



# **Transport for NSW**

## Yagoona Station Upgrade

### Biodiversity and Arboricultural Assessment

May 2021

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# 1. Introduction

## 1.1 Overview

The NSW Government is committed to facilitating and encouraging use of public transport, such as trains, by upgrading stations to make them more accessible, and improving interchanges around stations with other modes of transport such as buses, bicycles and cars. The Transport Access Program is an initiative targeted at achieving compliance with the DSAPT Regulations across the network.

Yagoona Station has been identified for an accessibility upgrade as it currently does not meet key requirements of the DSAPT or the *Commonwealth Disability Discrimination Act 1992* (DDA). It also does not allow for equitable access to the station platforms. Yagoona Station comprises one island platform, with stairs from the concourse off the Hume Highway providing the only means of access.

The existing footpath to the Yagoona Station concourse and the stairs to the platforms do not readily facilitate access for people with reduced mobility, parents/carers with prams or customers with luggage. There are no accessible toilet facilities at the station and no lift facilities providing access to the platform.

A Review of Environmental Factors (REF) is being prepared for the proposal in accordance with the requirements of Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). GHD has been engaged by Transport for NSW to prepare a biodiversity assessment to support the REF for the proposal.

This report assesses and documents the potential impacts on biodiversity values, with particular emphasis on threatened ecological communities, populations and species listed under the NSW *Biodiversity Conservation Act 1995* (BC Act) and biodiversity Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Mitigation measures to ameliorate potential impacts of the proposal are included in Section 6 of this report.

This report also contains an arboricultural assessment of landscape trees in the study area to identify those that will require removal and measures to protect those that will be retained during construction activities.

## 1.2 The proposal

Key features of the proposal are shown in Figure 1 and include:

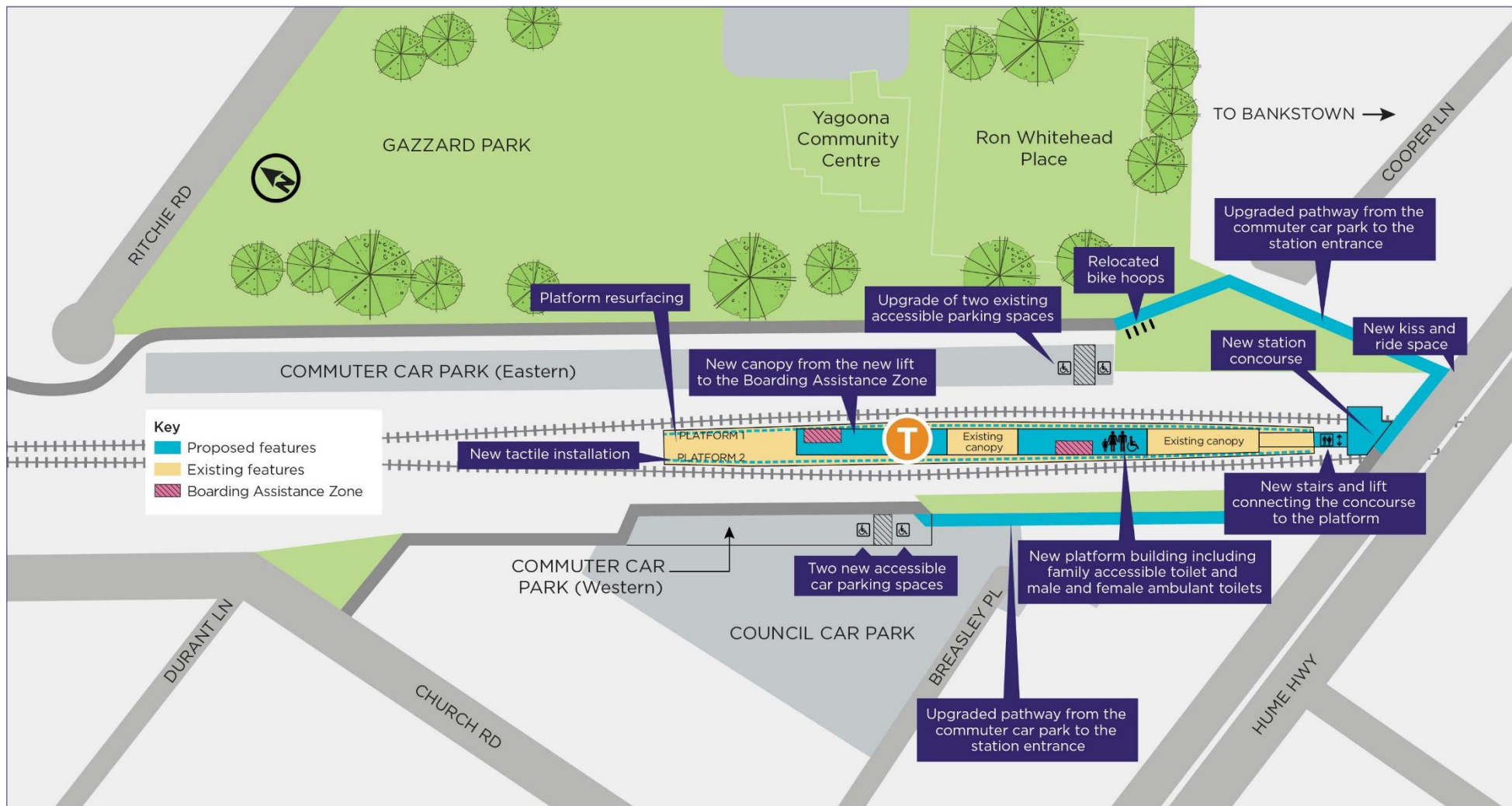
- new station entry concourse from the Hume Highway including a new lift and stairs to provide access to the station platforms
- new station building on the platform for all station facilities, including a new family accessible toilet and new male and female ambulant toilets
- additional platform canopies to provide continuous cover from the new lift and stairs to the boarding assistance zones on both platforms
- two new accessible parking spaces in the Breasley Place commuter car park and upgrade of the two accessible parking spaces in the Ritchie Road commuter car park
- upgrade of footpaths from both commuter car parks to the station entrance
- new kiss and ride bay on the Hume Highway
- platform regrading and resurfacing

- relocating existing bike hoops
- ancillary work including service upgrades and/or relocation, minor drainage work, adjustments to fencing and lighting, relocation of station furniture, new Opal card readers, installation of new tactile ground surface indicators, improvements and modifications to station communications and security systems (including closed-circuit television (CCTV) cameras) and wayfinding signage.

### **1.3 Purpose of this report**

The aims and scope of this report are to:

- outline the methods used for the biodiversity and arboricultural assessment
- describe the existing environment of the site, including the results of the desktop assessment and site surveys
- identify the presence or likely presence of threatened species, populations and ecological communities and their habitats listed under the BC Act and FM Act
- assess the potential for any MNES listed under the EPBC Act to occur within the site and/or to be affected by the project
- identify the potential impacts of the project on biodiversity values, including threatened biota and their habitats
- assess the likely significance of impacts on threatened biota listed under the BC Act and EPBC Act
- recommend mitigation measures to avoid or minimise impacts on threatened biota and biodiversity values
- identify and describe landscape trees, including trees to be removed and retained and provide recommendations for the protection of retained trees proximate to construction activities within the site
- outline the potential offset requirements, based on the guide (Transport for NSW 2019) for the clearing of trees that have heritage, streetscape, community/public amenity or intrinsic value.



**Figure 1 Key features of the proposal**

(Indicative only, subject to detailed design)



## **1.4 Scope and limitations**

Flora and fauna surveys were conducted by GHD in the study area for one day in February 2021. Some fauna species that may occur in the locality or region on a seasonal basis, use habitats periodically (as part of a wider home range) or become active at different times of the year may not have been recorded. Similarly, some flora species that are difficult or impossible to locate or identify at certain times of year due to a lack of reproductive material and/or their seasonal nature may also have not been observed.

For the above reasons, the impact assessment and conclusions of this report draw upon information obtained from a variety of sources in addition to the field survey data. An assessment of the likelihood of occurrence of threatened species has been provided, on the basis of known distributional ranges and previous records in the locality and the habitats present in the study area. The assessment of impacts includes those threatened species not detected but considered likely to occur or to be impacted by the proposal based on the results of the desktop review and field surveys.

## **1.5 Assumptions**

This assessment has been completed based on information provided by the Transport for NSW design team, including a site plan (DRG No: 150XXX-YAG-AR-DRG-19120) and CAD base and information gained from the site visit.



## 2. Legislative context

### 2.1 New South Wales State legislation

#### 2.1.1 Environmental Planning and Assessment Act 1979

The proposed development is a Part 5 activity under the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EP&A Act forms the legal and policy platform for proposal assessment and approval in New South Wales (NSW) and aims to, amongst other things, 'encourage the proper management, development and conservation of natural and artificial resources'. All development in NSW is assessed in accordance with the provisions of the EP&A Act and the *Environmental Planning and Assessment Regulation 2000*. The determining authority for the project is Sydney Trains.

Section 1.7 of the EP&A Act states that the Act is subject to provisions of Part 7 of the *Biodiversity Conservation Act 2016* (BC Act) and Part 7A of the *Fisheries Management Act 1994* (FM Act). Part 7.3 of the BC Act and Section 220ZZ of the FM Act list factors that must be taken into account when determining the significance of potential impacts of a proposed activity on threatened species, populations or ecological communities (or their habitats) listed under the BC Act and the FM Act. The 'assessment of significance' is used to assist in the determination of whether a proposal is 'likely' to impose 'a significant effect' on threatened biota and thus whether a species impact statement (SIS) is required under the BC Act or FM Act. Under the BC Act, there is also the option to prepare a Biodiversity Development Assessment Report (BDAR) rather than an SIS if a significant impact is likely.

#### 2.1.2 Biodiversity Conservation Act 2016

The BC Act provides legal status for biota of conservation significance in NSW. The BC Act aims to, amongst other things, 'maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development'. It provides for the listing of threatened species and communities, establishes a framework to avoid, minimise and offset the impacts of proposed development (the Biodiversity Offsets Scheme [BOS]), and establishes a scientific method for assessing the likely impacts on biodiversity values and calculating measures to offset those impacts (the Biodiversity Assessment Method [BAM]). As this project is being assessed under Part 5 of the EP&A Act, assessment in accordance with the BAM is not required unless there is likely to be a significant impact on threatened biota.

The BC Act has been addressed in this assessment through:

- desktop review to determine the threatened species, populations or ecological communities that have been previously recorded within the locality and hence could occur subject to the habitats present
- field surveys for listed threatened species, populations and ecological communities
- assessment of the potential for threatened species (or their habitat) to occur and be impacted
- assessment of potential impacts on listed threatened species, populations and ecological communities
- identification of suitable impact mitigation and environmental management measures.

Threatened biota recorded or likely to occur in the site are detailed further in Section 4.

There would be no significant impact to threatened species listed under the BC Act as determined by assessments of significance (Section 5).

### **2.1.3 Biosecurity Act 2015**

The *Biosecurity Act 2015* provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds.

The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Legal requirements to minimise the potential for the introduction and/or spread of weeds as a result of the proposal are discussed in Section 6.2.

## **2.2 Commonwealth legislation**

### **2.2.1 Environment Protection and Biodiversity Conservation Act 1999**

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on MNES or the environment of Commonwealth land undergo an assessment and approval process. Under the EPBC Act, an action includes a proposal, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' or a significant impact to the environment of Commonwealth land is deemed to be a 'controlled action' and may not be conducted without prior approval from the Australian Minister for the Environment.

Potential MNES of relevance to this assessment include:

- threatened species and ecological communities
- migratory species.

The EPBC Act has been addressed in this assessment through:

- desktop review to determine the listed biodiversity matters that are predicted to occur within the locality of the proposal and hence could occur, subject to the habitats present
- field surveys for listed threatened biota and migratory species and to identify potential habitat
- assessment of potential impacts on threatened and migratory biota
- identification of suitable impact mitigation and environmental management measures.

## 3. Methods

### 3.1 Desktop review

A desktop assessment comprising database searches to identify threatened biota listed under the BC Act and MNES listed under the EPBC Act that may be affected by the proposed works was completed on 8 March 2021. The results of the database searches are provided in Appendix A.

Biodiversity databases and literature pertaining to the Proposal area and locality that were reviewed prior to conducting field investigations included:

- the Commonwealth Department of Agriculture, Water and the Environment Protected Matters Search Tool (PMST) online database for all MNES, selected for a 10 kilometre radius of the proposal (DAWE, 2021a)
- DAWE online species profiles and threats database (DAWE, 2021b)
- NSW Environment, Energy and Science Bionet database (licensed) for records of threatened species, populations and endangered ecological communities listed under the BC Act that have been recorded within the locality of the proposal (EES, 2021a)
- existing regional-scale vegetation mapping (OEH, 2016 and Tozer, 2010) and the NSW vegetation types database (EES, 2021b) to identify vegetation communities present in the study area
- Bankstown City Council (2015a) Part B11 of Bankstown DCP: Draft Tree Preservation Order
- Bankstown Local Environmental Plan 2015
- Canterbury Council (2013) Tree Management Order.

A review of a previous biodiversity assessment prepared for Transport for NSW (GHD, 2019) (and which includes portions of the study area) was undertaken. Aerial photography of the study area was also reviewed.

The habitat resources present at the study area (determined during the site inspection) were compared with the known habitat associations/requirements of the threatened and migratory biota highlighted by the desktop review and the results of the field survey to assess the likelihood of occurrence of threatened species at the study area.

