i>Callistemon linearifolius</i>)	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Grows in dry sclerophyll forest on the coast and adjacent ranges.	V	-	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Leafless Tongue Orchid (<i>Cryptostylis hunteriana</i>)	The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>)	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
White-flowered Wax Plant (<i>Cynanchum elegans</i>)	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree <i>Leptospermum laevigatum</i> – Coastal Banksia <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> coastal scrub; Forest Red Gum <i>Eucalyptus tereticornis</i> aligned open forest and woodland; Spotted Gum <i>Corymbia maculata</i> aligned open forest and woodland; and Bracelet Honeymyrtle <i>Melaleuca armillaris</i> scrub to open scrub	E	E	None / absent	Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Darwinia biflora</i>	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include <i>Eucalyptus haemastoma</i> , <i>Corymbia gummifera</i> and/or <i>E. squamosa</i> . The vegetation structure is usually woodland, open forest or scrub-heath	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Darwinia peduncularis</i>	Occurs as local disjunct populations in coastal NSW with a couple of isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone	V	-	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence	V	-	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Campfield's Stringybark (<i>Eucalyptus camfieldii</i>)	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Wallangarra White Gum (<i>Eucalyptus scoparia</i>)	In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. In Queensland it is equally rare, occurring at three sites on the Stanthorpe Plateau including one population in Girraween National Park. Only one Queensland population has more than a dozen trees. Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes	E1	V	None / absent	Known from local occurrence records. Subject Land not located within natural occurrence range for this species. Local records represent planted individuals. The species is not cryptic and no population was identified during survey. No significant impact on this species is anticipated as a result of the Project
Tangled Bedstraw (<i>Galium australe</i>)	Tangled Bedstraw is widespread in Victoria and Tasmania and is also found in South Australia (and ACT Territory in Jervis Bay). Most flowering collections have been made in late spring to early autumn. In NSW (and ACT Territory in Jervis Bay), Tangled Bedstraw has been recorded in Turpentine forest and coastal Acacia shrubland	E1		Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Yellow Gnat-orchid (<i>Genoplesium baueri</i>)	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone	E	E	Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Tallong Midge Orchid (<i>Genoplesium plumosum</i>)	Occurs exclusively in heathland, generally dominated by Violet Kunzea (<i>Kunzea parvifolia</i>), Common Fringe-myrtle (<i>Calytrix tetragona</i>) and parrot-peas (<i>Dillwynia spp.</i>). Grows on very shallow soils, often with lichens and mosses on sandstone conglomerate rock shelves	E4A	E	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Narrow-leaf Finger Fern (<i>Grammitis stenophylla</i>)	<i>Grammitis stenophylla</i> is known from 30 locations across New South Wales. The species is known to occur in 24 conservation reserves. It is common in several areas, such as the Mount Warning Shield, the sandstone reserves of the lower Clarence, the granites of Washpool, Gibraltar and Nymbioda National Parks, and also Mt Jerusalem and Nightcap National Park. Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest	E1	-	Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Caley's Grevillea (<i>Grevillea caleyi</i>)	Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas. All natural remnant sites occur within a habitat that is both characteristic and consistent between sites	E4A	CE	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Haloragodendron lucasii</i>	Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland	E1	E	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Hibbertia superans</i>	Flowering time is July to December. The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides	E1	-	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Kunzea rupestris</i>	Restricted, with most locations in the Maroota - Sackville - Glenorie area and one outlier in Ku-ring-gai Chase National Park, all within the Central Coast botanical subdivision of NSW. Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Lasiopetalum joyceae</i>	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved. Grows in heath on sandstone	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred soils and PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Deane's Tea-tree (<i>Leptospermum deanei</i>)	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Macadamia Nut (<i>Macadamia integrifolia</i>)	The Macadamia Nut grows in remnant rainforest, preferring partially open areas such as rainforest edges. However, this habitat is not continuously fit for the species	-	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Biconvex Paperbark (<i>Melaleuca biconvexa</i>)	Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Deane's Paperbark (<i>Melaleuca deanei</i>)	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Tall Knotweed (<i>Persicaria elatior</i>)	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance	V	V	None / absent	Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Hairy Geebung (<i>Persoonia hirsuta</i>)	<i>Persoonia hirsuta</i> has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. <i>Persoonia hirsuta</i> has a large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	E	E	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Persoonia mollis</i> subsp. <i>maxima</i>	Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple <i>Angophora costata</i>, Sydney Peppermint <i>Eucalyptus piperita</i>, Red Bloodwood <i>Corymbia gummifera</i>, Turpentine <i>Syncarpia glomulifera</i>, Coachwood <i>Ceratopetalum apetalum</i> and Black Wattle <i>Callicoma serratifolia</i>	E1	E	Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain	V	V	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Spiked Rice-flower (<i>Pimelea spicata</i>)	Once widespread on the Cumberland Plain, the Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama)	E1	E	None / absent	Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Dark Greenhood (<i>Pterostylis nigricans</i>)	The Dark Greenhood occurs in north-east NSW north from Evans Head, and in Queensland. Coastal heathland with Heath Banksia (<i>Banksia ericifolia</i>), and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces, on sandy soils	V	-	None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Eastern Australian Underground Orchid (<i>Rhizanthella slateri</i>)	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest	V	E	Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Scrub Turpentine (<i>Rhodamnia rubescens</i>)	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	E4B	CE	Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Native Guava (<i>Rhodomyrtus psidioides</i>)	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW	E4B	CE	None / absent	Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Magenta Lilly Pilly (<i>Syzygium paniculatum</i>)	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest	E	V	Low	Known from local occurrence records. Species was not detected during surveys for this EIA or Hornsby Park EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
<i>Tetratheca glandulosa</i>	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gynea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops	V		None / absent	Known from local occurrence records. Subject Land did not contain preferred PCTs for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

*BC Act Status: V=Vulnerable, E1=Endangered flora, E2 = Endangered population, E3 = Endangered community, E4A=Critically Endangered

**EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct

Table A2-3: Fauna species

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Regent Honeyeater (<i>Anthochaera phrygia</i>)	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	E4B	E	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred dry open forest and woodland habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Dusky Woodswallow (<i>Artamus cyanopterus cyanopterus</i>)	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland	V	-	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred dry open forest and woodland habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Fork-tailed Swift (<i>Apus pacificus</i>)	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities.	-	C,J,K	Low	Known from local occurrence records. Species not heavily reliant on ground conditions. Subject Land lacks suitable roosting cliffline habitat. Subject Land not considered important habitat for this species. No significant impact on this species is anticipated as a result of the Project
Australasian Bittern (<i>Botaurus poiciloptilus</i>)	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.) Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	E	E	None/ absent	Not known from local occurrence records. Subject land lacks suitable wetland or waterbody habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms	-	B,C,J,K	None / absent	Known from local occurrence records. Subject Land lacks coastal or intertidal habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Curlew Sandpiper (<i>Calidris ferruginea</i>)	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland.	-	CE,C,J,K	None / absent	Known from local occurrence records. Subject Land lacks coastal or intertidal habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Gang-gang Cockatoo (<i>Callocephalon fimbriatum</i>)	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas.	V	E	Known	Known from local occurrence records and has been observed in the Hornsby Park site. Subject Land contains broadly suitable habitat but is located slightly to the north of this population's known range. The Project would remove a small number of feed trees but no potential nesting trees for this species
Gang-gang Cockatoo (<i>Callocephalon fimbriatum</i>) population in the Hornsby and Ku-ring-gai Local Government Areas	This endangered population is found in the Ku-ring-gai and Hornsby local government areas. The population is believed to be largely confined to an area bounded by Thomleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east. It is known to inhabit areas of Lane Cove National Park, Pennant Hills Park and other forested gullies in the area	E2	E	Low	Known from local occurrence records. Subject Land contains broadly suitable habitat but is located slightly to the north of this population's known range. No significant impact on this species is anticipated as a result of the Project
Glossy Black-Cockatoo (<i>Calyptrorhynchus lathami</i>)	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods.	V	V	Low	Not known from local occurrence records. Subject Land contains limited <i>Allocasuarina</i> sp. feed trees. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Eastern Pygmy-possum (<i>Cercartetus nanus</i>)	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities	V	-	Low	Known from recent occurrence records. Subject Land lacked heathy forest habitat preferred by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>)	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features	V	V	Low	Known from local occurrence records. Subject Land is not located within 2km of suitable roosting habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Brown Treecreeper (eastern sub-species) (<i>Climacteris picumnus victoricae</i>)	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	V	-	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred eucalypt woodland habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Oriental Cuckoo (<i>Cuculus optatus</i>)	It mainly inhabits forests, occurring in coniferous, deciduous and mixed forest. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground. It is usually secretive and hard to see	-	C,J,K	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred dense mixed forest habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Varied Sittella (<i>Daphoenositta chrysoptera</i>)	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland.	V	-	Known	Known to occur on the Subject Land. The Subject Land contains suitable foraging resources for this species. The Project would remove a portion of this habitat
Eastern Bristlebird (<i>Dasyornis brachypterus</i>)	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone	E1	E	Low	Known from recent occurrence records. Subject Land lacks preferred heath understorey habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Spotted-tailed Quoll (<i>Dasyurus maculatus</i>)	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	V	E	Low	Known from recent occurrence records. Subject Land considered too isolated to support a population of the species without detected during the EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Red Goshawk (<i>Erythrorhynchus radiatus</i>)	Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	E4B	V	Low	Known from recent occurrence records. Subject Land lacks open woodland habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Grey Falcon (<i>Falco hypoleucos</i>)	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey	E1	V	Low	Known from recent occurrence records from the locality. Species is a vagrant to coastal regions. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>)	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	V	-	Moderate	Known from local occurrence records. The Subject Land contains suitable foraging resources for this species. The Project would remove a portion of this habitat
Little Lorikeet (<i>Glossopsitta pusilla</i>)	Forages primarily in the canopy of open <i>Eucalyptus</i> forest and woodland, yet also finds food in <i>Angophora</i> , <i>Melaleuca</i> and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g., paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	V	-	Low	Known from local occurrence records. Subject Land lacks preferred open woodland and forest and riparian habitat preferred by this species. No significant impact on this species is anticipated as a result of the Project
Painted Honeyeater (<i>Grantiella picta</i>)	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten.	V	V	Low	Not known from recent occurrence records from the locality. Subject Land was not observed to contain significant mistletoe resources. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Sooty Oystercatcher (<i>Haematopus fuliginosus</i>)	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels	V	-	None / absent	Known from local occurrence records. Subject Land lacks rocky foreshore habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
White-bellied Sea-Eagle (<i>Haliaeetus leucogaster</i>)	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh.	V	-	Low	Known from recent occurrence records. Subject Land and immediate locality (1km) lack large waterbodies for foraging by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Giant Burrowing Frog (<i>Heleioporus australiacus</i>)	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	V	V	Low	Known from occurrence records from the locality. Subject Land lacks woodland and open dry sclerophyll forest preferred by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Little Eagle (<i>Hieraaetus morphnoides</i>)	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used	V	-	Low	Known from local occurrence records. Subject Land considered too dense to be suitable foraging habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland	-	V,C,J,K	Low	Known from local occurrence records from the locality. Species not strongly dependent on ground conditions with an almost exclusively aerial habitat. No significant impact on this species is anticipated as a result of the Project
Broad-headed Snake (<i>Hoplocephalus bungaroides</i>)	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney	E1	V	Low	Known from recent occurrence records from the locality. Subject Land lacks significant sandstone escarpment habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Southern Brown Bandicoot (eastern) (<i>Isodon obesulus obesulus</i>)	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils	E1	E	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred heathy forest habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Black Bittern (<i>Ixobrychus flavicollis</i>)	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves	V	-	Low	Known from recent occurrence records from the locality. Subject Land lacks significant wetland or dense riparian habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Swift Parrot (<i>Lathamus discolor</i>)	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations	E	E	Low	Known from recent occurrence records from the locality. Subject Land contains eucalypt forest habitat but lacks preferred foraging tree species. No significant impact on this species is anticipated as a result of the Project
Broad-billed Sandpiper (<i>Limicola falcinellus</i>)	The Broad-billed Sandpiper occurs in sheltered parts of the coast, favouring estuarine mudflats but also occasionally occur on saltmarshes, shallow freshwater lagoons, saltworks and sewage farms, and in areas with large soft intertidal mudflats, which may have shell or sandbanks nearby. Occasionally they occur on reefs or rocky platforms. They have also been recorded in creeks, swamps and lakes near the coast, particularly those with bare mudflats or sand exposed by receding water	V	C, J, K	None / absent	Known from local occurrence records. Subject Land lacks coastal or intertidal habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Green and Golden Bell Frog (<i>Litoria aurea</i>)	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available		V	Low	Known from recent occurrence records from the locality. Subject Land lacked suitable waterbody and adjacent habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Square-tailed Kite (<i>Lophoictinia isura</i>)	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland	V	-	Low	Known from local occurrence records. Subject Land considered too dense to be suitable foraging habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Macquarie Perch (<i>Macquaria australasica</i>)	Requires free-flowing waterways to complete life cycle. The species is heavily dependent on the availability of flowing mesohabitats (runs and/or riffles) and small complex rock piles (aggregations of 0.5–1 m diameter boulders) to provide cover	-	E	None/ absent	Subject Land lacks free-flowing waterway habitat for this species. Unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>)	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures	V	-	Known	Known from local occurrence records and has been previously detected in the Hornsby Park site. The Subject Land contains suitable foraging resources for this species. The Project would remove a portion of this habitat but no potential roosting trees

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Little Bent-winged Bat (<i>Miniopterus australis</i>)	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats	V	-	Known	Known to occur on the Subject Land. The Subject Land contains suitable foraging resources for this species but lacked suitable roosting resources (caves). The Project would remove a portion of this habitat
Large Bent-winged Bat (<i>Miniopterus orianae oceanensis</i>)	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures	V	-	Known	Known to occur on the Subject Land. The Subject Land contains suitable foraging resources for this species but lacked suitable roosting resources (caves). The Project would remove a portion of this habitat
Stuttering Frog (<i>Mixophyes balbus</i>)	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	E1	V	Low	Known from recent occurrence records. Subject Land lacked suitable escarpment forest habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Southern Myotis (<i>Myotis macropus</i>)	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage	V	-	Low	Known from recent occurrence records. Subject Land lacked suitable open water foraging resources for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Turquoise Parrot (<i>Neophema pulchella</i>)	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland	V	-	Low	Known from recent occurrence records from the locality. Subject Land lacks woodland habitat preferred by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Barking Owl (<i>Ninox connivens</i>)	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils	V	-	Low	Known from local occurrence records. Subject Land lacks significant woodland and open forest habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Powerful Owl (<i>Ninox strenua</i>)	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood Acacia <i>melanoxylon</i> , Rough-barked Apple <i>Angophora floribunda</i> , Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species	V	-	Known	Known to occur on the Subject Land. The Subject Land contains suitable foraging resources for this species. The Project would remove a portion of this habitat
Eastern Curlew (<i>Numenius madagascariensis</i>)	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets	-	CE,B,C,J, K	None/ absent	Not known from recent occurrence records from the locality. Subject Land lacks suitable wetland, mudflat or intertidal habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Greater Glider (<i>Petauroides volans</i>)	The greater glider chooses habitat based on several factors. A large factor determining habitat choice is the presence of specific species of eucalypt. Distribution levels are higher in regions of montane forest containing manna gum (<i>E. viminalis</i>) and mountain gum (<i>E. dalrympleana</i> , <i>E. obliqua</i>). Furthermore, the presence of <i>E. cypellocarpa</i> appears to improve the quality of habitat for the greater glider in forests dominated by <i>E. obliqua</i> . Another factor determining population density is elevation. Optimal levels are 845 m above sea level. Within a forest of suitable habitat, they prefer overstorey basal areas in old-growth tree stands	-	V	None / absent	Known from recent occurrence records. Subject Land lacks suitable tall forest habitat required by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Yellow-bellied Glider (South-eastern) (<i>Petaurus australis</i>)	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	V	V	None / absent	Not known from recent occurrence records. Species not detected during surveys for EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Squirrel Glider (<i>Petaurus norfolcensis</i>)	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	V	-	Low	Known from local occurrence records. Subject Land lacks preferred woodland habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Brush-tailed Rock-wallaby (<i>Petrogale penicillata</i>)	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night	E	V	None / absent	Not known from recent occurrence records from the locality. Subject Land and adjacent lands lack required escarpment habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Scarlet Robin (<i>Petroica boodang</i>)	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	V	-	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred dry open forest and woodland habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Koala (<i>Phascolarctos cinereus</i>)	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	V	V	Low	Known from recent occurrence records. Subject Land considered too isolated to support a population of the species without detected during the EIS. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Grey Plover (<i>Pluvialis squatarola</i>)	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes	-	C, J, K	None / absent	Known from local occurrence records. Subject Land lacks coastal or intertidal habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Superb Parrot (<i>Polytelis swainsonii</i>)	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box	V	V	Low	Known from local occurrence records. However, Subject Land lacks preferred vegetation communities for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Dural Land Snail (<i>Pommerhelix duralensis</i>)	The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.	E1	E	None / absent	Known from local occurrence records. However, Subject Land does not occur near the shale-sandstone transition zone. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Australian Grayling (<i>Prototroctes maraena</i>)	Australian Grayling spend most of their lives in freshwater, inhabiting rivers and streams, usually in cool, clear waters with a gravel substrate and alternating pool and riffle zones but can also occur in turbid water. The species can penetrate well inland, and has been reported from over 100 km upstream from the sea	-	V	None/ absent	Subject Land lacks free-flowing waterway habitat for this species. Unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Eastern Chestnut Mouse (<i>Pseudomys gracilicaudatus</i>)	In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps. In the tropics it is more an animal of grassy woodlands.	V	-	None / absent	Not known from recent occurrence records from the locality. The Subject Land lacks preferred dense, wet heath or swamp habitat. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Pookila (<i>Pseudomys novaehollandiae</i>)	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes	-	V	None / absent	Not known from recent occurrence records from the locality. The Subject Land lacks preferred vegetation assemblages for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Red-crowned Toadlet (<i>Pseudophryne australis</i>)	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter	V	-	Low	Known from local occurrence records. Subject Land lacks sandstone ridge habitat preferred by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	V	V	Known	Known to occur on the Subject Land. The Subject Land contains suitable foraging resources for this species. The Project would remove a portion of this habitat
Superb Fruit-Dove (<i>Ptilinopus superbus</i>)	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees	V	-	Low	Known from local occurrence records. Subject Land contains closed forest habitat but lacks considerable fruiting trees. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Pilotbird (<i>Pycnoptilus floccosus</i>)	Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter	-	V	None / absent	Not known from recent occurrence records from the locality. Subject Land lacks preferred tree species and vegetation assemblages. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Australian Painted Snipe (<i>Rostratula australis</i>)	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	E	E	Low	Known from local occurrence records. Subject Land lacks suitable wetland or waterbody habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Yellow-bellied Sheath-tail-bat (<i>Saccolaimus flaviventris</i>)	The Yellow-bellied Sheath-tail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows	V	-	Moderate	Known from local occurrence records. The Subject Land contains suitable foraging resources for this species. The Project would remove a portion of this habitat
Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>)	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings	V	-	Known	Known to occur on the Subject Land. The Subject Land contains suitable foraging resources for this species as well as potential roosting trees. The Project would remove a portion of this habitat but no potential roosting trees
Diamond Firetail (<i>Stagonopleura guttata</i>)	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum <i>Eucalyptus pauciflora</i> Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.	V	-	Low	Known from recent occurrence records from the locality. Subject Land lacks preferred dry open forest and woodland habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