### 3.2 Field survey

A field survey was conducted by a Senior GHD Arborist/Ecologist (AQF10; International Society of Arboriculture membership no. 212238 and Arboriculture Australia membership no. 2173) and GHD Ecologist on 23 February, 2021. Also in attendance were other members of the GHD environmental impact assessment project team and representatives of Transport for NSW. The biodiversity and arboricultural survey was carried out after an initial site meeting. GHD arborist/ecologists were accompanied by a Protection Officer and the Transport for NSW deputy Project Manager for field surveys.

The study area was surveyed on foot in order to collect sufficient information to identify the type, condition, extent and conservation significance of vegetation and habitat resources. Surveys were focussed in areas of planted vegetation along the rail corridor and including within Ron Whitehead Place to assess the potential habitat value for native species, including threatened species. An arboricultural assessment, including a visual tree assessment and assessment of the structure and health of trees within the Proposal area were also undertaken by the GHD arborist.

The methodology for biodiversity and arboricultural surveys is detailed below and is considered suitable for the study area given its heavily urbanised nature, comprising cleared and developed land with disturbance from existing roads, and urban habitation with no intact stands of native vegetation.

The aims of the field survey were to:

- identify vegetation types, their condition and location
- identify fauna habitat types and specific features, in particular those of relevance for threatened species
- identify the presence or likely presence of threatened species, populations and ecological communities (and their habitats) listed under BC Act within the study area that may be impacted by the proposal
- identify the presence or likely presence of threatened or migratory biota listed under the EPBC Act within the study area that may be impacted by the proposal
- identify those trees that will require removal and provide measures to protect those that will be retained during construction activities.

A description of survey techniques is provided in 3.2.1 and 3.2.2.

### **3.2.1 Biodiversity assessment**

#### **3.2.1.1 Flora survey**

Given the limited extent of vegetation in the study area, the flora survey involved the following techniques:

- vegetation mapping and extrapolation of existing vegetation mapping
- random meander surveys (as per Cropper, 1993)
- targeted threatened flora surveys in areas of potentially suitable habitat.

Vegetation communities were mapped using aerial photograph interpretation within a geographical information system (GIS) as guided by the field survey results. Vegetation mapping of the surrounding locality by OEH (2016) was used as a baseline, although it is recognised that areas within the study area are substantially modified for urban development.

Detailed plot/transect surveys were not completed due to the small size of the study area and lack of complete, continuous patches of native vegetation. Instead, plant species recorded within the study area were listed, along with a frequency of occurrence estimate. Species lists are provided in Appendix B.

Targeted surveys were undertaken for threatened flora species which could potentially occur within the study area given known distributions, previous records in the study area and locality and habitat requirements for each species. Random meander surveys (as per Cropper, 1993) were undertaken throughout suitable habitat within the study area and traversed on foot along footpaths and other vegetated areas where access was publicly available. Consideration was

given to previous threatened species records within the locality and within close proximity to the study area (eg EES, 2021a) when identifying areas of potentially suitable habitat.

A more focused search was undertaken for Downy Wattle (*Acacia pubescens*), a threatened species known to occur in the study area. Ramets of Downy Wattle were counted and mapped using the Collector Application.

### **3.2.1.2 Fauna habitat survey**

The fauna survey involved the following techniques:

- fauna habitat assessment
- hollow-bearing tree assessment
- opportunistic observations of fauna species.

### **3.2.1.3 Fauna habitat assessment**

General fauna habitat assessments were undertaken throughout the study area, including active searches for potential shelter, basking, roosting, nesting and/or foraging sites. Indicative habitat criteria for targeted threatened species (ie those determined as having the potential to occur within the study area following the desktop review) were identified prior to fieldwork. Fauna habitat assessments aimed to identify potential habitat for these species.

Habitat criteria were based on information provided in EES and DAWE threatened species profiles, field guides, and the knowledge and experience of GHD field ecologists. Habitat assessment assists in the compilation of a comprehensive list of threatened fauna species that are predicted within the vicinity of the study area, rather than relying solely on single event surveys that are subject to seasonal limitations and may only represent a snapshot of assemblages present.

Habitat assessments included active searches for:

- hollow-bearing trees, trees with bird nests or other potential roost sites
- evidence of fauna activity such as tracks, feeding scars, scats/pellets, scratches and diggings
- specific food trees and evidence of foraging (particularly for the Grey-headed Flying-fox)
- leaf litter and fallen timber suitable for reptiles.

The locations of habitat features, including trees with nests were captured with a handheld GPS unit.

### **3.2.1.4 Opportunistic observations**

Opportunistic and incidental observations of fauna species made during the field surveys were recorded. Survey effort was concentrated in areas that supported habitat resources and mature trees were scanned for roosting or nesting birds.

## **3.2.2 Arboricultural assessment**

### **Visual tree assessment**

Trees in the study area were assessed by conducting a ground-based Visual Tree Assessment (VTA) (see Matheney and Clark 1994a and 1994b). The assessment included identification and assessment of all trees over 3 metres in height. Attributes for each tree recorded included:

- tree or Tree Group No
- botanical name of tree species

- common name of tree species
- height of tree in metres (m)
- spread (radius m.)
- Diameter at Breast Height (DBH) (m)
- diameter above buttress
- age class
- health
- structure
- SULE
- TPZ and SRZ
- comments.

The diameters of each tree at breast height and diameter above the root buttress were measured, using a Forestry DBH tape. The height and crown spread of trees were estimated.

No diagnostic equipment, aerial inspection (climbing) or tree root mapping was undertaken. Tagging of the trees was not necessary, because of the ease of on-site location, with reference to existing infrastructure. The information provided in this report reflects the condition of the trees at the time of inspection and only relates to the trees surveyed.

The estimate of a tree's age was based on the definitions outlined by Draper and Richards (2009). Trees were classed as follows:

- Young (Early Mature): age <20% of their life expectancy *in situ*,
- Mature: aged between 20 to 80% of their life expectancy *in situ*,
- Over-mature: aged >80% of their life expectancy *in situ*.

### **3.2.3 Structure and health**

For each tree, the Safe Useful Life Expectancy (SULE) was determined based on the health and structure of the subject tree (after Barrell, 2001). The SULE code is provided in Appendix D. The health and structural integrity of each tree were evaluated per the criteria outlined in Table 1. All trees surveyed are located within the study area.

The estimate of each tree's age was based on the definitions outlined by Draper and Richards (2009). Trees were classed as follows:

- Young (Early Mature): age <20% of their life expectancy *in situ*
- Mature: aged between 20 to 80% of their life expectancy *in situ*
- Over-mature: aged >80% of their life expectancy *in situ*.

**Table 1 List of items used to determine tree structure and health**

Structural Considerations *	
Presence/absence of cankers (abnormal growth caused by fungi or bacteria)	Evidence of 'end weight' (accumulation of mass at the end of a branch)
Presence/absence of cavities (open wound with evidence of decay)	Presence/absence of epicormic shoots (shoots arising from latent or adventitious buds)
Presence/absence of co-dominant stems (Stems or branches of equal diameter, often weekly attached)	Presence/absence of previous branch or trunk failure
Presence/absence of conks (fruiting body of decay fungi eg Bracket Fungus)	Evidence of girdling roots (roots that encircle the base [above ground] of the stem)
Presence/absence of decay (degradation of wood by fungi / bacteria)	Leaning trunk (bias)
Evidence of decline (loss of vigour)	Low canopy (branches that are close to ground may require heavy pruning for construction clearance)
Evidence of dieback (death of twigs and branches)	Presence/absence of wounds (injuries on the surface of a stem or branch)
Health Considerations	
Presence/absence of pest and diseases	Proportion of necrotic material in platform
Amount of extension growth	Absence/presence of epicormic growth
Density of canopy	Foliage size and colour

\* Adapted from Matheny & Clark (1998).

### 3.2.4 Tree protection and structural root zones

The calculations of the TPZs for assessed trees were based on the DBH as outlined in *Australian Standard 4970 'Protection of Trees on Development Sites'* (SA, 2009):

TPZ radius = DBH x 12 where: DBH = Diameter at Breast height (in metres).

Where the trees have co-dominant leaders, the following formula was applied, in order to calculate DBH:  $DBH = (dbh1^2 + dbh2^2 + \dots + dbhn^2)^{0.5}$

The Structural Root Zone (SRZ) for each tree was also calculated. The calculation of the SRZ is based on the difference between the subject tree's DBH and the diameter near the tree's base, as outlined in *Australian Standard 4970 'Protection of Trees on Development Sites'* (SA, 2009).

Where:

DBH = Diameter at Breast height (in metres).

The calculation for Structural Root Zone (SRZ) radius is as follows:

$SRZ = (D \text{ SRZ} \times 50)^{0.42} \times 64.$

Where:

D = Difference between DBH and Diameter (in metres) at base of leader (DBL)

The TPZ is the optimal area over the tree's root zone which would be required to ensure the tree's vigour and stability, if located near a construction site.

While there is some acceptance of disturbance (<10%) within a healthy tree's TPZ, no disturbance within the tree's Structural Root Zone (SRZ) is acceptable, unless approved by the Project Arborist.

The TPZ and SRZ calculations according to SA (2009) are stated for each tree in Appendix C.



## 4. Existing environment

### 4.1 Overview

The study area is located within and around Yagoona Train Station. Land uses adjoining the study area consist primarily of urban streetscapes and residential, commercial and industrial developments, interspersed with urban parklands. The study area is located in the City of Canterbury-Bankstown local government area (LGA).

The study area is within the Blacktown soil landscape (EES, 2021d) which comprises gently undulating rises on Wianamatta Shale with local relief 10-30 m and slopes generally <5%. It is underlain by the Wianamatta Group Ashfield Shale and Bringelly Shale formations which comprises laminite and dark grey siltstone, shale, with occasional calcareous claystone, laminite and coal. It is likely that the original topsoil has undergone modification since original clearing and development of roads, parks and railway easements. Native vegetation in this soil landscape is almost completely cleared, with all canopy vegetation in the study area comprising planted native species. Canopy vegetation in the site is isolated and occurs in small patches on both sides of the rail corridor and at Ron Whitehead Place. The study area does not provide habitat connectivity to other areas of intact native vegetation in the locality. There are substantial volumes of fill materials within the study area, including gravel, buildings and ballast.

Existing vegetation consists of a combination of planted indigenous and exotic trees, shrubs and forbs, growing in association with self-recruited native and exotic species.

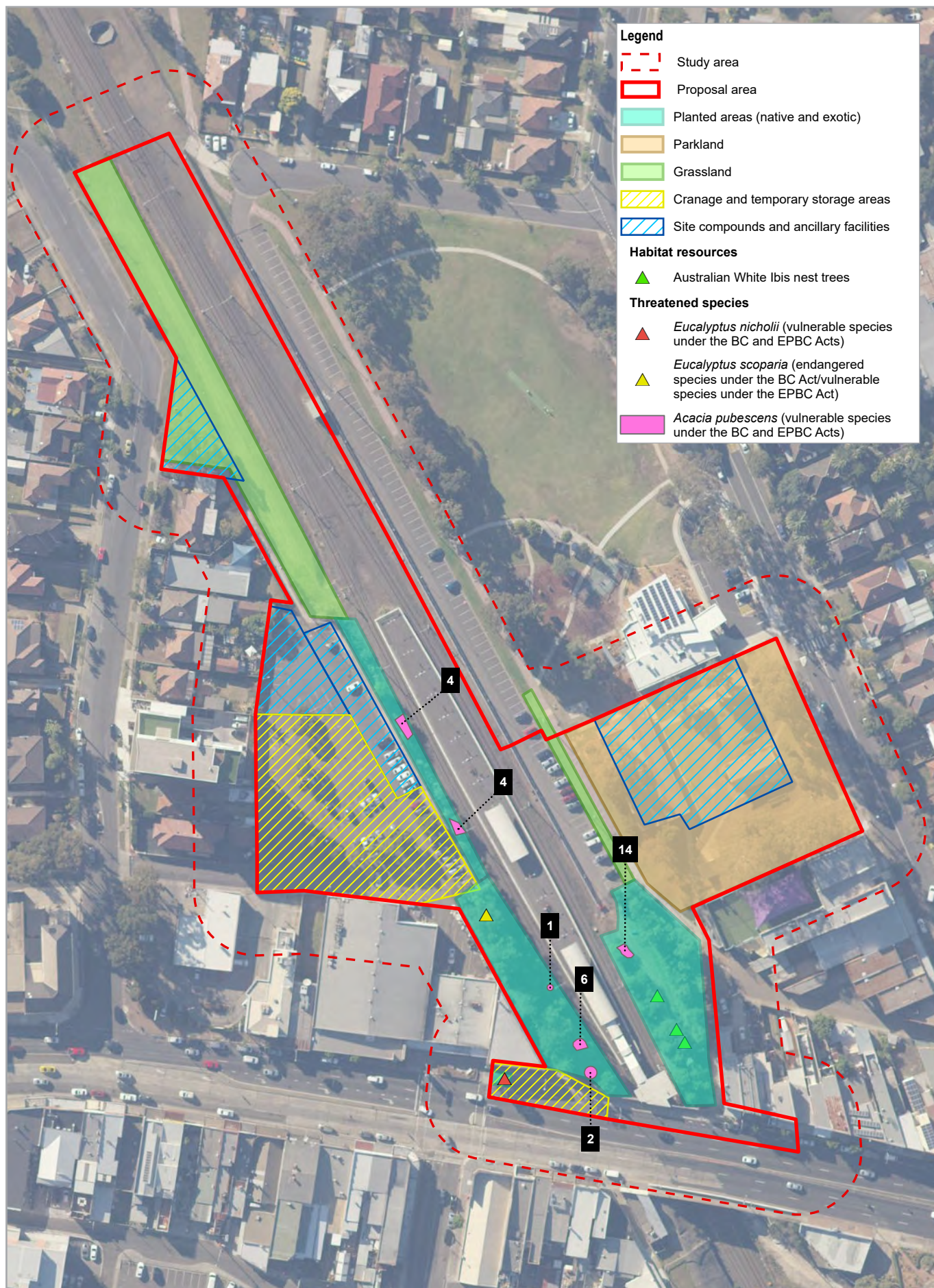
Benson and Howell (1990) describe patches of Ironbark-Melaleuca scrub occurring to the north of the study area, in Birrong, which constitute fragments of the western-most limits of distribution of Turpentine-Ironbark Forest and, to the north-west, in Lansdowne, occurrences of understorey species which are typical of the floristics of Cumberland Plain Woodland.