Species	Expected habitat from OEH.	BC Act*	EPBC Act**	Likelihood of occurrence	Potential impacts
Crested Tern (<i>Thalasseus bergii</i>)	The greater crested tern occurs in tropical and warm temperate coastal parts of the Old World from South Africa around the Indian Ocean to the Pacific and Australia. The subspecies <i>T. b. bergii</i> and <i>T. b. enigma</i> breed in Southern Africa from Namibia to Tanzania, and possibly on islands around Madagascar	-	J	None / absent	Known from local occurrence records. Subject Land lacks coastal or intertidal habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Common Greenshank (<i>Tringa nebularia</i>)	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms	-	B,C,J,K	Low	Species not known from local occurrence records. Subject Land lacks mudflat habitat preferred by this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Masked Owl (<i>Tyto novaehollandiae</i>)	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Lives in dry eucalypt forests and woodlands from sea level to 1100 m	V	-	Low	Known from local occurrence records. Subject Land lacks significant woodland and open forest habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Sooty Owl (<i>Tyto tenebricosa</i>)	Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently. Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests	V	-	Low	Known from local occurrence records. Subject Land lacks significant temperate rainforest habitat for this species. Considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project
Rosenberg's Goanna (<i>Varanus rosenbergi</i>)	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component	V	-	Low	Known from local occurrence records. Subject Land lacked significant termite mound resources. Species considered unlikely to occur. No significant impact on this species is anticipated as a result of the Project

*BC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E2=Endangered Population

**EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct, B=Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II (Bonn Convention), C=China-Australia Migratory Bird Agreement (CAMBA), J=Japan-Australia Migratory Bird Agreement (JAMBA), K=Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)

10. APPENDIX 3: ASSESSMENTS OF SIGNIFICANCE (BC ACT) AND TESTS OF SIGNIFICANCE (EPBC ACT)

A3.1: ASSESSMENTS OF SIGNIFICANCE (BC ACT)

Under Part 7.2A of the *Biodiversity Conservation Act 2016* (BC Act) a five-part test is required to determine whether a significant impact on any threatened species or TEC listed under the NSW BC Act known or considered likely to occur on a site as a result of a proposed action. If a significant impact is considered likely, based on the test then further assessment through a Species Impact Statement (SIS) is required or a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

The following listed entities are known to occur or to have suitable habitat and a potential to occur in the Project Area and would be impacted upon by the Project.

A3.1.1 Blue Gum High Forest in the Sydney Basin Bioregion

This TEC is listed as critically endangered under the BC Act.

A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum (*Eucalyptus saligna*) and Blackbutt (*E. pilularis*). Forest Oak (*Allocasuarina torulosa*) and Sydney Red Gum (*Angophora costata*) also occur. Species adapted to moist habitat such as Lilly Pilly (*Acmena smithii*), Sandpaper Fig (*Ficus coronata*), Rainbow Fern (*Calochleana dubia*) and Common Maidenhair (*Adiantum aethiopicum*) may also occur.

Distribution

Originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000 there was less than 200 hectares remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is less than 20 hectares. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas. An example of Blue Gum High Forest can be seen at the Dalrymple-Hay Nature Reserve, St Ives.

Habitat and ecology

- Occurs only in areas where rainfall is high (above 1100 millimetres per year) and the soils are relatively fertile and derived from Wianamatta shale. In lower rainfall areas, it grades into Sydney Turpentine-Ironbark Forest;
- The rainforest understorey species rely on birds and mammals to disperse their seeds and are vulnerable to fire;
- Along the drier ridgelines, fire would have been more frequent and an important factor in maintaining understorey diversity; and
- The community also occurs on soils associated with localised volcanic intrusions, 'diatremes'.

This TEC was present on the Subject Land, occurring in discrete patches around the Quarry Void as well as in the north and west of the Study Area. This vegetation was characterised by a native overstory with a largely exotic understorey.

- a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable to a TEC.

- b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or**
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

The Project would remove vegetation from the understory of this TEC for sections of the Urban Cycle Path, Higgins Link, Quarry Void, Pathway from Sports Field to Quarry Void, Ancillary Tracks and Miscellaneous Areas. However, these impacts would be restricted to understory clearing, which was observed to largely consist of woody weeds (*Ligustrum sp.* (Privet)) within all of these proposed works areas. No removal of characteristic canopy trees, shrubs or significant understory species would occur as a result of the Project.

The TEC retained on adjacent lands may be indirectly impacted by works for the Project and by increased sediment, nutrient and contaminant runoff from the development area. However, the TEC occurs within a relatively modified environment at present, contains significant weed infestations and is impacted by runoff by existing tracks and cleared areas. The Project, with adequate stormwater and runoff management is not considered likely to substantially and adversely modify the composition of this TEC to the extent that it is likely to be placed at risk of extinction.

- c) In relation to the habitat of a threatened species or ecological community:**

- I. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity;**
- II. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and**
- III. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The Project would impact lands within this TEC for the sections of the Urban Cycle Path, Higgins Link, Quarry Void, Pathway from Sports Field to Quarry Void, Ancillary Tracks and Miscellaneous Areas. However, this would comprise understory clearing of almost exclusively woody weeds. No characteristic canopy, shrub or significant understory species would be removed or modified by the Project.

No area of the TEC would become fragmented or isolated as a result of the Project. Clearing would occur largely along existing tracks and pathways or consist of narrow tracks through largely exotic understory. Canopy connectivity would not be reduced and habitat connectivity for resident fauna would not be significantly impacted.

The TEC present within the proposed impact areas is critical to the survival of the TEC in the locality,

with large stands known to the south-west of the Subject Land (NSW Department of Planning, Industry and Environment, 2022). The Project would not lead to the fragmentation or isolation of any area of this TEC. The TEC on the Subject Land is characterised by a native overstory with an almost exclusively woody weed understory. Impacts would be limited to understory clearing with no mature trees to be removed by the Project.

d) Whether the action proposed is likely to have an adverse effect any declared area of outstanding biodiversity value (either directly or indirectly);

At the time of writing, there are four AOBV declared under the BC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed AOBV, the Little Penguin population in Sydney's North Harbour - critical habitat declaration is located closest to the Project Area. However, as the Subject Land is located approximately 20 km from the AOBV, the Project would not be expected to have any direct or indirect effect on this or any other declared AOBV.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to this TEC:

- Clearing of native vegetation;
- Human-caused climate change;
- Infection of native plants by *Phytophthora cinnamomi*;
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
- Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat);
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; and
- Removal of dead wood and dead trees.

The Project would result in a small loss of native vegetation (minor understory native species), production of greenhouse gases and removal of dead wood; however, these impacts would be limited to track expansion and improvement or footpath tracks through largely exotic understory. Escaped garden plants from future site users (contaminated shoes, bike tyres etc.) could impact this TEC; however, exotic species are already present throughout the Subject Land and adjacent lands including numerous priority weeds. Importation of unclean fill or infected landscaping plants could be a vector for the introduction of *P. cinnamomi* and/or Rust Fungi. However, these KTPs arising from the Project are not considered significant on the locality scale due to the small size of the Project footprint. Drivers of the above KTPs are already present in the locality and the Project is considered unlikely to significantly exacerbate them.

With appropriate mitigation, the Project is not considered likely to significantly exacerbate these KTPs

on the locality scale.

Conclusion

This TEC was present within significant portions of the Subject Land and would be impacted by parts of the Project. The Project would involve upgrades of existing tracks and creation of new foot tracks within areas of this TEC. However, these impacts would be restricted to the largely exotic understory and no characteristic canopy, shrub or significant understory vegetation would be removed. Indirect impacts may affect the TEC; however, the drivers of many of these impacts are already present in the locality. The Project is not considered likely to place the local occurrence of this TEC at risk of extinction.

The Project is not considered likely to have a significant impact on this TEC. Further assessment through a BDAR is not considered necessary.