No creeks or drainage lines occur within the study area. The study area does not contain any key fish habitat.

### 4.2 Vegetation

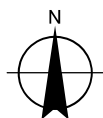
#### 4.2.1 Vegetation types

There are no mapped native Plant Community Types (EES, 2021c) within the study area. There are three non-native vegetation map units: exotic grassland, parkland and exotic and native vegetation (including self recruitment) (see Table 2, Table 3 and Table 4 and refer to Figure 2). These map units were not assigned a Plant Community Type (PCT) because of the low cover and species richness of indigenous native plants and/or because they occur on highly modified soils and landforms.



Paper Size ISO A4  
0 20 40  
Meters

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



Transport for NSW  
Yagoona Station Upgrade  
Biodiversity and Arboricultural Assessment



**Vegetation types, threatened  
biota and habitat resources**

Project No. 1254729  
Revision No. 0  
Date 13/05/2021

**FIGURE 2**





**Table 2 Vegetation – Exotic grassland**

Exotic Grassland	
Photo 1	 <p>Grassland on railway property to the south-east of Yagoona Station</p>
Photo 2	 <p>Emergent shrubs, growing within drainage line</p>
Extent and distribution within site	This vegetation type occurs as a narrow band along the eastern side of the railway line, at the southern limit of the study area.
Description	<p>Grassland to 1.4 m (height of flowering stems at time of survey), but apparently occasionally slashed. Foliage Projective Cover (PPFC) is &gt;80%, (see Photo 1). The suite of grass species is mostly exotic, with a dense sward of Rhodes Grass (<i>Chloris gayana</i>) and Carpet Grass (<i>Axonopus fissifolius</i>). Other exotic grass species include Paspalum (<i>Paspalum dilatatum</i>), Prairie Grass (<i>Bromus catharticus</i>) and Kikuyu Grass (<i>Cenchrus clandestinus</i>). Indigenous grass species are sparse and scattered. Species include Redleg Grass (<i>Bothriochloa decipiens</i> var. <i>decipiens</i>), Weeping Grass (<i>Microlaena stipoides</i> var. <i>stipoides</i>), Wallaby Grass (<i>Rytidosperma tenuius</i>) and Couch (<i>Cynodon dactylon</i>).</p> <p>Occasional emergent exotic forbs include Paddy's Lucerne (<i>Sida rhombifolia</i>), Crofton Weed (<i>Ageratina adenophora</i>), Spear Thistle (<i>Cirsium vulgare</i>), Flaxleaf Fleabane (<i>Conyza bonariensis</i>), Wandering Jew (<i>Tradescantia fluminensis</i>) and Purpletop (<i>Verbena bonariensis</i>). Indigenous forbs include Whiteroot (<i>Lobelia purpurascens</i>), Trailing Speedwell (<i>Veronica plebeia</i>), Fishweed (<i>Einadia trigonos</i> subsp. <i>trigonos</i>) and Kidney Weed (<i>Dichondra repens</i>). The midstorey is largely absent.</p> <p>Close to the railway line, along a poorly-drained area, some native shrub species have established (see Photo 2). Species include Blackthorn (<i>Bursaria spinosa</i> subsp. <i>spinosa</i>), Spiny-headed Mat-rush (<i>Lomandra longifolia</i>), Hairy Bush-lea (<i>Pultenaea villosa</i>), Parrot Pea (<i>Dillwynia sieberi</i>) and Peach Heath (<i>Lissanthe strigosa</i> subsp. <i>strigosa</i>).</p>

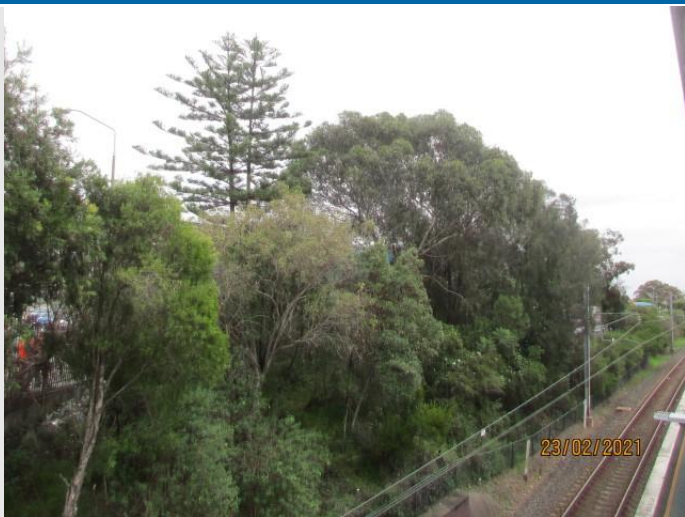

Exotic Grassland	
Threatened plants	No threatened flora species were recorded in this community in the proposal disturbance footprint. Occasional slashing of the grassland is likely to inhibit growth and development of indigenous forbs and grasses.
Threatened ecological communities	No TECs occur within this artificially developed vegetation type.

**Table 3 Vegetation - Parkland**

Parkland	
Photo 3	 <p>View of parkland looking towards railway line. Gazzard Park can be seen in right background.</p>
Photo 4	 <p>View of parkland looking north: Cooper Road can be seen in left of picture</p>
PCT(EES, 2021c)	n/a
PCT ID	n/a
Survey effort	General observations. No plot data recorded.
Extent and distribution within site	Parkland occurs as an open, maintained space to the north east and east of the station including Gazzard Park and Ron Whitehead Place.

Parkland	
Description	Grassland to 1.4 m (height of flowering stems at time of survey), but apparently occasionally slashed. Foliage Projective Cover (PPFC) is >80%, (see Photo 3). Exotic grass species include Carpet Grass ( <i>Axonopus fissifolius</i> ), Paspalum ( <i>Paspalum dilatatum</i> ), Prairie Grass ( <i>Bromus catharticus</i> ) and Kikuyu Grass ( <i>Cenchrus clandestinus</i> ). Indigenous grass species are sparse and scattered. Species include Redleg Grass ( <i>Bothriochloa decipiens</i> var. <i>decipiens</i> ), Weeping Grass ( <i>Microlaena stipoides</i> var. <i>stipoides</i> ), Wallaby Grass ( <i>Rytidosperma tenuius</i> ) and Couch ( <i>Cynodon dactylon</i> ).
Threatened plants	No threatened flora species were recorded in this community in the Proposal area. Occasional slashing of the grassland is likely to inhibit growth and development of indigenous forbs and grasses.
Threatened ecological communities	This vegetation type is not commensurate with a threatened ecological community listed under the BC Act or EPBC Act.

**Table 4 Vegetation – Planted exotic and native (including self recruited specimens)**

Planted Exotic and Native (including self-recruited specimens)	
Photo 5	 <p>Planted and self-recruited patch along the eastern side of Yagoona Railway Station</p>
Photo 6	 <p>Planted and self-recruited patch along the western side of Yagoona Railway Station. Swamp Oaks in background will require topping.</p>
PCT(EES, 2021c)	n/a
PCT ID	n/a
Survey effort	General observations. No plot data recorded.



Planted Exotic and Native (including self-recruited specimens)	
Extent and distribution within site	This vegetation type occurs as narrow bands along the eastern and western sides of the railway line, mostly on constructed batters and in a car park to the east of the station.
Description	<p>Woodland to Open-forest and shrubland, varying in height from 22 to 5 m. Foliage Projective Cover (PPFC) varies from 30% to 20%, depending on species composition. Planted tree species which are indigenous to Parramatta LGA include Swamp Oak (<i>Casuarina glauca</i>), Prickly-leaved Paperbark (<i>Melaleuca styphelioides</i>), Woollybutt (<i>Eucalyptus longifolia</i>) and Grey Ironbark (<i>Eucalyptus paniculata</i> subsp. <i>paniculata</i>). Other planted tree species include Norfolk Island Pine (<i>Araucaria heterophylla</i>), Black Bean (<i>Castanospermum australe</i>), Brush Box (<i>Lophostemon confertus</i>) and the threatened species Wallangarra White Gum (<i>Eucalyptus scoparia</i>) and Narrow-leaved Black Peppermint (<i>Eucalyptus nicholii</i>). Apparently self-recruited tree species include Jacaranda (<i>Jacaranda mimosifolia</i>), Peppercorn (<i>Schinus molle</i> var. <i>areira</i>), Silky Oak (<i>Grevillea robusta</i>) and Mulberry (<i>Morus alba</i>).</p> <p>Common planted shrub species include Grevillea cultivars (<i>Callistemon</i> 'Harkness', <i>Callistemon</i> 'Kings Park Special'), River Bottlebrush (<i>Callistemon viminalis</i>) and Mock Orange (<i>Murraya paniculata</i>). Apparently self-recruited shrubs include Large-leaved Privet (<i>Ligustrum lucidum</i>), Blackthorn (<i>Bursaria spinosa</i> subsp. <i>spinosa</i>), Brush Daphne (<i>Pittosporum undulatum</i>), African Olive (<i>Olea europaea</i> subsp. <i>cuspidata</i>) and Mickey Mouse Plant (<i>Ochna serrulata</i>).</p> <p>Self-recruited climbing species include Moth Vine (<i>Araujia sericifera</i>), Madeira Vine (<i>Anredera cordifolia</i>) and Bindweed (<i>Convolvulus arvensis</i>).</p>
Threatened plants	<p>Two planted threatened flora species (<i>Eucalyptus scoparia</i> and <i>Eucalyptus nicholii</i>) were recorded in this vegetation type. Both specimens will be retained and protected. The threatened Downy Wattle (<i>Acacia pubescens</i>) was recorded in this vegetation type on both sides of the railway.</p> <p>The locations of threatened plants are indicated in Figure 2.</p>
Threatened ecological communities	This vegetation is not commensurate with a threatened ecological community listed under the BC Act or EPBC Act.

#### 4.2.2 Landscape trees

A total of 135 trees were assessed within the study area. Details of the surveyed trees are presented in the Tree Schedule in Appendix C. The locations of the subject trees or tree groups are indicated on Figure 3.

None of the trees are listed as heritage items under the Bankstown Local Environmental Plan.

A number of specimens have higher landscape significance, either because of their dimensions, location or species (and refer to Figure 3 and Appendix C). These include:

- Trees on the western side of Yagoona Station:
  - Tree 1, Narrow-leaved Peppermint (*Eucalyptus nicholii*) although not a large or mature specimen, has landscape significance because of its location, and also because it is a threatened species. This specimen will be retained and protected during construction.
  - Tree 31, Wallangarra White Gum (*Eucalyptus scoparia*) is a large mature specimen, and is a planted threatened species. This specimen will be retained and protected during construction.
  - Trees 2 to 8, *Callistemon* spp. (*Callistemon* cultivars) are located in the car park adjacent to the station and provide colour and shelter, as well as defining parking areas. These specimens will be retained and protected during construction.
- Trees on the eastern side of Yagoona Station (and including Ron Whitehead Place):
  - Tree 11, Spotted Gum (*Corymbia maculata*) and Tree Group 12 (3 x *Corymbia citriodora* x *C. maculata* hybrid and Woollybutt (*Eucalyptus longifolia*)) are large, mature trees in a parkland setting. These trees will be retained and protected during construction.

- Tree Group 19 is a complete, continuous line of Swamp Oaks (*Casuarina glauca*) which provide a screen between public open space and the railway. These trees will require topping to allow access during the proposed works. Tree Group 20, a group of Flame Bottletree (*Brachychiton acerifolium*) supplement the screening effect of Tree Group 19 and also provide colour during flowering time but would not require trimming.
- Tree group 27 includes a Norfolk Island Pine (*Araucaria heterophylla*) which is visible from the railway platform. This specimen is proposed for removal.