A3.1.2 Gang-gang Cockatoo (*Callocephalon fimbriatum*)

This species is listed as vulnerable under the BC Act.

Gang-gang Cockatoos are one of the more distinctive and charismatic members of Australia's avifauna. These birds are primarily slate-grey, with the males easily identified by their scarlet head and wispy crest, while females have a grey head and crest and feathers edged with salmon pink on the underbelly. They range in length from 32 to 37 cm, with a wingspan of 62 to 76 cm. The call has been likened to a creaking gate or cork being pulled from a bottle.

Distribution

The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee.

Habitat and ecology

- In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests;
- In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas;
- May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests; and
- Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground.

This species has been observed in the Hornsby Park site during previous surveys and by Council staff.

a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population

of the species is likely to be placed at risk of extinction.

The Project would remove immature and sub-adult native eucalypt feed trees for this species for sections of the Canopy Skywalk; however, these impacts are not considered a significant reduction in habitat utility for this species. No potential nesting trees would be removed by the Project. Impacts would be largely along already in-use tracks and frequented areas and largely restricted to daylight hours. The Subject Land and locality contains large areas of mature native forest which would not be impacted by the Project. Construction works within 200m of potential roost trees have the potential to affect breeding success and such works should avoid the nesting period for this species (October to January) if nesting is observed on site during the construction phase.

The Project is not considered likely to place a viable local population of this species at risk of extinction.

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

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or***
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.***

Not applicable to a threatened species.

c) In relation to the habitat of a threatened species or ecological community:

- I. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity;***
- II. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and***
- III. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

The Project would remove feed native trees for this species for sections of the canopy skywalk; however, these are immature sub-emergent trees, and understory clearing would be largely restricted to existing tracks and footpath tracks through largely exotic understory. Suitable foraging habitat is not limited on the Subject Land or the wider locality, with large areas of native eucalypt forest present in Berowra Valley Nation Park to the west. Construction works within 200m of potential roost trees have the potential to affect breeding success and such works should avoid the nesting period for this species (October to January) if breeding is observed on the site during the construction phase.

No area of native vegetation would become fragmented or isolated as a result of the Project, the Subject Land would retain connectivity with vegetation on adjacent lands with impacts from the Project limited to minor small tree removal and clearing in a largely exotic understory. No area of habitat for this species would become fragmented or isolated as a result of the Project.

The habitat present on the Subject Land is not limited in the locality for this for this species, and the Project would not lead to the fragmentation or isolation of any area of potential habitat. It is not considered important for the long-term survival of the species in the locality.

d) Whether the action proposed is likely to have an adverse effect any declared area of outstanding biodiversity value (either directly or indirectly);

At the time of writing, there were four AOBV declared under the BC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed AOBV, the Little Penguin population in Sydney's North Harbour - critical habitat declaration is located closest to the Project Area. However, as the Subject Land is located approximately 20 km from the AOBV, the Project would not be expected to have any direct or indirect effect on this or any other declared AOBV.

e) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to this species:

- Clearing of native vegetation;
- Human-caused climate change;
- Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species;
- Infection of native plants by *Phytophthora cinnamomi*;
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
- Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat); and
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

The Project would result in a small loss of native vegetation (immature trees and minor understory native species), production of greenhouse gases and removal of dead wood; however, these impacts would be limited to small tree removal, track expansion and improvement or footpath tracks through largely exotic understory. Escaped garden plants from future site users (contaminated shoes, bike tyres etc.) could impact habitat value for this species; however, exotic species are already present throughout the Subject Land and adjacent lands including numerous priority weeds.

Importation of unclean fill or infected landscaping plants could be a vector for the introduction of *P. cinnamomic*, Rust Fungus and/or Psittacine circoviral disease. However, these KTPs arising from the Project are not considered significant on the locality scale due to the small size of the Project footprint and limited impacts on native vegetation. Drivers of the above KTPs are already present in the locality and the Project is considered unlikely to significantly exacerbate them. The Project does not include activities likely to introduce or spread Psittacine circoviral disease to the site which could impact this species.

With appropriate mitigation, the Project is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

The Subject Land contains suitable foraging habitat for this species and it is known from previous surveys within the Hornsby Park site. The Project would remove some understory tree and (largely exotic) understory habitat for this species; however, this would largely occur along existing tracks or be restricted to narrow footpath corridors within the understory. No potential nesting trees would be removed by the Project; however, construction works within 200m of potential nest trees have the potential to affect breeding success and such works should avoid the nesting period for this species (October to January). The habitat present is not limited in the locality and the Project would not lead to the fragmentation or isolation of any area of potential habitat for this species. The locality contains large areas of similar eucalypt forest foraging habitat for this species with strong habitat connectivity to Berowra Valley National Park present to the west.

The Project is not considered likely to have a significant impact on this species. Further assessment through a BDAR is not considered necessary.

A3.1.3 Grey-headed Flying Fox (*Pteropus poliocephalus*)

This species is listed as vulnerable under the BC Act.

The Grey-headed Flying-fox is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle.

Distribution

Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations.

Habitat and ecology

- Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops;
- Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy;
- Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young;
- Annual mating commences in January and conception occurs in April or May; a single young is born in October or November;
- Site fidelity to camps is high; some camps have been used for over a century;
- Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km;
- Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines; and
- Also forage in cultivated gardens and fruit crops.

This species was not detected during surveys; however, it was detected during surveys for the EIS and is known from numerous occurrence records from the locality and suitable habitat is present on the

Subject Land including suitable feed tree species (*Eucalyptus* sp.). The nearest known camp of this species mapped on the Department's interactive flying-fox web viewer is located in the suburb of Gordon, approximately 8.5km to the south-east of the Subject Land (Commonwealth of Australia, 2021).

a) *In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

The Project would remove immature and sub-adult native eucalypt feed trees for this species for sections of the Canopy Skywalk; however, these are sub-emergent trees and not considered important feed trees for the local population of this species. The Subject Land contains large areas of mature native forest containing suitable feed trees which would not be impacted by the Project.

The Project is not considered likely to place a viable local population of this species at risk of extinction.

b) *In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

- I. *Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or***
- II. *Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.***

Not applicable to a threatened species.

c) *In relation to the habitat of a threatened species or ecological community:*

- I. *The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity;***
- II. *Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and***
- III. *The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

The Project would remove feed trees for this species for sections of the canopy skywalk; however, these are immature sub-emergent trees, not considered important foraging resources. Feed trees are not limited on the Subject Land or the wider locality, with large areas of native eucalypt forest present in Berowra Valley National Park to the west.

No area of native vegetation would become fragmented or isolated as a result of the Project, the Subject Land would retain connectivity with vegetation on adjacent lands with impacts from the Project limited to minor small tree removal and clearing in a largely exotic understory. No area of habitat for this species would become fragmented or isolated as a result of the Project.

The habitat present on the Subject Land is not limited in the locality for this for this species, and the Project would not lead to the fragmentation or isolation of any area of potential habitat. It is not considered important for the long-term survival of the species in the locality.

d) Whether the action proposed is likely to have an adverse effect any declared area of outstanding biodiversity value (either directly or indirectly);

At the time of writing, there were four AOBV declared under the BC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed AOBV, the Little Penguin population in Sydney's North Harbour - critical habitat declaration is located closest to the Project Area. However, as the Subject Land is located approximately 20 km from the AOBV, the Project would not be expected to have any direct or indirect effect on this or any other declared AOBV.

e) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to this species:

- Clearing of native vegetation;
- Human-caused climate change;
- Infection of native plants by *Phytophthora cinnamomi*;
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
- Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat); and
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

The Project would result in a small loss of native vegetation (immature trees and minor understory native species), production of greenhouse gases and removal of dead wood; however, these impacts would be limited to small tree removal, track expansion and improvement or footpath tracks through largely exotic understory. Escaped garden plants from future site users (contaminated shoes, bike tyres etc.) could impact habitat value for this species; however, exotic species are already present throughout the Subject Land and adjacent lands including numerous priority weeds. Importation of unclean fill or infected landscaping plants could be a vector for the introduction of *P. cinnamomi* and/or Rust Fungi. However, these KTPs arising from the Project are not considered significant on the locality scale due to the small size of the Project footprint and limited impacts on native vegetation. Drivers of the above KTPs are already present in the locality and the Project is considered unlikely to significantly exacerbate them.

With appropriate mitigation, the Project is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

The Subject Land contains suitable habitat for this species and the species is known from the Subject Land and from recent occurrence records from the locality. The habitat present is not limited in the locality and the Project would not lead to the fragmentation or isolation of any area of potential habitat

for this species. The Project would remove some feed trees; however, these are immature, sub-emergent trees and not considered high-value foraging habitat. No camp of this species is known from the Subject Land and the nearest camp is located approximately 8.5km away in the suburb of Gordon.

The Project is not considered likely to have a significant impact on this species. Further assessment through a BDAR is not considered necessary.

A3.1.4 Powerful Owl (*Ninox strenua*)

This species is listed as vulnerable under the BC Act.

The Powerful Owl is the largest owl in Australasia. It is a typical hawk-owl, with large yellow eyes and no facial-disc. Adults reach 60 cm in length, have a wingspan of up to 140 cm and weigh up to 1.45 kilograms. Males are larger than females. The upper parts of the Powerful Owl are dark, greyish-brown with indistinct off-white bars. The underparts are whitish with dark greyish-brown V-shaped markings. Juvenile Powerful Owls have a white crown and underparts that contrasts with its small, dark streaks and dark eye patches. The call of this species may be heard at any time of the year, but it is more vocal during the autumn breeding season. It has a slow, deep and resonant double hoot, with the female's being higher pitched and expressing an upward inflection on the second note.