**Photo 7 Tree Groups 20 (front) and 19 (Background).**



**Photo 8 Tree 1; a landscape feature in an otherwise bare section of the Hume Highway.**

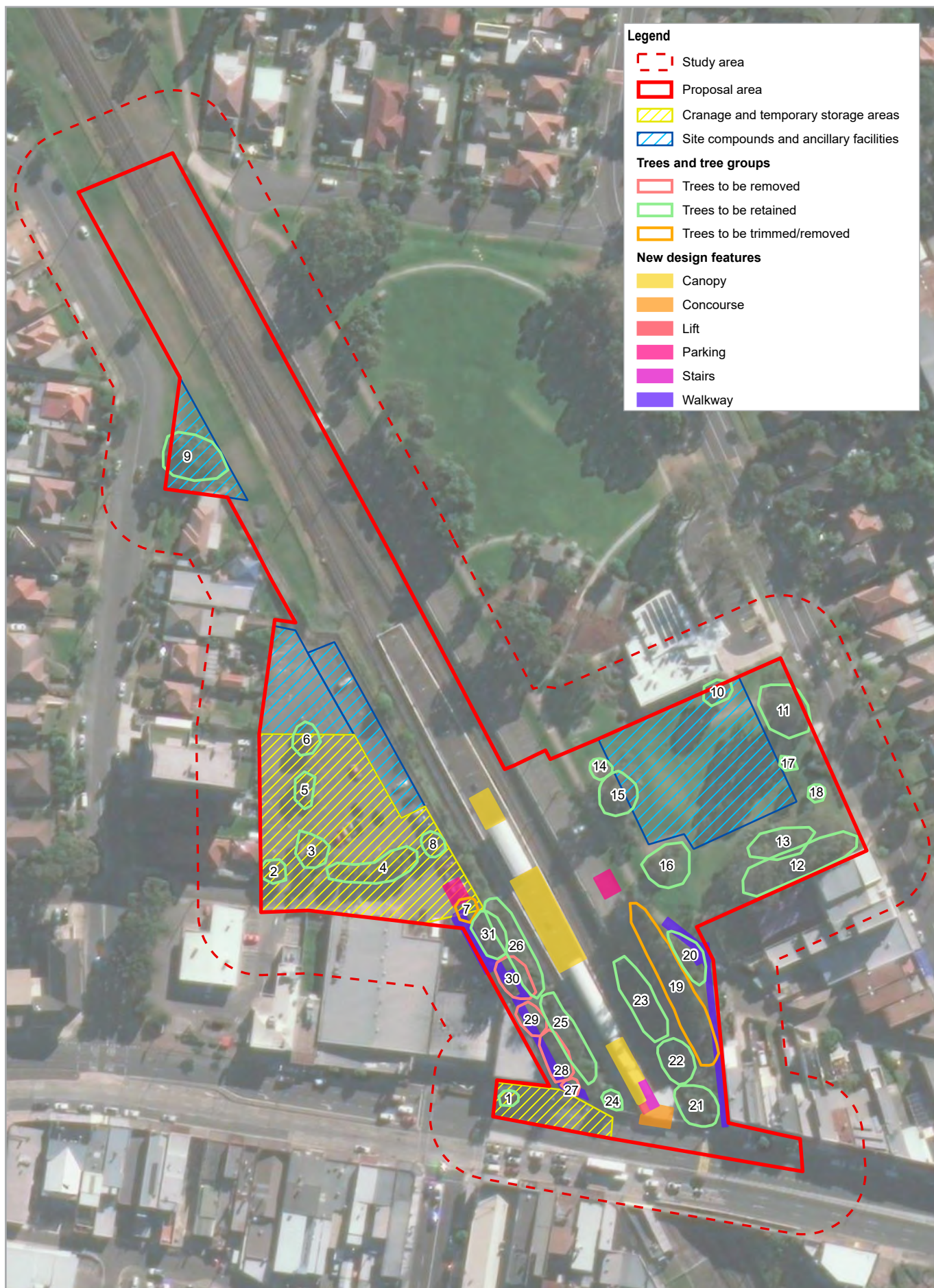


### 4.2.3 Exotic species

The study area contains 5 species declared as priority weeds within the Greater Sydney region (which includes the local council area of Canterbury-Bankstown) as shown in Table 5.

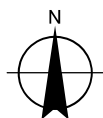
**Table 5 Priority weeds recorded within the study area**

Common name	Scientific name
Climbing Asparagus Fern	<i>Asparagus plumosus</i>
Ground Asparagus	<i>Asparagus aethiopicus</i>
Green Cestrum	<i>Cestrum parqui</i>
Madeira vine	<i>Anredera cordifolia</i>
African Olive	<i>Olea europaea</i> subsp. <i>cuspidata</i>
Lantana	<i>Lantana camara</i>



Paper Size ISO A4  
0 20 40  
Meters

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



Transport for NSW  
Yagoona Station Upgrade  
Biodiversity and Arboricultural Assessment

Project No. 1254729  
Revision No. 0  
Date 13/05/2021

Tree plan

FIGURE 3

## 4.3 Fauna and fauna habitats

### 4.3.1 Fauna species

A low diversity of fauna species were recorded during the field survey, as would be expected in a highly modified urban environment. A total of 11 species of native fauna were recorded in the study area (see Appendix B). Fauna observed were all common and widespread species, capable of persisting in highly urbanised habitats such as those within the study area. Native bird species regularly recorded included the Noisy Miner (*Manorina melanocephala*), Little Corella (*Cacatua sanguinea*) and Australian White Ibis (*Threskiornis molucca*).

Australian White Ibis (*Threskiornis molucca*) was recorded nesting within the eastern side of the rail corridor. This species is not listed as threatened under the BC or EPBC Acts. Multiple nests and young were observed within the canopy of Melaleuca trees at this location (Figure 2). The sub-population of Australian White Ibis recorded in the study area do not comprise ibis management sites identified in the Canterbury-Bankstown White Ibis Management Plan (Ecosure 2018).

No threatened fauna species were recorded during the field survey. Threatened and migratory species that may occur in the study area are discussed in more detail in Section 4.4.3, Section 5.1.5 and 5.4.2.

Three exotic species were recorded during the survey: the Common Myna (*Sturnus tristis*), Rock Dove (*Columba livia*) and Spotted Turtle-dove (*Streptopelia chinensis*).

Other introduced species likely to occur within the study area include the Black Rat (*Rattus rattus*) and Red-whiskered Bulbul (*Pycnonotus jocosus*).

The fauna species that were recorded, habitat associations and additional species of fauna that may occur based in the habitats present are described below.

### 4.3.2 Terrestrial fauna habitats

#### 4.3.2.1 Exotic grassland

Much of the land within the study area has been previously cleared of native vegetation for the railway, roads, industrial areas, and recreation. The rail corridor is cleared and vegetated with introduced grasses and herbs interspersed with bare ground, ballast and other artificial substrates in the north-western corner of the study area. This area contains the occasional shrubs on the edge of the rail track and embankment and trees adjacent to Church Road. Exotic grassland occurs adjacent to access gates and has been used as vehicle tracks within the rail corridor. It had not been maintained at the time of the survey.

Exotic and native grassland contains few habitat resources of relevance to most native species. Grasses and herbs would provide foraging resources for relatively mobile and opportunistic native fauna, including birds such as the Australian Magpie (*Cracticus tibicen*) and Magpie-lark (*Grallina cyanoleuca*). Microbats may forage over grassland areas on occasion. Small, common lizards such as the Dark-flecked Garden Sunskink (*Lampropholis delicata*) would occur, particularly in areas where shelter such as ballast, rocks and shrubs were present.

Common native frog species, including the Brown Striped Frog (*Limnodynastes peronii*) and Common Eastern Froglet (*Crinia signifera*) would also likely utilise habitats present in small drainage depressions in these areas.



#### 4.3.2.2 Planted native species

This habitat type includes planted native species with an exotic forest midstorey within the rail corridor to the east and west of Yagoona Station. It also includes all parkland vegetation associated with Ron Whitehead Place. No hollow-bearing trees were recorded within this habitat type.

Planted native species within the study area provide potential habitat for a range of common bird species and mammal species. The Noisy Miner (*Manorina melanocephala*) is the most dominant and abundant species present. Other bird species recorded included the Grey Butcherbird (*Cracticus torquatus*) and Rainbow Lorikeet (*Trichoglossus haemotodus*). Large numbers of the exotic Rock Dove (*Columbia livia*) were recorded foraging for grass seed in open grassland within Ron Whitehead Place. Small birds were not recorded during the survey. Melaleuca plantings at Ron Whitehead Place and the eastern car park would comprise foraging habitat for nectarivorous bird species.

A small colony of the Australian White Ibis (*Threskiornis molucca*) were observed nesting in planted trees in the rail corridor to the east of Yagoona Station. Prior to the 1970s, this species was rarely sighted in urban areas and did not breed in the Sydney region (OEH, 2016b). The preferred habitat of this species includes swamps, lagoons, floodplains and grasslands, but it has also become a successful inhabitant of urban parks and gardens (Birdlife Australia, 2016) following extensive droughts and changes in water regimes in inland areas (OEH, 2016b).

Arboreal mammals, including the Common Brushtail Possum (*Trichosurus vulpecula*) and Common Ringtail Possum (*Pseudocheirus peregrinus*) may forage within planted trees on occasion. The Common Ringtail Possum may shelter in stands of planted vegetation in the rail corridor where a dense midstorey is present, although no dreys were observed. The Common Brushtail Possum may also forage in large mature trees at Ron Whitehead Place (particularly tree 11 and 25). These species, if present, may provide prey for the Powerful Owl (*Ninox strenua*), that has been previously recorded in the locality and may possibly forage for in the study area on occasion.

The Grey-headed Flying-fox (*Pteropus poliocephalus*) and microbats may forage in planted trees in the study area. Few other threatened fauna species are likely to occur in this vegetation type, except on a transient basis.

No reptiles or frogs were recorded in this habitat type.

## 4.4 Threatened and migratory biota

### 4.4.1 Threatened ecological communities

There are no threatened ecological communities (TECs) within the study area.

### 4.4.2 Threatened flora

Three threatened flora species were recorded within the study area:

- Downy Wattle (*Acacia pubescens*) listed as a vulnerable species under the BC and EPBC Acts
- Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) listed as a vulnerable species under the BC and EPBC Acts
- Wallangarra White Gum (*Eucalyptus scoparia*) listed as an endangered species under the BC Act and a vulnerable species under the EPBC Act.

Several ramets of the threatened species Downy Wattle (*Acacia pubescens*), growing on both sides of the railway line have been described by GHD (2019). Their locations were verified and are shown in Figure 2.

At least two of the ramets were found to be greener and less hairy, in comparison with the description of Downy Wattle, and therefore it is possible that some of the ramets are hybrids. “.....the species is known to hybridise with some bipinnate wattles such as *A. baileyana*, *A. jonesii* and *A. cardiophylla* which occur outside the range of *A. pubescens*.....” (NSW NPWS, 2003).

The Recovery Plan for Downy Wattle notes that “...Hybrids can be a major threat through reduction of the genetic integrity of the species. Hybrids and any bipinnate *Acacia* species that are not native to the area and that are in proximity to *A. pubescens* sites need to be removed. Council officers and others who may be planting such *Acacia* species in or near bushland, need to be informed about hybridisation - that it occurs and what the consequences may be. It should be noted that *A. baileyana* has been listed as a bushland weed by the Australian Association for Bush Regenerators...”.



**Photo 10 Ramet of Downy Wattle, on the eastern side of railway line.**

One planted specimen of Narrow-leaved Black Peppermint was recorded within the study area off the Hume Highway on the western side of Yagoona Station (see Figure 2 and Photo 11). The species is listed as vulnerable under the BC and EPBC Act. Narrow-leaved Black Peppermint occurs on granitic soils of the New England Tablelands from Nundle to north of Tenterfield (EES, 2021b). It is not indigenous to Sydney but is a commonly planted street tree that has been widely distributed in Sydney by the horticultural industry as an ornamental landscape planting. The occurrence of this species within the study area does not meet the species profile description (EES, 2021b) for the geographical distribution, geology or vegetation formation in which the species naturally occurs, therefore it is not assigned the conservation significance of a threatened species for the purposes of this assessment. The Narrow-leaved Black Peppermint would be retained during construction.



**Photo 11 Narrow-leaved Black Peppermint, on the western side of railway line.**

A planted specimen of Wallangarra White Gum was recorded within the study area within the rail corridor and adjacent to a public footpath on the western side of Yagoona Station (see Figure 2 and Photo 12). The species is listed as endangered under the BC Act and vulnerable under the EPBC Act. Wallangarra White Gum occurs in scattered locations in niches on both sides of the Queensland/NSW border and only three locations near Tenterfield in NSW and is not indigenous to the Sydney area (EES, 2021b). It has been widely distributed by the horticultural industry as an ornamental landscape planting. The occurrence of this specimen in the study area does not meet the threatened species final determination listing attributes (NSW Scientific Committee 2002) or species profile description (EES, 2021b) and therefore not assigned the conservation significance of a threatened species for the purposes of this assessment. The Wallangarra White Gum would be retained and protected during construction.



**Photo 12 Wallangarra White Gum on the western side of railway line.**

An additional 41 threatened flora species and 4 threatened flora populations have been recorded or are predicted to occur in the locality (Appendix A). These additional species were not recorded during the survey and are not likely to occur within the study area given that no complete, continuous stands of vegetation occur and because of the highly modified nature of the areas to be affected by the proposed works.

Those threatened flora species recorded or that could possibly occur in the study area based on previous records and/or the presence of suitable habitat are presented in Table 6.

**Table 6 Likelihood of occurrence of threatened flora in the study area**

Scientific name	Common name	Status		Potential occurrence	Level of impact
		BC Act	EPBC Act		
<i>Acacia pubescens</i>	Downy Wattle	V	V	Present	None. All ramets of the meta-population occur outside the areas of vegetation to be removed.
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	-	-	Present	None. This specimen occurs outside the areas of vegetation to be removed.
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	-	-	Present	Low. This specimen will be retained, but occurs immediately adjacent to vegetation proposed for removal. May be exposed to indirect impacts from the proposal.



#### 4.4.3 Threatened fauna

A total of 54 threatened fauna species listed under the BC Act and/or EPBC Act have been previously recorded or are predicted to occur in the locality (Appendix A).

No threatened fauna species were recorded during the survey.

The study area contains mostly exotic grassland and planted native species (both managed and unmanaged) within the rail corridor, car parks and also Ron Whitehead Place. Most of the threatened fauna recorded in the locality are unlikely to occur given their specific habitat requirements, preference for larger tracts of native vegetation and a general absence of important habitat resources within the study area (see Appendix A).

The Grey-headed Flying-fox, a vulnerable species listed under the BC Act and EPBC Act, has been previously recorded ~50 metres away to the west of Yagoona Station. There are a large number of records of the species in the locality (EES, 2021a). The Grey-headed Flying-fox would forage in planted street trees and parklands within the study area when eucalypts and myrtaceous shrubs are in flower. Three eucalypt species known to be significant food plants for Grey-headed Flying -fox (Eby and Law, 2008) occur in the study area: Spotted Gum, Forest Red Gum and Grey Ironbark.

No breeding camps of the Grey-headed Flying-fox occur in the study area. The closest camps are located at Cabramatta Creek (Cabramatta), to the west and Duck River in Clyde to the north, both of which are under 8 kilometres from the study area (DAWE, 2021c). A nationally important Grey-headed Flying-fox camp also occurs to the east at Wolli Creek over 10 kilometres away. The study area would not comprise roosting habitat for this species. Potential roosting habitat is restricted to riparian vegetation within Duck River, Georges River, Cooks River and Salt Pan Creek and associated tributaries within the locality.

Threatened microbats previously recorded in the locality, including the Southern Myotis (*Myotis macropus*), Little Bent-winged Bat (*Miniopterus australis*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Eastern Freetail Bat (*Micronomus norfolkensis*) have a low likelihood of occurrence in the study area. The study area does not contain suitable habitat for the Southern Myotis which forages over waterbodies and roosts in close proximity to water. The Eastern Freetail Bat is not a common occurrence in highly urbanised areas and the planted trees within the study area are unlikely to provide habitat of importance for this species. The study area does not contain any bridges or culverts that may provide roosting habitat for the Large Bent-winged Bat. There were no hollow-bearing trees in the study area that provide roost sites for tree-roosting microbats.

The Powerful Owl (*Ninox strenua*) has been regularly recorded in the locality and would forage for arboreal prey within planted vegetation, particularly within Ron Whitehead Place where large mature trees are present. The study area does not provide breeding habitat for the species and is unlikely to roost in this highly modified location.

Those threatened fauna species that could possibly occur in the study area based on previous records and/or the presence of suitable habitat are presented in Table 7.

**Table 7 Likelihood of occurrence of threatened fauna in the study area**

Scientific name	Common name	Status		Likelihood of occurrence within study area	Level of impact
		BC Act	EPBC Act		
<i>Miniopterus australis</i>	Little Bent-winged Bat	V		Moderate. Low number of records. Absence of roosting and breeding habitat. Potential foraging habitat in open grassland.	Low. Temporary removal of a small amount of potential foraging habitat (grassland) in compound areas.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V		Moderate. Large number of records. Absence of roosting and breeding habitat. Potential foraging habitat in open grassland. Could occur on occasion.	Low. Temporary removal of a small amount of potential foraging habitat (grassland) in compound areas.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	High, when food trees are flowering. Large number of local records. Likely to feed on blossom within planted trees in Ron Whitehead Place.	n/a. No feed trees for the species would be removed. No roost camps would be directly impacted.
<i>Ninox strenua</i>	Powerful Owl	V		Moderate. Large number of records. Absence of roosting and breeding habitat. Potential foraging habitat in open grassland. Could occur on occasion.	Low. Removal of a negligible amount of potential foraging habitat for the species.

The study area does not contain important habitat for other threatened fauna species, including forest and woodland birds, that rely on more structurally and floristically complex stands of native vegetation for foraging, roosting and nesting. There is no suitable habitat in the study area for threatened reptiles and frogs (see Appendix A). Few other threatened fauna species are likely to occur in this vegetation type, except on a transient basis.

#### **4.4.4 Migratory species**

No migratory species were recorded during field surveys. There is no habitat for migratory waders or wetland birds within the study area.

There is very limited potential for migratory woodland species to occur given the nature of the modified habitats present.

Important habitat for these migratory birds is defined in the significance criteria for listed migratory species (DoE, 2013) as follows:

- habitat utilised by a migratory species occasionally or periodically within the region that supports an ecologically significant proportion of the population of the species
- habitat that is of critical importance to the species at particular life-cycle stages
- habitat utilised by a migratory species which is at the limit of the species range
- habitat within an area where the species is declining.

Habitat in the study area is unlikely to be important for these species as it is highly fragmented and subject to substantial disturbance. The habitats present would not support an ecologically significant proportion of any population, would not be critical to the lifecycle of any species and are not at the limit of these species' range. The likelihood of occurrence for migratory species has been assessed in Appendix A.

## 5. Potential impacts

### 5.1 Direct impacts

#### 5.1.1 Vegetation removal

The proposal is located within highly modified lands within and around the rail corridor at Yagoona station and no intact stands of naturally occurring native vegetation or threatened ecological communities would be disturbed for the proposed works.

The proposal would result in the removal of up to 0.05 hectares of vegetation comprising native planted vegetation along the western edge of Yagoona station (see Table 8). This would include a line of planted trees and some small midstorey plantings in-between a billboard and a fence. A further 0.05 hectares of vegetation comprising a line of Swamp Oak along the western side of Yagoona station could require trimming and/or topping for crane jib access. Two Callistemons in the car park may also require trimming to facilitate the construction of accessible parking spaces.

Up to 0.51 hectares of parkland and grassland vegetation would be temporarily disturbed during construction for the placement of site compounds and ancillary facilities. Parkland vegetation to be disturbed Only groundcover vegetation in parkland areas will be disturbed. Canopy trees recorded within Ron Whitehead Place will be retained and protected during construction activities.

The Proposal area has limited habitat value for native plants. Any vegetation clearing required in these areas would principally remove exotic grasses, planted non-threatened native plants and environmental weeds. The meta-population of the threatened Downy Wattle comprising up to 31 ramets, that occurs on both sides of Yagoona station within planted areas would be retained as part of the proposal.

Environmental safeguards to minimise the clearing of planted native vegetation and protect retained vegetation would be included in the REF and Construction Environment Management Plan (CEMP). Vegetation loss would be offset in accordance with the Transport for NSW Vegetation Offset Guide (Transport for NSW, 2019) (Section 6.3).

**Table 8 Vegetation removal in the Proposal area**

Vegetation type	Vegetation to be cleared (ha)	Vegetation to be trimmed (ha)	Vegetation to be temporarily disturbed (ha)	Location
Planted areas (native and exotic)	0.05	0.05	n/a	Vegetation to be cleared is located between public access walkways and station platform on western side of Yagoona Station and within the rail corridor. Plantings requiring trimming occur in Breasley Place car park and also outside the rail corridor on the eastern side of Yagoona Station.
Parkland	n/a	n/a	0.21	Eastern side of Yagoona Station at Ron Whitehead Place.
Grassland	n/a	n/a	0.30	Western side of Yagoona Station and adjacent to Church Road.

## 5.1.2 Landscape tree removal

### Trees to be removed

The proposal will result in the removal of some mature and early-mature planted trees as well as self-recruited specimens from within the Proposal area, to construct a pedestrian access from the Hume Highway to the car park.

The trees to be removed are described as tree Groups 27, 28, 30 and part of 29 and 31 (see Table 9; Figure 3). All occur along the top and upper slopes of a batter on the western side of the railway line, within a fenced area. Apart from the trees described in the Tree table (Appendix C), there are numbers of self-recruited shrubs and small trees, including several invasive species, such as Lantana, Mulberry, African Olive and Privet.

The proposed removal of Tree Groups 27, 28, 30 and part of 29 and 31 and would comprise a minor reduction in the extent of vegetation from the station precincts and would not threaten the persistence of any local populations of native plants. The removal of a small number of planted trees from within an urban landscaped setting is of negligible concern and could be eventually corrected by judicious planting and landscaping in adjacent areas. Table 9 describes those trees which will require removal.

**Table 9 Trees located within the Proposal area that will be removed.**

Tree or tree group number	Botanical name	Common name
27	<i>*Araucaria heterophylla</i>	Norfolk Island Pine
	<i>Melaleuca styphelioides</i>	Prickly-leaved paperbark
	<i>Eucalyptus haemastoma</i>	Scribbly Gum
	<i>*Prunus persica</i> x 3	Peach
	<i>^Callistemon viminalis</i> x 2	River Bottlebrush
	<i>Callistemon salignus</i>	Pink Tips
28	<i>Elaeocarpus reticulatus</i>	Blueberry Ash
	<i>Eucalyptus haemastoma</i>	Scribbly Gum
	<i>Casuarina glauca</i>	Swamp Oak
29	<i>Backhousia myrtifolia</i>	Ironwood
	<i>^Eucalyptus curtisii</i>	Plunkett Mallee
	<i>Casuarina glauca</i> x 2	Swamp Oak
	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark
30	<i>Casuarina glauca</i>	Swamp Oak
31 <sup>1</sup>	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i> x 2	Coast Banksia
	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark
	<i>Casuarina glauca</i>	Swamp Oak
	<i>Callistemon salignus</i>	Pink Tips

<sup>^</sup> Native species not indigenous to Canterbury-Bankstown Council LGA

<sup>\*</sup> Introduced species

<sup>1</sup> All trees within Tree group 31 would be removed with the exception of a single specimen of Wallangarra White Gum.

### 5.1.2.1 Trees to be retained

All other trees will be retained, although the tops of the Swamp Oaks in Tree Group 19 will need to be removed in addition to trimming of the two Callistemon cultivars on the edge of the car park.

The installation of appropriate tree protection measures will depend on disturbance levels and will require assessment by the project arborist during works.

### 5.1.3 Impacts on fauna and habitats

The study area comprises a highly modified urban environment. The existing rail corridor contains primarily cleared land and planted native vegetation which generally have low biodiversity value. Given the absence of intact stands of native vegetation or waterbodies, impacts on local populations of fauna species are likely to be low.

The lines of planted trees and shrubs within the station car park, the edges of the rail corridor and within Ron Whitehead Place provide a limited habitat for predominantly common, mobile native fauna capable of persisting in urban environments. The vegetation to be removed includes potentially small midstorey plantings and canopy trees mostly comprising Swamp Oak. Swamp Oak is generally not a productive food source of pollen, nectar or leaves and is likely to provide low habitat value for fauna species. Other trees to be retained in the study area, including eucalypts such as Spotted Gum, Yellow Bloodwood, Grey Ironbark, Narrow-leaved Ironbark; Tallowood and Forest Red Gum are likely to provide greater foraging and refuge sources for native fauna. The vegetation to be removed would not provide critical or important habitat for any local populations of native fauna.

Fauna habitat in the study area is located adjacent to Yagoona Station and the Hume Highway and is already subjected to high levels of noise and vibration. The use of machinery and general disturbance associated with work activities may deter some common fauna species from utilising potential habitat in the study area. However, this would only be temporary for the duration of the works and is unlikely to cause significant impacts to fauna in the study area that would already be habituated to noise and vibration given the proximity of major roads and train line.

The proposal would retain three nesting trees (*Melaleuca* spp.) for Australian Ibis recorded on the eastern side of Yagoona station within the rail corridor. Yagoona Station is outside the sites identified by the White Ibis Management Plan and is not defined by clear objectives for management or monitoring.

The proposal would not remove any hollow-bearing trees.

Environmental safeguards are proposed in Section 6.2 to minimise the impacts on fauna as a result of the proposed works.

### 5.1.4 Key threatening processes

A key threatening process (KTP) is defined in the BC Act as an action, activity or proposal that:

- adversely affects two or more threatened species, populations or ecological communities; and
- could cause species, populations or ecological communities that are not currently threatened, to become threatened.

KTPs are listed under the BC Act, the FM Act and also under the EPBC Act. A number of KTPs are listed under more than one Act.

The proposal involves the clearing of planted native vegetation and self-recruiting exotics within garden beds and landscaped areas and would not increase the operations of any KTP's.

## **5.1.5 Impacts on threatened biota**

### **5.1.5.1 Threatened ecological communities**

The proposed station upgrade would not have an adverse impact on any TECs listed under the BC or EPBC Acts.

### **5.1.5.2 Threatened species**

The study area has limited biodiversity values due to its highly modified nature, absence of intact native vegetation and very limited habitat complexity. The vegetation in the Proposal area does not constitute habitat of importance for the persistence of any threatened fauna species listed under the BC or EPBC Acts known to occur in the wider locality.

Flowering eucalypts within the patch of planted vegetation within Ron Whitehead Place may contain potential foraging habitat for Grey-headed Flying-fox however these trees would not be removed by the proposal.

Small areas of exotic grassland within proposed compound site areas may provide potential foraging habitat for threatened microbat spp. These areas would be temporarily disturbed and reinstated following construction. A small amount of potential foraging habitat for threatened microbats and the Powerful Owl above planted native vegetation on the western side of Yagoona station would also be removed.

No threatened flora would be impacted by the proposal. The planted specimens of Wallangarra White Gum, Narrow-leaved Peppermint and also the meta-population of Downy Wattle, would all be retained and protected as part of the proposal (see Section 6.2).

Where trees can be retained, protection measures would be implemented to reduce the potential for impacts during and post construction (see Section 6.2).

### **Migratory species**

The study area is not considered important habitat for migratory species predicted to occur in the locality as defined in the migratory species significant impact criteria (DotE, 2013). This is due to the fact that small area of exotic vegetation in the study area would not support an ecologically significant proportion of the population of these species, is not of critical importance to these species at particular life-cycle stages, is not at the limit of these species ranges, and is not within an area where these species are declining. Based on the above considerations the proposal is unlikely to impose a significant effect on any of the listed migratory fauna species predicted to occur within the locality.

## **5.2 Indirect impacts**

The impact mitigation and environmental management measures specified in Section 6.2 are likely to ensure that construction impacts are restricted to the project area. There are unlikely to be any substantial indirect impacts associated with construction activities. Given the proposed mitigation measures, adjoining land uses, existing activities in the project area and the extent of existing development, weed infestation and disturbance in the broader study area, the project would not result in any tangible indirect impacts.



### **5.3 Operational impacts**

Impacts on biodiversity values would be largely restricted to the construction phase of the project.

The study area is located within or immediately adjoining the existing rail corridor which is dominated by infrastructure and highly modified environments. There are unlikely to be any additional operational impacts beyond those that already occur. Vegetation adjoining the study area is already subject to weed infestation and other edge effects. Fauna that occupy habitats within the project area and adjacent areas are likely to be accustomed to existing noise, light and vibration originating from passenger trains, road traffic and the urban environment. The project is unlikely to increase the extent, duration or magnitude of any of these impacts to the extent that would result in a significant negative effect on biodiversity values.