Distribution

The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover.

Habitat and ecology

- The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest;
- The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species;
- The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example, in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl;
- Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400 can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha;

- Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him; and
- Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days.

This species was not detected during surveys; however, it is known from the Hornsby Park EIS to occur on the Subject Land and is also known from recent occurrence records from the locality. Suitable habitat is present on the Subject Land in the form of densely vegetated creeklines, native forest and forest edge habitat. A breeding pair is known to breed on the Subject Land, with reference to the Hornsby Park VMP and native vegetation in the north, east and west of the Subject Land identified as important habitat for this pair for foraging and breeding (Hornsby Shire Council and Gecko Environment Management, 2020).

f) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Project would remove immature and sub-adult native eucalypt trees for this species for sections of the Canopy Skywalk as well as clear sections of (largely exotic) understory vegetation; however, these impacts are not considered a significant reduction in habitat utility for this species. Impacts would be largely along already in-use tracks and frequented areas and largely restricted to daylight hours. The Subject Land and locality contains large areas of mature native forest which would not be impacted by the Project. Construction works within 100m of potential roost trees have the potential to affect breeding success and such works should avoid the nesting period for this species (April to October).

The Project is not considered likely to place a viable local population of this species at risk of extinction.

g) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or***
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.***

Not applicable to a threatened species.

h) In relation to the habitat of a threatened species or ecological community:

- I. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity;***
- II. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and***
- III. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

The Project would remove native trees for this species for sections of the canopy skywalk as well as clear sections of (largely exotic understory) for several Project components; however, these are immature sub-emergent trees, and understory clearing would be largely restricted to existing tracks and footpath tracks through largely exotic understory. Suitable foraging habitat is not limited on the Subject Land or the wider locality, with large areas of native eucalypt forest present in Berowra Valley Nation Park to the west. A pair of this species are known to breed on the Subject Land. Construction works within 100m of potential roost trees have the potential to affect breeding success and such works should avoid the nesting period for this species (April to October).

No area of native vegetation would become fragmented or isolated as a result of the Project, the Subject Land would retain connectivity with vegetation on adjacent lands with impacts from the Project limited to minor small tree removal and clearing in a largely exotic understory. No area of habitat for this species would become fragmented or isolated as a result of the Project.

The habitat present on the Subject Land is not limited in the locality for this for this species, and the Project would not lead to the fragmentation or isolation of any area of potential habitat. It is not considered important for the long-term survival of the species in the locality.

i) Whether the action proposed is likely to have an adverse effect any declared area of outstanding biodiversity value (either directly or indirectly);

At the time of writing, there were four AOBV declared under the BC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed AOBV, the Little Penguin population in Sydney's North Harbour - critical habitat declaration is located closest to the Project Area. However, as the Subject Land is located approximately 20 km from the AOBV, the Project would not be expected to have any direct or indirect effect on this or any other declared AOBV.

j) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to this species:

- Clearing of native vegetation;
- Human-caused climate change;
- Infection of native plants by *Phytophthora cinnamomi*;
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
- Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat); and
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

The Project would result in a small loss of native vegetation (immature trees and minor understory

native species), production of greenhouse gases and removal of dead wood; however, these impacts would be limited to small tree removal, track expansion and improvement or footpath tracks through largely exotic understory. Escaped garden plants from future site users (contaminated shoes, bike tyres etc.) could impact habitat value for this species; however, exotic species are already present throughout the Subject Land and adjacent lands including numerous priority weeds. Importation of unclean fill or infected landscaping plants could be a vector for the introduction of *P. cinnamomi* and/or Rust Fungi. However, these KTPs arising from the Project are not considered significant on the locality scale due to the small size of the Project footprint and limited impacts on native vegetation. Drivers of the above KTPs are already present in the locality and the Project is considered unlikely to significantly exacerbate them.

With appropriate mitigation, the Project is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

The Subject Land contains suitable habitat for this species and it is known from surveys for the Hornsby Park EIS as well as from recent occurrence records from the locality. The Project would remove some understory tree and (largely exotic) understory habitat for this species; however, this would largely occur along existing tracks or be restricted to narrow footpath corridors within the understory. A pair of this species is known to breed on the Subject Land. Construction works within 100m of potential roost trees have the potential to affect breeding success and such works should avoid the nesting period for this species (April to October). The habitat present is not limited in the locality and the Project would not lead to the fragmentation or isolation of any area of potential habitat for this species. The locality contains large areas of similar eucalypt forest foraging habitat for this species with strong habitat connectivity to Berowra Valley Nation Park present to the west.

The Project is not considered likely to have a significant impact on this species. Further assessment through a BDAR is not considered necessary.

A3.1.5 Varied Sittella (*Daphoenositta chrysoptera*)

This species is listed as vulnerable under the BC Act.

The Varied Sittella is a small (10 cm) songbird with a sharp, slightly upturned bill, short tail, barred undertail, and yellow eyes and feet. In flight the orange wing-bar and white rump are prominent. In NSW most individuals have a grey head and are streaked with dark brown, but in the extreme north-east they have a white head, and in the extreme south-west a black cap. Varied Sittellas are more active and acrobatic among branches than the larger treecreepers. They fly into the heads of trees, typically working their way down branches and trunk with constant motion.

Distribution

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades.

Habitat and ecology

- Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland;
- Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy;
- Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years; and
- Generation length is estimated to be 5 years.

This species was recorded during surveys for the Hornsby Park EIS and is also known from numerous local occurrence records (Hornsby Shire Council and GHD, 2019). The Subject Land contains suitable eucalypt forest habitat for this species.

a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Project would remove immature and sub-adult native eucalypt trees for this species for sections of the Canopy Skywalk as well as clear sections of (largely exotic) understory vegetation; however, these impacts are not considered a significant reduction in habitat utility for this species. Impacts would be largely along already in-use tracks and frequented areas and largely restricted to daylight hours. The Subject Land and locality contains large areas of mature native forest which would not be impacted by the Project.

The Project is not considered likely to place a viable local population of this species at risk of extinction.

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

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or***
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.***

Not applicable to a threatened species.

c) In relation to the habitat of a threatened species or ecological community:

- I. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity;***
- II. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and***
- III. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.***

The Project would remove native trees for this species for sections of the canopy skywalk as well as clear sections of (largely exotic understory) for several Project components; however, these are immature sub-emergent trees, and understory clearing would be largely restricted to existing tracks and footpath tracks through largely exotic understory. Suitable foraging habitat is not limited on the Subject Land or the wider locality, with large areas of native eucalypt forest present in Berowra Valley Nation

Park to the west.

No area of native vegetation would become fragmented or isolated as a result of the Project, the Subject Land would retain connectivity with vegetation on adjacent lands with impacts from the Project limited to minor small tree removal and clearing in a largely exotic understory. No area of habitat for this species would become fragmented or isolated as a result of the Project.

The habitat present on the Subject Land is not limited in the locality for this for this species, and the Project would not lead to the fragmentation or isolation of any area of potential habitat. It is not considered important for the long-term survival of the species in the locality.

d) *Whether the action proposed is likely to have an adverse effect any declared area of outstanding biodiversity value (either directly or indirectly);*

At the time of writing, there were four AOBV declared under the BC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed AOBV, the Little Penguin population in Sydney's North Harbour - critical habitat declaration is located closest to the Project Area. However, as the Subject Land is located approximately 20 km from the AOBV, the Project would not be expected to have any direct or indirect effect on this or any other declared AOBV.

e) *Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

The Project would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to this species:

- Clearing of native vegetation;
- Human-caused climate change;
- Infection of native plants by *Phytophthora cinnamomi*;
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
- Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat); and
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

The Project would result in a small loss of native vegetation (immature trees and minor understory native species), production of greenhouse gases and removal of dead wood; however, these impacts would be limited to small tree removal, track expansion and improvement or footpath tracks through largely exotic understory. Escaped garden plants from future site users (contaminated shoes, bike tyres etc.) could impact habitat value for this species; however, exotic species are already present throughout the Subject Land and adjacent lands including numerous priority weeds. Importation of unclean fill or infected landscaping plants could be a vector for the introduction of *P. cinnamomi* and/or Rust Fungi. However, these KTPs arising from the Project are not considered significant on the locality scale due

to the small size of the Project footprint and limited impacts on native vegetation. Drivers of the above KTPs are already present in the locality and the Project is considered unlikely to significantly exacerbate them.

With appropriate mitigation, the Project is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

The Subject Land contains suitable habitat for this species and it is known from surveys for the Hornsby Park EIS as well as from recent occurrence records from the locality. The Project would remove some understory tree and (largely exotic) understory habitat for this species; however, this would largely occur along existing tracks or be restricted to narrow footpath corridors within the understory. The habitat present is not limited in the locality and the Project would not lead to the fragmentation or isolation of any area of potential habitat for this species. The locality contains large areas of similar eucalypt forest foraging habitat for this species with strong habitat connectivity to Berowra Valley Nation Park present to the west.

The Project is not considered likely to have a significant impact on this species. Further assessment through a BDAR is not considered necessary.

A3.1.6 Tree-dwelling Microchiropteran Bats

This test considers the following species, all listed as vulnerable under the BC Act:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*); and
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*).

They have been assessed together due to their similar habitat requirements.

The Eastern Freetail-bat has dark brown to reddish brown fur on the back and is slightly paler below. Like other freetail-bats it has a long (3 - 4 cm) bare tail protruding from the tail membrane. Freetail-bats are also known as mastiff-bats, having hairless faces with wrinkled lips and triangular ears. They weigh up to 10 grams.

Distribution

The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW.

Habitat and ecology

- Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range;
- Roost mainly in tree hollows but will also roost under bark or in man-made structures; and
- Usually solitary but also recorded roosting communally, probably insectivorous.

The Eastern False Pipistrelle is relatively large with a head-body length of about 65 mm. It weighs up to 28 grams. It is dark to reddish-brown above and paler grey on its underside. It has long slender ears

set well back on the head and some sparse hair on the nose.

Distribution

The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.

Habitat and ecology

- Prefers moist habitats, with trees taller than 20 m;
- Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings;
- Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy;
- Hibernates in winter; and
- Females are pregnant in late spring to early summer.

The Greater Broad-nosed Bat is a large powerful bat, up to 95 mm long, with a broad head and a short square muzzle. It is dark reddish-brown to mid-brown above and slightly paler below. It is distinguished from other broad-nosed bats by its greater size. While similar to the Eastern False Pipistrelle *Falsistrellus tasmaniensis*, it differs by having only two (not four) upper incisors.

Distribution

The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.

Habitat and ecology

- Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest;
- Although this species usually roosts in tree hollows, it has also been found in buildings;
- Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m;
- Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species; and
- Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

The Yellow-bellied Sheath-tail-bat is a very distinctive, large, insectivorous bat up to 87 mm long. It has long, narrow wings, a glossy, jet-black back, and a white to yellow belly extending to the shoulders and just behind the ear. Characteristically, it has a flattened head and a sharply-pointed muzzle. The tail is covered with an extremely elastic sheath that allows variation in the tail-membrane area. Males have a prominent throat pouch; females have a patch of bare skin in the same place.

Distribution

The Yellow-bellied Sheath-tail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes.

Habitat and ecology

- Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows;
- When foraging for insects, flies high and fast over the forest canopy, but lower in more open country;
- Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory;
- Breeding has been recorded from December to mid-March, when a single young is born; and
- Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.

None of these species were detected during surveys. However, all are known from local occurrence records and the Subject Land contains suitable habitat in the form of hollow-bearing trees and native eucalypt forest and forest edge foraging habitat. The Eastern Coastal Free-tailed Bat and the Greater Broad-nosed Bat have previously been recorded within the Hornsby Park site.

a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The Project would remove immature and sub-adult native eucalypt trees for these species for sections of the Canopy Skywalk as well as clear sections of (largely exotic) understory vegetation; however, these impacts are not considered a significant reduction in habitat utility for these species. Impacts would be largely along already in-use tracks and frequented areas and largely restricted to daylight hours. No hollow-bearing trees would be removed by the Project. The Subject Land and locality contains large areas of mature native forest which would not be impacted by the Project.

The Project is not considered likely to place a viable local population of these species at risk of extinction.

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

- I. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or***
- II. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.***

Not applicable to threatened species.

c) In relation to the habitat of a threatened species or ecological community:

- I. The extent to which habitat is likely to be removed or modified as a result of the***

proposed development or activity;

II. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity; and

III. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The Project would remove native trees for these species for sections of the canopy skywalk as well as clear sections of (largely exotic understory) for several Project components; however, these are immature sub-emergent trees, and understory clearing would be largely restricted to existing tracks and footpath tracks through largely exotic understory. Suitable foraging habitat is not limited on the Subject Land or the wider locality, with large areas of native eucalypt forest present in Berowra Valley Nation Park to the west. No hollow-bearing trees would be removed by the Project.

No area of native vegetation would become fragmented or isolated as a result of the Project, the Subject Land would retain connectivity with vegetation on adjacent lands with impacts from the Project limited to minor small tree removal and clearing in a largely exotic understory. No area of habitat for these species would become fragmented or isolated as a result of the Project.

The habitat present on the Subject Land is not limited in the locality for this for these species, and the Project would remove potential roosting resources or lead to the fragmentation or isolation of any area of potential habitat. It is not considered important for the long-term survival of these species in the locality.

d) Whether the action proposed is likely to have an adverse effect any declared area of outstanding biodiversity value (either directly or indirectly);

At the time of writing, there were four AOBV declared under the BC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed AOBV, the Little Penguin population in Sydney's North Harbour - critical habitat declaration is located closest to the Project Area. However, as the Subject Land is located approximately 20 km from the AOBV, the Project would not be expected to have any direct or indirect effect on this or any other declared AOBV.

e) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to these species:

- Clearing of native vegetation;
- Human-caused climate change;
- Infection of native plants by *Phytophthora cinnamomi*;
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on

plants of the family Myrtaceae;

- Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat); and
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

The Project would result in a small loss of native vegetation (immature trees and minor understory native species), production of greenhouse gases and removal of dead wood; however, these impacts would be limited to small tree removal, track expansion and improvement or footpath tracks through largely exotic understory. Escaped garden plants from future site users (contaminated shoes, bike tyres etc.) could impact habitat value for this species; however, exotic species are already present throughout the Subject Land and adjacent lands including numerous priority weeds. Importation of unclean fill or infected landscaping plants could be a vector for the introduction of *P. cinnamomi* and/or Rust Fungi. However, these KTPs arising from the Project are not considered significant on the locality scale due to the small size of the Project footprint and limited impacts on native vegetation. Drivers of the above KTPs are already present in the locality and the Project is considered unlikely to significantly exacerbate them.

With appropriate mitigation, the Project is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

The Subject Land contains suitable habitat for these species and they are all known from recent occurrence records from the locality. The Project would remove some understory tree and (largely exotic) understory habitat for these species; however, this would largely occur along existing tracks or be restricted to narrow footpath corridors within the understory. No potential roosting trees for these species would be removed by the Project. The habitat present is not limited in the locality and the Project would not lead to the fragmentation or isolation of any area of potential habitat for these species. The locality contains large areas of similar eucalypt forest foraging habitat for this species with strong habitat connectivity to Berowra Valley Nation Park present to the west.

The Project is not considered likely to have a significant impact on these species. Further assessment through a BDAR is not considered necessary.

A3.2: TESTS OF SIGNIFICANCE (EPBC ACT)

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), potential impacts on Matters of Environmental Significance (MNES) listed under the Act are assessed through “tests of significance”. The MNES Significant Impact Guidelines provide these tests as well as guidelines for their application. These tests are used to determine if an action is likely to have a significant impact and consequently whether the action requires a referral to the federal Minister of the Environment as part of the development application.

Assessments under the EPBC Act for the species either detected on or considered likely to occur on the Subject Land are provided below.

A3.2.1 Gang-gang Cockatoo (*Callocephalon fimbriatum*)

This species is listed as endangered under the EPBC Act.

Gang-gang Cockatoos are one of the more distinctive and charismatic members of Australia's avifauna. These birds are primarily slate-grey, with the males easily identified by their scarlet head and wispy crest, while females have a grey head and crest and feathers edged with salmon pink on the underbelly. They range in length from 32 to 37 cm, with a wingspan of 62 to 76 cm. The call has been likened to a creaking gate or cork being pulled from a bottle.

Distribution

The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee.

Habitat and ecology

- In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests;
- In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas;
- May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests; and
- Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground.

This species was not encountered during surveys of the Subject Land. However, it has been observed within the Hornsby Park site in previous surveys and by Council staff.

a) Lead to a long-term decrease in the size of a population;

The habitat of the Subject Land is considered to represent a small part of the foraging range of the local population of this species. The Project will not inhibit this species' ability to disperse through the locality. No hollow-bearing trees would be removed by the Project. Large areas of suitable habitat are

present on adjacent lands in the locality which contain similar hollow-bearing resources.

The Project is not considered likely to reduce the area of occupancy of a population of this species.

b) Reduce the area of occupancy of the species;

The habitat of the Subject Land is considered to represent a small part of the foraging range of the local population of this species. The Proposal will not inhibit this species' ability to disperse through the locality. The vegetation on the Subject Land has connectivity with large areas of native vegetation and the Project would not significantly reduce the area of available habitat or inhibit the species to disperse through the Hornsby Park site and wider locality.

The Project is not considered likely to reduce the area of occupancy of a population of this species.

c) Fragment an existing population into two or more populations;

This species is highly mobile and capable of crossing large areas of unsuitable habitat. The Project will remove a small portion of foraging habitat for this species from the locality but will not affect the species' ability to disperse through the local area. The vegetation on the Subject Land has connectivity with large areas of native vegetation and the Project would not significantly reduce the area of available habitat or inhibit the species to disperse through the Hornsby Park site and wider locality.

The Proposal is not considered likely to fragment an existing population of this species.

d) Adversely affect habitat critical to the survival of a species;

The MNES Significant Impact Guidelines identify habitat critical to the survival of a species or ecological community as habitat listed in an approved Recovery Plan, listed on the Register of Critical Habitat under the EPBC Act or as habitat needed (Commonwealth of Australia, 2013):

- 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.