The potential for these operational impacts can be further minimised through the implementation of appropriate mitigation measures as outlined in Section 6.2.

### **5.4 Significance of impacts**

#### **5.4.1 Threatened flora**

The Downy Wattle is listed as a vulnerable species under the BC and EPBC Acts. Up to 31 ramets of the Downy Wattle were recorded within planted vegetation on both the eastern and western side of Yagoona station. It is unlikely more ramets may occur given the small area of potential habitat at this location. It is likely that the 31 ramets represent only a handful of individuals in this patch. The patch of vegetation where the Downy Wattle occurs, is currently fenced and owned by Transport for NSW. The entire meta-population (comprising 31 ramets) of Downy Wattle within the study area would be retained as part of the proposal and is unlikely to be indirectly impacted by the proposal given the vegetated buffer between the ramets and the small areas of adjacent vegetation to be cleared. As such, the proposal is highly unlikely to have any adverse impacts on the Downy Wattle and a formal assessment of the likely significance of impact has not been completed for this species.

The Narrow-leaved Peppermint and Wallangarra White Gum that occur in the study area are both clearly planted specimens of uncertain provenance, growing within atypical habitat, and outside the normal geographical distribution, geology or vegetation formation in which the species naturally occurs. These specimens would not be removed as part of the proposal and will be protected during construction. In this context, the proposal will not result in a significant impact on these threatened species and formal assessments of significance are not warranted.

#### **5.4.2 Threatened fauna**

The study area provides some limited potential foraging habitat for the Grey-headed Flying-fox, several threatened microbats and the Powerful Owl. The small number of trees to be removed would not provide important foraging habitat for these species. There is no roosting or breeding habitat for these species in the study area and the study area does not contain habitat important for the lifecycle or persistence of any local population.

Given the above considerations, it is highly unlikely that any threatened species would be adversely affected by the proposed works and there will not be a significant impact on any local population of threatened fauna.

### **5.4.3 Migratory fauna**

No migratory bird species were observed during the field survey and no suitable habitat is present within the study area.

Based on a consideration of the criteria contained in the EPBC Act MNES significance guidelines (DoE, 2013), the proposal would not be likely to have a significant impact on any migratory species, given that it would not:

- substantially modify, destroy or isolate an area of important habitat for a migratory species
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species
- seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species.

## 6. Impact mitigation

### 6.1 Avoidance of impacts

A significant portion of the study area is located within the existing rail corridor, which has been cleared and substantially modified through earthworks and construction. The project's impacts are substantially less than would be associated with an undisturbed 'green field' site. The project has been purposefully designed to avoid or further reduce impacts on biodiversity values as far as is practicable, but due to spatial constraints some impacts on planted trees will be unavoidable.

The project has been designed to avoid direct impacts on the 31 stems of Downy Wattle growing on both sides of Yagoona station. Trees will also be trimmed or lopped to enable construction activities where possible to avoid the requirement for tree removal.

### 6.2 Mitigation measures

The proposal will require the removal of a number of trees and tree groups, comprising a mixture of planted exotic and indigenous species. Mitigation measures are proposed to minimise impacts associated with the removal of those trees.

#### 6.2.1 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) would be required for the construction phase of the proposal. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures and measures outlined below. The CEMP should be prepared and implemented by the contractor.

#### 6.2.2 Vegetation and fauna

The CEMP would be required to address the following as a minimum to minimise impacts on native flora and fauna:

- fencing some trees and tree groups with construction barrier fencing to limit the potential for damage (see further below).
- measures to minimise potential indirect impacts on the patches of all ramets of the threatened *Acacia pubescens*, including fencing where appropriate and restriction of access to ramets located downslope from the construction area, including
  - installation of construction barrier (silt) fencing along the edges of the patch on the western edge of Yagoona station to minimise uncontrolled runoff of moisture, sediments or pollutants
  - hygiene procedures to prevent the introduction and spread of pathogens such as *Phytophthora* sp. and Myrtle Rust. This would be achieved through the use of the construction barrier fencing outlined above which would restrict movement into these vegetated areas, as well as restricting parking to hardstand areas only.
  - priority weeds to be controlled as per statutory requirements.
- fauna management measures, including (but not limited to) the following:
  - An ecologist or suitably qualified wildlife handler to be present for removal of the trees in case of any unexpected finds (eg nestlings).
  - Any unexpected finds should be removed by the wildlife handler and either released into nearby areas of suitable habitat or handed to WIRES or Sydney Wildlife as necessary.

### 6.2.3 Tree protection measures

The following measures are recommended with respect to tree removal on site and for the protection of retained trees:

- A Project Arborist should be on site to supervise and guide all tree removal works.
- Tree removal should be carried out according to the guidelines outlined in Safe Work Australia (2016).
- The locations and extent of protective fencing for trees should be determined on-site by the Project Arborist.
- Tree fencing should comply with Australian Standards 2009. An example of appropriate fencing is indicated in Appendix E. The fencing should be installed prior to commencement of clearing and should be retained in place until the completion of construction.
- Suitable methods for protecting the leaders of the Wallangarra White Gum and Narrow-leaved Black Peppermint in Tree group 31 and 1 respectively if there is inadequate space for exclusion fencing. This could include the use of wooden slats around the base of these trees. Care must be taken when removing the Prickly-leaved Paperbark within Tree Group 31, given the likely overlap of its SRZ with that of the closely adjacent Wallangarra White Gum which would be retained.
- The following actions should not be permitted within the TPZ of any tree:
  - storage of materials, plants or equipment
  - installation of site sheds or portable toilets
  - excavations, trenching, ripping or cultivation of soils
  - modification of existing soil level or addition of fill materials
  - disposal of waste materials and chemicals (both solid or liquid)
  - mechanical removal of vegetation
  - pedestrian or vehicular movement.
- Any root pruning required within the TPZ should be approved by the Project Arborist and any digging and pruning of roots (only roots less than five centimetres may be pruned) within the TPZ should be conducted by hand for a clean cut.
- To protect soil within the TPZ, a layer of organic mulch may be applied (no more than 75 millimetres thick). Any mulch used should comply with the Australian Standard – composts, soil conditioners and mulches AS4454-2012 (SA 2012).
- Irrigation systems may be installed if an extended period of drought occurs. As a guide, the watering should occur at least once per week and allow deep soil penetration. The specific watering requirements will also depend on the climatic conditions.
- once the construction works are completed, retained trees should be re-inspected by the Project Arborist who should carry out a more in-depth assessment that would prescribe remedial work where necessary to reduce the risk to pedestrians or parked vehicles.
- In addition, the retained trees should be monitored for six months after completion of the proposed development to assess their health, vigour and to identify potential hazards. This is of particular importance given the proximity of the trees to areas of public access.

It is important to note that some defects, ill-health or decay in a tree are not always identifiable using VTA. In addition, there are occasions where supposed healthy and defect-free trees break or are damaged by wind-throw, especially those trees growing along a newly created edge. This is described as a 'normal failure rate' and is a function of the energy-saving, cost-effective and lightweight structure of a tree. Therefore, every tree represents some potential danger of failure (see Mattheck and Breloer, 2003). The trees should be monitored by the Project Arborist at six months and one year after completion of the works.

### 6.3 Biodiversity Offset

The Transport for NSW Vegetation Offset Guide (Transport for NSW, 2019) (the offset guide) has been used to assist Transport for NSW to consider the provision of non-statutory offsets for tree removal that fall outside statutory requirements. The offset guide identifies impact categories and associated offset requirements.

The principles of offsetting relevant to the guide are:

- offset 100 per cent of any native vegetation cleared
- offsets are to achieve a 'maintained or enhanced' ecological outcome
- offset heritage, public amenity, and/or visual landscape value of any trees removed where they may not have ecological value.

Table 10 summarises the potential offset requirements, based on the offset guide 'Secondary offsets' for the clearing of trees that have heritage, streetscape, community/public amenity or intrinsic value. Potential offset requirement do not include those trees that are proposed for trimming. Primary offsets are not required as no native vegetation types occur in the site or would be cleared by the proposal.

Locally indigenous species of an appropriate size for where they will be planted should be used for the delivery of offsets. Delivery of offsets would be determined by Transport for NSW, based on the recommendations provided in the offset guide (Transport for NSW, 2019).

**Table 10 Non-statutory biodiversity offset recommendations**

Offset trigger	Impact category	Impact	Offset multiplier	Offset provision
Secondary offset- Clearing of trees that have heritage, streetscape, community/public amenity or intrinsic value	Large trees (DBH <sup>1</sup> greater than 60 cm)	n/a	Plant minimum 8 trees for each tree cleared	n/a
Secondary offset- Clearing of trees that have heritage, streetscape, community/public amenity or intrinsic value	Medium trees (DBH greater than 15 cm, but less than 60 cm)	Removal of up to 22 trees on the western side of Yagoona station	Plant minimum 4 trees for each tree cleared	Plant 88 trees
Secondary offset- Clearing of trees that have heritage, streetscape, community/public amenity or intrinsic value	Young trees (DBH less than 15 cm)	Removal of up to one tree	Plant minimum 2 trees for each tree cleared	Plant 2 trees

Note: 1. Diameter at Breast Height

## 7. Conclusion

Transport for New South Wales (Transport for NSW) proposes to upgrade Yagoona Train Station, to meet key requirements of the DSAPT or the *Commonwealth Disability Discrimination Act 1992* (DDA) and allow equitable access to the station platforms.

The vegetation to be removed by the proposed improvement works comprises 0.05 hectares of planted vegetation on the western side of Yagoona station. A line of Swamp Oak on the eastern side of the station may also require trimming/topping for crane jib access. Up to 0.61 hectares of understorey vegetation in exotic grassland (and including within parklands) would be temporarily disturbed for compound sites.

The removal of up to 23 trees and disturbance to two areas of exotic grassland is likely to have a negligible impact on native flora and fauna within the locality. While a number of more mobile threatened fauna species, including the Grey-headed Flying Fox, Powerful Owl and microbats may occur in the study area on occasion, the trees and understorey vegetation to be removed and temporarily disturbed respectively, are unlikely to constitute habitat of importance for the persistence of any local populations of these threatened fauna species. Not habitat resources including nests or hollow-bearing trees would be removed as part of the proposal.

No threatened flora would be impacted by the proposal. The planted specimens of Wallangarra White Gum, Narrow-leaved Peppermint and also the meta-population of Downy Wattle, would all be retained as part of the proposal.

Based on the above considerations, the proposal is unlikely to have a significant impact on any threatened biota (or associated habitat) listed under the BC Act and therefore would not trigger the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report under the provisions of the Act. Similarly, the proposal would not have a significant impact on any listed biota under the EPBC Act and consequently a referral to the Australian Government Minister for the Environment is not required.

A range of environmental safeguards and management measures will be implemented by the construction contractor as part of the Construction Environmental Management Plan for the proposal to minimise the potential for any adverse impacts on retained trees, planted vegetation patches located downslope of the construction area and native fauna species that may be present in the Proposal area during construction.

Recommended non-statutory offset requirements, based on the offset guide (Transport for NSW, 2019) for the clearing of trees that have heritage, streetscape, community/public amenity or intrinsic value include the planting of up to 90 trees. Offset plantings should comprise indigenous native species of local provenance.

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# Appendices

## **Appendix A** – Likelihood of occurrence of threatened biota

### Threatened flora within 10km of the study area

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Endemic to central eastern NSW, known a limited number of locations, often comprising populations of few plants. Grows mainly in heath/ dry sclerophyll forest on sandy soils, prefers open, sometimes slightly disturbed sites such as trail margins, road edges, and in recently burnt open patches. Flowers September to March, and fruit matures in November.	Low. No suitable habitat is present.	Very low.
<i>Acacia prominens</i>	Gosford Wattle, Hurstville and Kogarah Local Government Areas	EP		3 records within 10km (EES, 2021a)	Occurs at a few sites along the railway line at Penshurst, at Carss Bush Park, Carss Park and there is an unconfirmed sighting at Oatley Park, Oatley. Grows in open situations on clayey or sandy soils. Habitats mostly cleared and occurs as isolated or small groups of trees. Flowers from July to September.	Nil. Outside known distribution.	Nil.
<i>Acacia pubescens</i>	Downy Wattle	V	V	4978 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Occurs mainly in Bankstown-Fairfield-Rookwood and Pitt Town areas, with outliers at Barden Ridge, Oakdale and Mountain Lagoon. Grows on alluviums, shales and shale/sandstone intergrades. Soils characteristically gravelly, often with ironstone. Occurs in open woodland and forest, in communities including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. Flowers from August to October.	Present. Recorded on both sides of Yagoona station during this survey.	Low. All ramets in this meta-population will be retained as part of the proposal.
<i>Acacia terminalis</i> subsp. <i>terminalis</i>	Sunshine Wattle	E	E	1 record within 10km (EES, 2021a)	Occurs in near-coastal areas from northern shores of Sydney Harbour south to the northern and western shores of Botany Bay. Grows in scrub and open eucalypt woodland or forest. The species is known to occur on sandy soil on creek banks, hillslopes of in shallow soil in rock crevices and sandstone platforms on cliffs. Flowers in autumn through to early winter.	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Allocasuarina glareicola</i>		E	E	Species or species' habitat may occur within 10km (DAWE, 2021a)	Primarily found in Richmond district; although outlier populations exist in Voyager Point, Liverpool. Found in open castlereagh woodland on soil derived from ironstone. The species is associated with the following species: Parramatta Red Gum, Red Ironbark, Narrow-leaved Apple, Hard-leaved Scribbly Gum and Melaleuca decora. Common associated understorey species include Prickly-leaved Paperbark, Finger Hakea, Needlebush, <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , Swamp Wattle, <i>Acacia brownei</i> , <i>Themeda triandra</i> and <i>Xanthorrhoea minor</i> .	Low. No suitable habitat is present.	Very low.
<i>Caesia parviflora</i> var. <i>minor</i>	Small Pale Grass-lily	E		1 record within 10km, last recorded 2001 (EES, 2021a)	In NSW occurs in Barcoongere State Forest between Grafton and Coffs Harbour. May be more widely distributed as not often identified to subspecies level. Grows in damp open places in open forest on sandstone.	Low. No suitable habitat is present.	Very low.
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E	V	Species or species' habitat likely to occur within 10km (EES, 2021a)	Occurs from Central Coast NSW to southern Victoria. Mostly coastal but extends inland to Braidwood in southern NSW. In NSW grows in grassy dry sclerophyll woodland on clay loam or sandy soils, and less commonly in heathland on sandy loam soils. Flowers between September and November.	Low. No suitable habitat is present.	Very low.
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V		31 records within 10km (EES, 2021a)	Recorded from the Georges to Hawkesbury Rivers in Sydney, and north to Nelson Bay. There is also a recent record from the northern Illawarra. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers from spring to summer	Low. No suitable habitat is present.	Very low.
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Occurs in coastal areas from East Gippsland to southern Queensland. Habitat preferences not well defined. Grows mostly in coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest. Prefers open areas in the understorey and is often found in association with Large Tongue Orchid and the Bonnet Orchid. Soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. Flowers November-February.	Low. No suitable habitat is present.	Very low.



Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Occurs from Gerroa (Illawarra) to Brunswick Heads and west to Merriwa in the upper Hunter. Most common near Kempsey. Usually occurs on the edge of dry rainforest or littoral rainforest, but also occurs in Coastal Banksia Scrub, open forest and woodland, and Melaleuca scrub. Soil and geology types are not limiting. Flowering occurs between August and May, with the peak in November.	Low. No suitable habitat is present.	Very low.
<i>Darwinia biflora</i>		V	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Known from north and north-western Sydney, in the Ryde, Baulkham Hills, Hornsby and Ku-Ring-Gai LGAs. Grows on the edges of weathered shale-capped ridges, at the intergrade with Hawkesbury Sandstone. Occurs in woodland, open forest and scrub/heath and is associated overstorey species include Scribbly Gum, Red Bloodwood and/or Scaly Bark.	Low. No suitable habitat is present.	Very low.
<i>Deyeuxia appressa</i>		E	E	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Known only from two pre-1942 records in Sydney, at Saltpan Creek and Killara. May be extinct in the wild. Thought to occur in moist conditions.	Low. Thought to be extinct.	Very low.
<i>Dillwynia tenuifolia</i>		V		1 record within 10km, last recorded 2005 (EES, 2021a)	Occurs in western Sydney, predominately the Cumberland Plain as well as the Lower Blue Mountains and north to Yengo. Grows in scrubby/dry heath areas of Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or clays derived from ironstone, and associated transitional communities including Castlereagh Scribbly Gum Woodland.	Nil. Outside known distribution.	Very low.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		20 records within 10km (EES, 2021a)	Occurs from Gosford in the north, Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Grows in a range of sclerophyll forest, scrubs and swamps, most of which have a strong shale soil influence.	Low. No suitable habitat is present.	Very low.
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	Species or species' habitat likely to occur within 10km (EES, 2021a)	Occurs from Raymond Terrace to Waterfall, with populations known from Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai and the Royal NP. Occurs in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. It grows in shallow sandy soils overlying Hawkesbury sandstone.	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	4 records within 10km, last recorded 2009 (EES, 2021a)	Naturally occurs only in New England Tablelands from Nundle to north of Tenterfield. Widely planted as urban street tree well outside its range. Grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	Present. One planted specimen occurs within the study area.	Low. This specimen will be retained as part of the proposal.
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	E	V	1 record within 10km, last recorded 2002 (EES, 2021a)	In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes. At lower elevations can occur in less rocky soils in damp situations	Present. One planted specimen occurs within the study area.	Low. This specimen will be retained as part of the proposal.
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E	E	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Occurs from Ulladulla to Port Stephens, with only 13 known extant populations. Grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers from February to March.	Low. No suitable habitat is present.	Very low.
<i>Grevillea beadleana</i>	Beadle's Grevillea	E	E	1 record within 10km, last recorded 2002 (EES, 2021a)	Four disjunct populations in north-east NSW: Torrington west of Tenterfield, Oxley Wild Rivers NP, Guy Fawkes River NP and Shannon Creek southwest of Grafton. Grows in open eucalypt forest with shrubby understorey, usually on steep granite slopes at high altitudes.	Low. No suitable habitat is present.	Very low.
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	V	199 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Occurs between Moss Vale/Bargo and lower Hunter Valley, with most occurrences in Appin, Wedderburn, Picton and Bargo. Broad habitat range including heath, shrubby woodland and open forest on light clay or sandy soils, and often in disturbed areas such as on the fringes of tracks.	Low. No suitable habitat is present.	Very low.
<i>Hibbertia fumana</i>		CE		6 records within 10km (EES, 2021a)	Currently only known from a single population at Moorebank but potentially elsewhere in greater Sydney. Generally found in areas of woodland with a more open understorey, in a long intergrade between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest. Has the potential to occur in similar intergrade alluvial habitats rich in sands and laterite in other parts of western Sydney.	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Hibbertia puberula</i>		E		258 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Distribution extending from Wollemi National Park south to Morton National Park and the south coast near Nowra. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. Flowers from October to January	Low. No suitable habitat is present.	Very low.
<i>Hibbertia sp. Bankstown</i>		CE	CE	217 records within 10km (EES, 2021a)	Listed under EPBC Act as <i>Hibbertia puberula</i> subsp. <i>glabrescens</i> . Known only from Bankstown airport. Habitat is very heavily modified, lacks canopy species and is currently a low grass/shrub association with many pasture grasses and other introduced herbaceous weeds. Soil at the site is a sandy (Tertiary) alluvium with a high silt content and is associated with Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion.	Low. No suitable habitat is present.	Very low.
<i>Hibbertia stricta</i> subsp. <i>furcatula</i>		E		7 records within 10km (EES, 2021a)	<i>Hibbertia stricta</i> subsp. <i>furcatula</i> is known to occur in two populations, one in the southern outskirts of Sydney, and one near Nowra on the mid-South Coast of NSW. Occurs in dry sclerophyll forest and woodland. Northern metapopulation occurs on upper slopes and above the Woronora escarpment, at or near the interface of Hawkesbury sandstone and the Lucas Heights soil landscape. Southern population appears to occur in sandy soils on sandstone, with one record from gravelly clay soil.	Low. No suitable habitat is present.	Very low.
<i>Leucopogon exolasius</i>	Woronora Beard-heath	V	V	1 record within 10km (EES, 2021a); Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Occurs along the upper Georges River and in Heathcote NP, Royal NP and is also known from the Blue Mountains along the Grose River. Grows in woodland on sandstone and prefers rocky hillsides along creek banks up to 100 m altitude. Associated species include Sydney Peppermint and Silvertop Ash and Graceful Bush-pea, Flaky-barked Tea-tree and <i>Dillwynia retorta</i> .	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP		459 records within 10km (EES, 2021a)	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. A climber that grows in vine thickets and open shale woodland.	Low. No suitable habitat is present.	Very low.
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Scattered, disjunct populations in coastal areas from Jervis Bay to Port Macquarie, with most populations in the Gosford-Wyong areas. Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low. No suitable habitat is present.	Very low.
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	1 record within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Occurs from Nowra to St Albans and west to the Blue Mountains, with most records in Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas. Mostly grows on broad flat ridgetops, dry ridges and slopes and strongly associated with low nutrient sandy loam soils, sometimes with ironstone. Grows in heath- open forest, often in sandstone ridgetop woodland communities.	Low. No suitable habitat is present.	Very low.
<i>Persicaria elatior</i>	Knotweed	V	V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Tall Knotweed has been recorded in south-eastern NSW from Ulladulla to the Victorian border. In northern NSW it is known from Raymond Terrace and the Grafton area. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Occurs within the Blue Mountains, Southern Highlands and Sydney coastal regions from Hilltop to Glen Davis and Royal NP to Gosford. Population within the Hills Shire particularly important due to high density of plants. Grows on sandy soils in dry sclerophyll open forest, woodland and heath on sandstone up to 600 m above sea level.	Low. No suitable habitat is present.	Very low.
<i>Persoonia nutans</i>	Nodding Geebung	E	E	72 records within 10km (EES, 2021a); Species or species' habitat likely to occur within 10km (DAWE, 2021a)	Occurs from Richmond to Macquarie Fields on the Cumberland Plain. Grows only on aeolian and alluvial sediments in sclerophyll forest and woodland plant communities. Largest populations occur in Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland.	Low. No suitable habitat is present.	Very low.
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Confined to area between north Sydney in the south and Maroota in the north-west. Grows on shaley/ironstone soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Often grows amongst dense grasses and sedges. Flowers October to May.	Low. No suitable habitat is present.	Very low.
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	303 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Disjunct populations within the Cumberland Plain ((Marayong and Prospect Reservoir south to Narellan and Douglas Park) and Illawarra (Landsdowne to Shellharbour to northern Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland.	Low. No suitable habitat is present.	Very low.
<i>Pomaderris brunnea</i>	Brown Pomaderris	E	V	5 records within 10km (EES, 2021a)	Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Low. No suitable habitat is present.	Very low.



Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Pomaderris prunifolia</i>	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	EP		14 records within 10km (EES, 2021a)	Known from only 3 sites within population range: at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown. At Rydalmere occurs along a road reserve near a creek, among grass species on sandstone. At Rookwood Cemetery occurs in small gully of degraded Cooks River / Castlereagh Ironbark Forest on shale soils.	Low. No suitable habitat is present.	Very low.
<i>Pterostylis gibbosa</i>	Illawarra Greenhood	E	E	Species or species' habitat may occur within 10km (DAWE, 2021a)	Known from a small number of populations in the Illawarra, Shoalhaven and Hunter regions. Grows in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum, Woollybutt and Melaleuca decora. Near Nowra, the species grows in an open forest of Spotted Gum, Forest Red Gum and Grey Ironbark. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark, Forest Red Gum and Black Cypress Pine.	Low. No suitable habitat is present.	Very low.
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	1 record within 10km, last recorded 2007 (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Occurs in western Sydney between Picton and Freemans Reach. Grows in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. Associated vegetation above these rock shelves is sclerophyll forest or woodland on shale or shale/sandstone transition soils.	Low. No suitable habitat is present.	Very low.
<i>Pultenaea aristata</i>	Prickly Bush-pea	V	V	1 record within 10km (EES, 2021a)	Restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong. Occurs in either dry sclerophyll woodland or wet heath on sandstone.	Low. No suitable habitat is present.	Very low.
<i>Pultenaea pedunculata</i>	Matted Bush-pea	E		4 records within 10km, last recorded 2007 (EES, 2021a)	In NSW there are three disjunct populations in the Cumberland Plains in Sydney, the coast between Tathra and Bermagui and the Windellama area south of Goulburn. NSW populations typically among woodland vegetation but also found on road batters and coastal cliffs. In Windellama it is largely confined to loamy soils in dry gullies.	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Rhizanthella slateri</i>	Eastern Underground Orchid	V	E	Species or species' habitat may occur within 10km (DAWE, 2021a)	Currently known only from 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. The species grows in eucalypt forest but no informative assessment of the likely preferred habitat for the species is available. Flowers September and November.	Low. No suitable habitat is present.	Very low.
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	CE	1 record within 10km, last recorded 2007 (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Occurs in coastal districts north from Batemans Bay in New South Wales, to areas inland of Bundaberg in Queensland. Populations of <i>R. rubescens</i> typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000 -1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Low. No suitable habitat is present.	Very low.
<i>Rhodomyrtus psidioides</i>	Native Guava	CE	CE	Species or species' habitat may occur within 10km (DAWE, 2021a)	Native Guava 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. It is a pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Low. No suitable habitat is present.	Very low.
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	11 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Occurs in narrow coastal strip from Upper Lansdowne to Conjola State Forest. Grows in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas, often in remnant littoral or gallery rainforests.	Low. No suitable habitat is present.	Very low.
<i>Thelymitra</i> sp. <i>Kangaloon</i>	Kangaloon Sun Orchid	CE	CE	Species or species' habitat may occur within 10km (DAWE, 2021a)	The Kangaloon Sun-orchid is only known to occur on the southern tablelands of NSW in the Moss Vale / Kangaloon / Fitzroy Falls area at 550-700 m above sea level. It is found in swamps in sedgeland over grey silty grey loam soils.	Low. No suitable habitat is present.	Very low.
<i>Thesium australe</i>	Austral Toadflax	V	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Found in small, scattered populations along the east coast, northern and southern tablelands. Occurs in grassland or grassy woodland, and is often found in association with Kangaroo Grass.	Low. No suitable habitat is present.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Wahlenbergia multicaulis</i>	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	EP		111 records within 10km (EES, 2021a)	There are 13 known sites, two of which are in northern Sydney (Thornleigh and Mt Ku-Ring-Gai) with the remainder in western Sydney (Rookwood, Chullora, Bass Hill, Bankstown, Georges Hall, Campsie, South Granville and Greenacre). Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of various forms), typically amongst other herbs rather than in the open.	Low. No suitable habitat is present.	Very low.
<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V		77 records within 10km (EES, 2021a)	Is found on the coast between Mimosa Rocks National Park and Wamberal north of Sydney (Nelson's Lake, Potato Point, Sussex Inlet, Wowly Gully, Parramatta River at Ermington, Clovelly, Voyager Point, Wollongong and Royal National Park). This species grows on the margins of salt marshes and lakes.	Low. No suitable habitat is present.	Very low.
<i>Zannichellia palustris</i>		E		6 records within 10km (EES, 2021a)	Known from the Lower Hunter and Sydney Olympic Park. Grows in fresh or slightly saline stationary or slowly flowing water.	Low. No suitable habitat is present.	Very low.