There is an approved conservation advice for this species which defines critical habitat as “*all foraging habitat during both the breeding and non-breeding season*” (Commonwealth of Australia, 2022). Page 6 of this document lists preferred feed tree species for both seasons. Numerous tree species present within the Hornsby Park site are important foraging resources during the summer months, including *Angophora costata* (Sydney Red Gum), *Eucalyptus pilularis* (Blackbutt) and *Syncarpia glomulifera* (Turpentine). Based on this assessment, the habitat of the Subject Land meets the definition of critical habitat under the conservation advice.

However, these foraging resources are not limited in the locality, and no hollow-bearing trees would be removed by the Project. The vegetation on the Subject Land has strong connectivity with large areas of suitable habitat and the Project would not create a barrier to the movement of this species through this habitat.

The Proposal is not considered likely to significantly adversely affect habitat critical to the survival of this species.

e) Disrupt the breeding cycle of a population;

The Project would not remove any hollow-bearing trees. Construction works within 200m of potential roost trees have the potential to affect breeding success and such works should avoid the nesting period for this species (October to January) if breeding is observed on the site during the construction phase.

The Proposal is not considered likely to disrupt the breeding cycle of a population of this species.

f) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The Project would remove a small number of foraging trees for this species from the local area. This habitat is not limited in the locality for this highly mobile species. The Project would not remove any potential nesting trees. The vegetation on the Subject Land has connectivity with large areas of native vegetation and the Project would not significantly reduce the area of available habitat or inhibit the species to disperse through the Hornsby Park site and wider locality.

The Proposal is not considered likely to adversely affect habitat to the extent that the species is likely to decline.

g) Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;

This species is not highly susceptible to terrestrial exotic predators due to its arboreal and airborne habit. The locality is already heavily urbanised therefore the Project is not likely to result in an increase in local domestic predator populations (dogs and cats).

h) Introduce disease that may cause the species to decline; or

The species is susceptible to Psittacine Circoviral (beak and feather) disease. The Project would not include activities likely to introduce or spread this disease, such as the keeping of domestic parrots. The local area is also heavily urbanised with potential vectors to wild parrot populations already present. The Project is not considered likely to significantly increase the risk of the transmission of this disease to wild populations of this or other native Psittacine species.

The Project is not considered likely to introduce diseases which could cause the species to decline.

i) Interfere with the recovery of the species.

The Subject Land contains general foraging habitat, not limited in the local area. The Project would not remove any potential nesting trees. The vegetation on the Subject Land has connectivity with large areas of native vegetation and the Project would not significantly reduce the area of available habitat or inhibit the species to disperse through the Hornsby Park site and wider locality.

The Project is not considered likely to interfere substantially with the recovery of the species.

Conclusion

The Subject Land contains suitable foraging habitat for this species and it is known from previous surveys within the Hornsby Park site. The Project would remove some understory tree and (largely exotic) understory habitat for this species; however, this would largely occur along existing tracks or be restricted to narrow footpath corridors within the understory. No potential nesting trees would be removed by the Project; however, construction works within 200m of potential nest trees have the

potential to affect breeding success and such works should avoid the nesting period for this species (October to January). The habitat present is not limited in the locality and the Project would not lead to the fragmentation or isolation of any area of potential habitat for this species. The locality contains large areas of similar eucalypt forest foraging habitat for this species with strong habitat connectivity to Berowra Valley Nation Park present to the west.

Although this habitat is considered to meet the definition of critical habitat under the approved recovery plan, the small amount of clearing required for the Proposal is not considered a significant loss of habitat for the species in the local area.

A3.2.2 Grey-headed Flying Fox (*Pteropus poliocephalus*)

This species is listed as vulnerable under the BC Act.

The Grey-headed Flying-fox is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle.

Distribution

Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations.

Habitat and ecology

- Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops;
- Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy;
- Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young;
- Annual mating commences in January and conception occurs in April or May; a single young is born in October or November;
- Site fidelity to camps is high; some camps have been used for over a century;
- Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km;
- Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines; and
- Also forage in cultivated gardens and fruit crops.

This species was not detected during surveys; however, it was detected during surveys for the EIS and is known from numerous occurrence records from the locality and suitable habitat is present on the Subject Land including suitable feed tree species (*Eucalyptus sp.*). The nearest known camp of this species mapped on the Department's interactive flying-fox web viewer is located in the suburb of Gordon, approximately 8.5km to the south-east of the Subject Land (Commonwealth of Australia, 2021).

With reference to the Commonwealth MNES Significant Impact Guidelines, an "important population"

is defined as either populations identified as such in an approved recovery plan or are populations that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

An approved National Recovery Plan for this species is currently in force (Commonwealth of Australia, 2021). Page 14-15 of this Plan identifies land considered critical to the survival of the species as lands where one or more listed feed tree species (on Page 14) are present and/or:

- Contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May);
- Contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer; or
- Contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp as identified on the Department's interactive flying-fox web viewer.

The Subject Land does contain at least two tree species listed on Page 14 of the plan (*Eucalyptus pilularis* (Blackbutt) and *Syncarpia glomulifera* (Turpentine)) and the nearest camp mapped on the Department's interactive flying-fox web viewer is located in Gordon, approximately 8.5km to the south-east of the Subject Land (Commonwealth of Australia, 2021b). Based on this, the Subject Land is considered to represent critical habitat for the survival of this species. Therefore, individuals of this species using the Subject Land are considered to represent an important population of the species.

a) Lead to a long-term decrease in the size of an important population of a species;

The Subject Land does not contain roosting habitat in the form of a camp for this species. The nearest known camp is located in Gordon, approximately 8 km to the south-east of the Subject Land (Commonwealth of Australia, 2021b). The Project would remove some sub-emergent feed trees for this species for the canopy skywalk. However, these are not considered important foraging resources for this species. No mature, canopy trees would be removed by the Project.

The habitat present on the Subject Land is not considered important to the long-term survival of the species, with similar habitat present on the wider Subject Land and the locality. The Project would not lead to increased fragmentation of habitat for this species in the locality. Habitat connectivity with Berowra Valley National Park would not be decreased as a result of the Project.

The Project is not considered likely to lead to a long-term decrease in the size of an important population of this species.

b) Reduce the area of occupancy of an important population;

As discussed above, individuals of this species using the Subject Land are considered to form part of an important population of the species. The Project would remove suitable foraging trees for this species from the local area. However, these trees are sub-emergent immature trees and are not considered important foraging resources for the local population of this species.

Impacts of the Project would be limited to minor removal of immature trees and clearing of (largely

exotic) understory vegetation for track upgrades. These impacts would not significantly reduce the foraging habitat utility for this species or represent a barrier for the dispersal of the local population through the Subject Land or wider locality.

The Project would not significantly reduce the area of occupancy of an important population of this species.

c) Fragment an existing important population into two or more populations;

This species is highly mobile and capable of crossing large areas of unsuitable habitat. The Project will remove a small portion of foraging habitat for this species from the locality in the form of lower value sub-emergent native trees. However, clearing associated with the Project would not fragment or isolate any area of suitable habitat for this species on the Subject Land or adjacent lands.

The Project is not considered likely to fragment an existing important population of this species.

d) Adversely affect habitat critical to the survival of a species;

As discussed above, the Subject Land meets the definition of habitat critical to the survival of the species as detailed in the National Recovery Plan. The Project would remove suitable foraging trees for this species from within 20km of a nationally important camp of the species. However, the trees to be removed for the Canopy Skywalk comprise sub-emergent eucalypts not considered important foraging trees for the species on the Subject Land.

The Project would not significantly adversely affect habitat critical to the survival of this species.

e) Disrupt the breeding cycle of an important population;

The Subject Land does not contain a breeding camp of this species. The Project would not directly disrupt the breeding cycle of the local population in the nearest camp, located in Gordon approximately 8 km from the Subject Land. It would remove foraging habitat for individuals of this camp from the local area; however, these trees are immature and sub-emergent. No mature, canopy forage tree species would be removed by the Project.

The Project is not considered likely to disrupt the breeding cycle of an important population of this species.

f) Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The Project would remove several small suitable foraging trees for this species from the Subject Land. No mature, canopy feed trees would be removed. This habitat is not limited in the locality for this highly mobile species. The Subject Land does not contain important breeding habitat for this species in the form of an active camp. The Project would not disrupt habitat connectivity within the Subject Land or with the adjacent Berowra Valley National Park to the west.

The Project is not considered likely to adversely affect habitat to the extent that the species is likely to decline.

g) Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

This species is not highly susceptible to terrestrial exotic predators due to its arboreal and airborne habit. The Subject Land is located near to an already highly urbanised locality with a significant population

of domestic predators (dogs and cats). The Project is not considered likely to increase the local population of these predators.

h) Introduce disease that may cause the species to decline; or

The species is not susceptible to any disease likely to be introduced by the Project. The local area (to the east) is already highly modified and many vectors are present for the introduction of new diseases independent of the Project.

The Project is not considered likely to introduce diseases which could cause the species to decline.

i) Interfere substantially with the recovery of the species.

The Subject Land meets the definition of habitat critical to the survival of this species. It contains mature feed tree species and is located within 20 km of a nationally important camp of this species. The Project would remove some suitable feed trees from the Subject Land; however, these are immature, sub-emergent trees and no mature canopy trees would be removed.

The habitat available on the Subject Land is not limited in the locality. The Project would not represent a barrier to the dispersal of this species across the locality and would not significantly affect the habitat utility of the local area for this highly mobile species.

The Project is not considered likely to interfere substantially with the recovery of the species.

Conclusion

The Subject Land meets the definition of habitat critical to the survival of this species. However, the Project would not remove any mature feed trees from the Subject Land, with clearing restricted to a few sub-emergent individuals of lower habitat value. This level of impact is considered a negligible reduction in available habitat for this species in the local area and is not considered likely to represent a significant decline in habitat utility in the local area for this species. The Project would not fragment or isolate any area of habitat for this species on the Subject Land or disrupt connectivity with habitat in the adjacent Berowra Valley National Park to the west.

No significant impact on this species is considered likely as a result of the Project.

11. APPENDIX 4: SITE PLANS

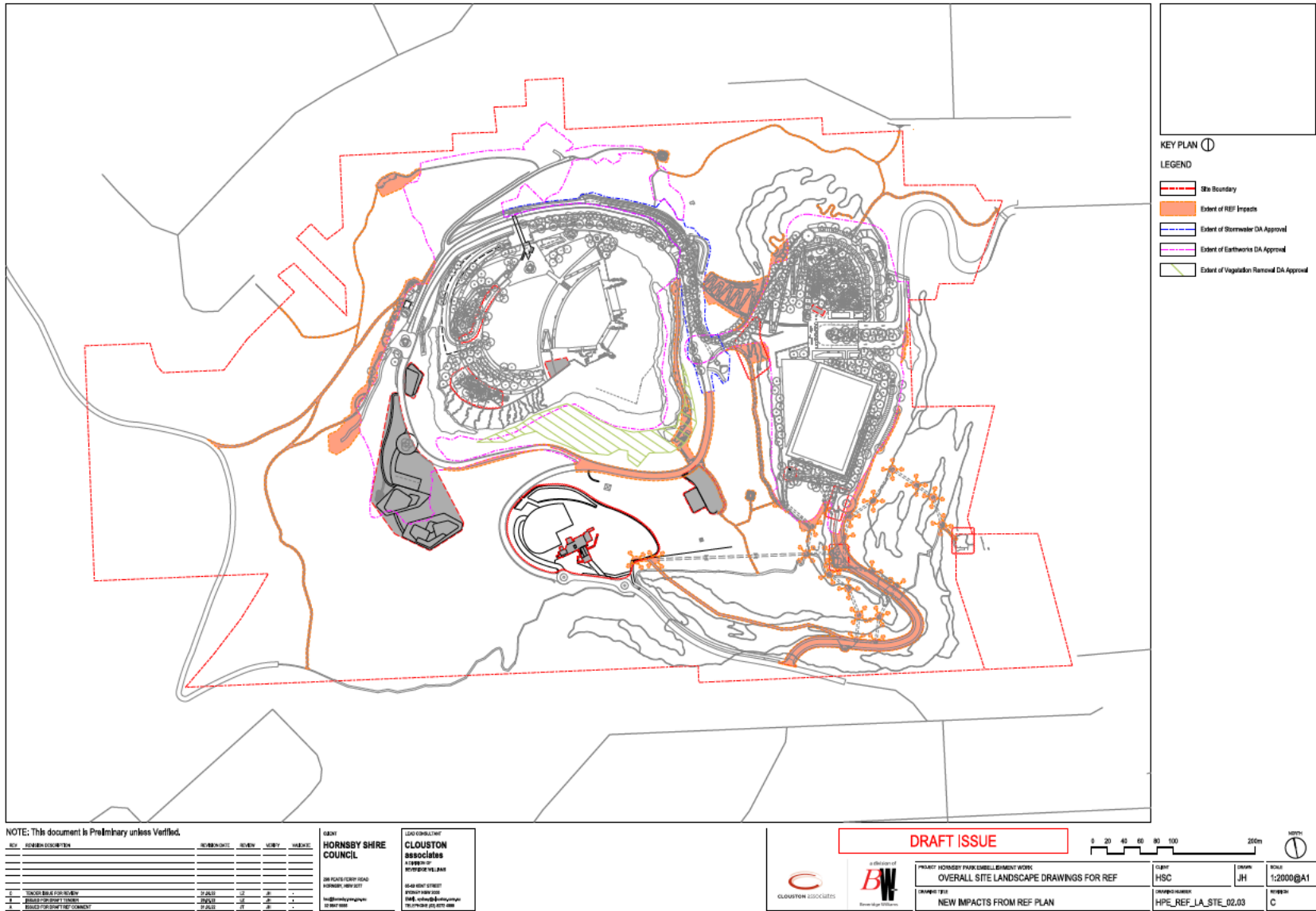
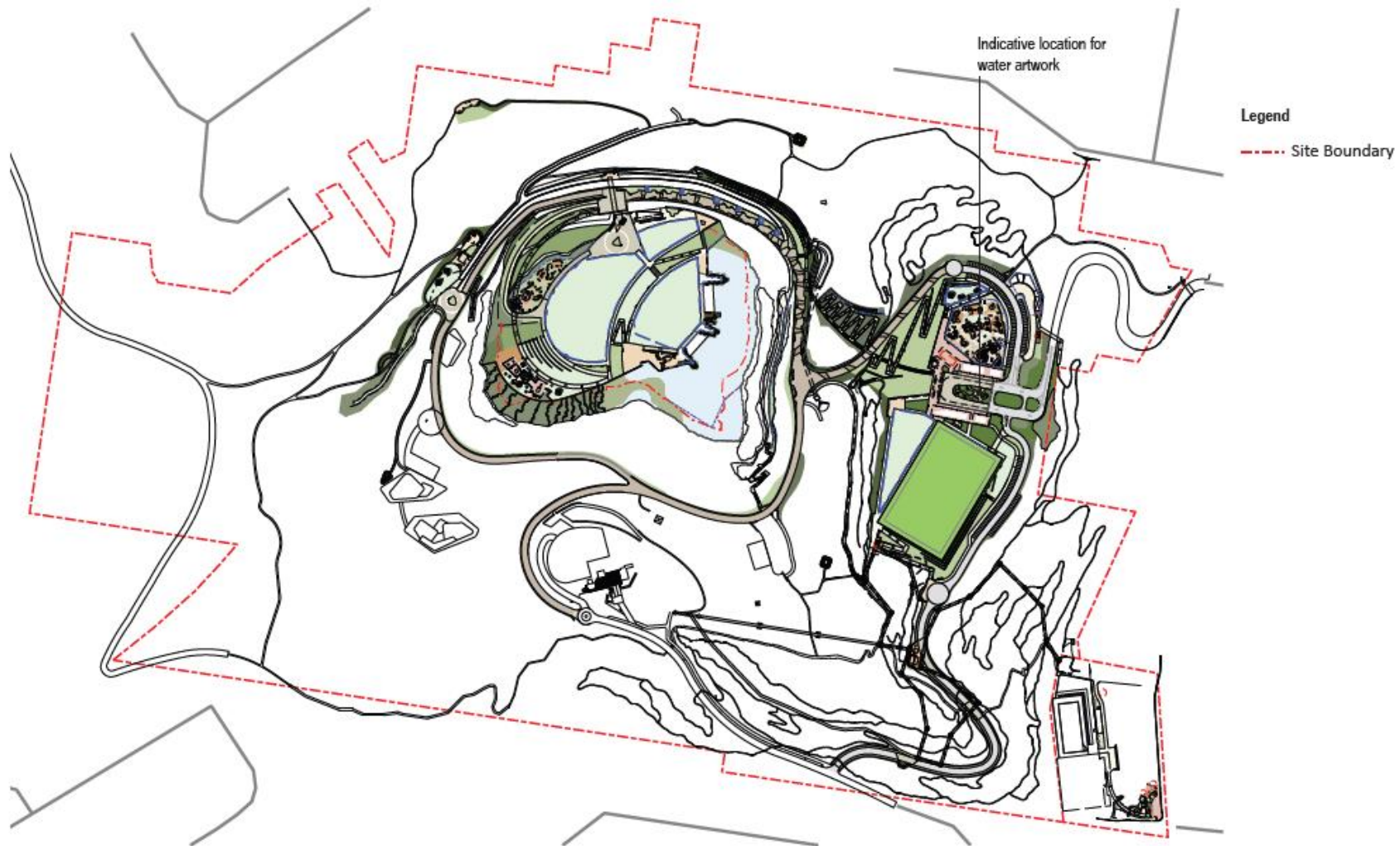


Figure A4.1: REF Plan



Client:
HORNSBY SHIRE COUNCIL

1:4000 @ A3

0 20 40 60 80 100

200m



Hornsby Park Embellishment • Hornsby

Overall Site Plan for Coordination

S20-043 Sk 216

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LANDSCAPE ARCHITECTS • URBAN DESIGNERS • LANDSCAPE PLANNERS 65-69 KENT STREET • SYDNEY NSW 2008 • PO BOX R1308 • ROYAL EXCHANGE NSW 1025 • AUSTRALIA • SYDNEY@CLOUSTON.COM.AU • TELEPHONE +61 2 8272 4866 • FACSIMILE +61 2 8272 4868

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Figure A4.2: Overall site plan