Notes: V= vulnerable, E= endangered, CE = critically endangered

### Threatened fauna within 10km of the study area

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<b>BIRDS</b>							
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	2 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. 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.	Low. Only two local records. Preferred foraging habitat is not present. Would not breed in the area.	Very low.
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		21 records within 10km (EES, 2021a)	The Dusky Woodswallow is widespread from the coast to inland, including the western slopes of the Great Dividing Range and farther west. It is often recorded in woodlands and dry open sclerophyll forests, and has also been recorded in shrublands, heathlands regenerating forests and very occasionally in moist forests or rainforests. The understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, often with coarse woody debris. It is also recorded in farmland, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber. The nest is an open shallow untidy cup frequently built in an open hollow, crevice or stump. Although Dusky Woodswallows have large home ranges, individuals may spend most of their time in about a 2 ha range and defend an area about 50 m around the nest. Dusky Woodswallows prefer larger remnants over smaller remnants. Competitive exclusion by Noisy Miners ( <i>Manorina melanocephala</i> ) is a significant threat to this species.	Low. Suitable woodland habitat not present. Vegetation on site comprises very small remnants unlikely to be used by the species.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	5 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. The Species favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes ( <i>Typha</i> spp.) and spikerushes ( <i>Eleocharis</i> spp.), it hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. The species may construct feeding platforms over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.	Nil. No freshwater wetland habitat present.	Nil.
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		1 record within 10km (EES, 2021a)	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. It inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber, it's diet consists of insects and small vertebrates, such as frogs, lizards and snakes. It is largely nocturnal, being especially active on moonlit nights and nests on the ground in a scrape or small bare patch.	Nil. One record in locality. Very few records from metropolitan Sydney. Unlikely to occur in this LGA due to urbanisation and fox predation.	Nil.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V		1 record within 10km (EES, 2021a)	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. In spring and summer the species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species 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.	Low. Suitable woodland habitat not present.	Very low.



Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V		1 record within 10km (EES, 2021a)	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. It 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. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> , and <i>A. gymnathera</i> . Belah is also utilised and may be a critical food source for some populations. The species is dependent on large hollow-bearing eucalypts for nest sites.	Nil. <i>Allocasuarina</i> species not present. Only one local record.	Nil.
<i>Circus assimilis</i>	Spotted Harrier	V		9 records within 10km (EES, 2021a)	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. The species occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Low. Suitable woodland and grassland habitat not present.	Very low.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		14 records within 10km (EES, 2021a)	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 species inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low. Suitable woodland habitat not present.	Very low.
<i>Falco hypoleucos</i>	Grey Falcon	E		Species or species' habitat likely to occur within 10km (DAWE, 2021a)	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The species is 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. It also occurs near wetlands where surface water attracts prey.	Low. Suitable woodland habitat not present. No wetlands present in adjacent areas.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Glossopsitta pusilla</i>	Little Lorikeet	V		36 records within 10km (EES, 2021a)	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs. The species forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Low. Study area does not contain vegetation with a suitable patch size or habitat complexity for foraging. Unlikely to breed in the area.	Very low.
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. The species inhabits Boree/ Weeping Myall ( <i>Acacia pendula</i> ), Brigalow ( <i>A. harpophylla</i> ) and Box-Gum Woodlands and Box-Ironbark Forests. It is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Low. Absence of Box Gum Woodland and Box-Ironbark Forests. Limited foraging habitat. No mistletoe recorded.	Very low.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V		293 records within 10km (EES, 2021a)	The White-bellied Sea-eagle is widespread along the New South Wales coast, and along all major inland rivers and waterways. The species habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. It 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. The terrestrial habitats the species has been recorded in, include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	Low. No major river systems present. Limited foraging habitat. No breeding habitat.	Very low.
<i>Hieraaetus morphnoides</i>	Little Eagle	V		21 records within 10km (EES, 2021a)	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. The species occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. It nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Low. Unlikely to forage and breed in disturbed areas.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Hirundapus caudacutus</i>	White-throated Needletail		V,C,J,K	21 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	White-throated Needletails often occur in large numbers over eastern and northern Australia. White-throated Needletails are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.	Very low. Suitable habitat not present.	
<i>Lathamus discolor</i>	Swift Parrot	E	CE	9 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland the species occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Their favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Forest Red Gum, Mugga Ironbark, and White Box.	Very low. No breeding habitat present. Limited foraging habitat in planted trees in Ron Whitehead Place.	
<i>Lophoictinia isura</i>	Square-tailed Kite	V		5 records within 10km (EES, 2021a)	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. The species is 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, it has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	Very low. Suitable habitat not present.	

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V		1 record within 10km, last recorded 2007 (EES, 2021a)	In NSW the Black-chinned Honeyeater is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter. The species occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark ( <i>Eucalyptus sideroxylon</i> ), White Box ( <i>E. albens</i> ), Inland Grey Box ( <i>E. microcarpa</i> ), Yellow Box ( <i>E. melliodora</i> ), Blakely's Red Gum ( <i>E. blakelyi</i> ) and Forest Red Gum ( <i>E. tereticornis</i> ). It also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	Very low. No breeding habitat present. Limited foraging habitat in planted trees in Ron Whitehead Place.	
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	CE	Species or species' habitat may occur within 10km (DAWE, 2021a)	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. Typical winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured but they will turn up anywhere within these coastal regions. The species can be found foraging in weedy areas associated with these coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses.	Nil. Outside known distribution of the species. No suitable habitat is present.	Nil.
<i>Neophema pulchella</i>	Turquoise Parrot	V		4 records within 10km (EES, 2021a)	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. The species typically lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Low. Only one local record. Limited foraging habitat in open grassland areas.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Ninox connivens</i>	Barking Owl	V		1 record within 10km (EES, 2021a)	The Barking Owl is found throughout continental Australia except for the central arid regions. The owls sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights. Extensive wildfires in 2019-20 reduced habitat quality further, burnt many old, hollow-bearing trees needed as refuge by prey species and reduced the viability of some regional owl populations. The species inhabit 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. The species typically roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	Very low. Suitable habitat not present.	
<i>Ninox strenua</i>	Powerful Owl	V		75 records within 10km (EES, 2021a)	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. 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, Black She-oak, Blackwood, Rough-barked Apple, Cherry Ballart and a number of eucalypt species.	Moderate. Very limited foraging habitat where arboreal prey may be present in planted trees and gardens. No breeding habitat.	Low. Marginal foraging habitat would be removed in planted vegetation.
<i>Pandion cristatus</i>	Eastern Osprey	V		23 records within 10km (EES, 2021a)	Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. The species favour coastal areas, especially the mouths of large rivers, lagoons and lakes. The species breeds in NSW from July to September.	Low. No major river systems present. Limited foraging habitat. No breeding habitat.	Very low.



Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Petroica boodang</i>	Scarlet Robin	V		6 records within 10km (EES, 2021a)	In NSW, the Scarlet Robin from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. The 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. The species habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	Low. Suitable woodland habitat not present. Vegetation on site comprises very small remnants unlikely to be used by the species. Important habitat components such as woody debris is present in the study area.	Very low.
<i>Petroica phoenicea</i>	Flame Robin	V		2 records within 10km (EES, 2021a)	In NSW, the Flame Robin breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. The species breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes, it prefers clearings or areas with open understoreys.	Low. Suitable woodland habitat not present. Vegetation on site comprises very small remnants unlikely to be used by the species. Important habitat components such as woody debris is present in the study area.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	Species or species' habitat known to occur within 10km (DAWE, 2021a)	In NSW many records of the Australian Painted Snipe are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. The species prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Nil. No freshwater wetland habitat present.	Nil.
<i>Tyto longimembris</i>	Eastern Grass Owl	V		1 record within 10km (EES, 2021a)	Eastern Grass Owls have been recorded occasionally in all mainland states of Australia but are most common in northern and north-eastern Australia. In NSW they are more likely to be resident in the north-east. Eastern Grass Owl numbers can fluctuate greatly, increasing especially during rodent plagues. Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. Always breeds on the ground. Nests are found in trodden grass, and often accessed by tunnels through vegetation.	Nil. Outside known distribution of the species. No suitable habitat is present.	Nil.
<i>Tyto novaehollandiae</i>	Masked Owl	V		3 records within 10km (EES, 2021a)	The Masked Owl occurs 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. This species lives in dry eucalypt forests and woodlands from sea level to 1100 m and often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Very low. Suitable habitat not present.	
<i>Tyto tenebricosa</i>	Sooty Owl	V		2 records within 10km (EES, 2021a)	The Sooty Owl occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. This species occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Sooty Owls roost by day in the hollow of a tall forest tree or in heavy vegetation and nest in very large tree hollows. This species hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum or Sugar Glider.	Very low. Suitable habitat not present.	

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<b>FROGS</b>							
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. It is found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	Nil. Not recorded in the locality. Site does not contain breeding habitat or sandstone landscapes used by this species.	Nil.
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	12150 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	Since 1990 there have been approximately 50 recorded locations of Green and Golden Bell Frog in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. The species inhabits marshes, dams and stream-sides, particularly those containing bullrushes ( <i>Typha</i> spp.) or spikerushes ( <i>Eleocharis</i> spp.). Optimal habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available. Some sites the species has been recorded in, occur in highly disturbed areas.	Nil. Large number of records however no freshwater wetland habitat is present.	Nil.
<i>Litoria raniformis</i>	Growling Grass Frog	E	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Currently, the Growling Grass Frog is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few yet unconfirmed records have also been made in the Murray Irrigation Area in recent years. The species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn	Nil. No local records and occurs outside the known distribution range for this species.	Nil.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Mixophyes balbus</i>	Stuttering Frog	E	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Considered to have disappeared from Victoria and to have undergone considerable range contraction in NSW, particularly in south-east NSW. The Dorrigo region, in north-east NSW, appears to be a stronghold for this species. It is 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.	Nil. Rainforest and open forest with thick leaf litter is absent.	Nil.
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		4 records within 10km (EES, 2021a)	The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. It occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. The species inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.	Nil. Few local records however the study area does not contain sandstone ridgelines, ephemeral feeder creeks or flooded depressions.	Nil.
<b>GASTROPODS</b>							
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	E		22 records within 10km (EES, 2021a)	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. The species primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. It lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Nil. Cumberland Plain Woodland is absent.	Nil.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	The Dural Land Snail is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species is definitely found within the Local Government Areas of The Hills Shire, Hawkesbury Shire and Hornsby Shire. Records from the Blue Mountains City, Penrith City and Parramatta City may represent this species. Occurrence in Wollondilly Shire is considered unlikely in light of current knowledge. It favours sheltering under rocks or inside curled-up bark, it does not burrow nor climb.	Nil. No local records and the study area does not contain preferred shale sandstone transition habitat.	Nil.
<b>MAMMALS</b>							
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		2 records within 10km (EES, 2021a)	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. The species is 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. It feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes and is an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable.	Nil. Only two local records and the study area does not contain the appropriate myrtaceous midstorey species required for this species.	Nil.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	3 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Large-eared Pied Bat is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. The species roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. It is found in well-timbered areas containing gullies.	Nil. Low number of local records and the study area does not occur adjacent to sandstone escarpments which this species prefers.	Nil.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	1 record within 10km, last recorded 2002 (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. The species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares. Are known to traverse their home ranges along densely vegetated creeklines.	Nil. One record in the locality. Absence of suitable foraging and denning habitat.	Nil.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		13 records within 10km (EES, 2021a)	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species prefer moist habitats, with trees taller than 20 m.	Low. Limited foraging habitat above planted trees. No roosting habitat was recorded.	Very low.
<i>Isoodon obesulus</i>	Southern Brown Bandicoot	E	E	Species or species' habitat may occur within 10km (DAWE, 2021a)	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares.	Nil. Site does not contain breeding habitat or sandstone landscapes used by this species.	Nil.
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V		14 records within 10km (EES, 2021a)	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. The species typically inhabit dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures.	Low. Limited foraging habitat above planted trees. No roosting habitat was recorded. Not a common occurrence in urbanised areas.	Very low.



Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Miniopterus australis</i>	Little Bent-winged Bat	V		8 records within 10km (EES, 2021a)	The Little Bentwing-bat occurs along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. It prefers 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. The species 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.	Moderate. Low number of records. Absence of roosting and breeding habitat. Potential foraging habitat above open grassland.	Low. Marginal foraging habitat would be temporarily unavailable above grassland habitat.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V		92 records within 10km (EES, 2021a)	Large Bentwing-bats occur along the east and north-west coasts of Australia. The species use caves as the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Moderate. Large number of records. Absence of roosting and breeding habitat. Potential foraging habitat in open grassland. Could occur on occasion.	Low. Marginal foraging habitat would be temporarily unavailable above grassland habitat.
<i>Myotis macropus</i>	Southern Myotis	V		42 records within 10km (EES, 2021a)	The Southern Myotis is mainly coastal but may occur inland along large river systems. Usually associated with permanent waterways at low elevations in flat/undulating country, usually in vegetated areas. Forages over streams and watercourses feeding on fish and insects from the water surface. Roosts in a variety of habitats including caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage, typically in close proximity to water.	Nil. No suitable habitat is present.	Nil.
<i>Peaturoides volans</i>	Greater Glider	V	V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. It prefers taller montane, moist eucalypt forest with relatively old trees and abundant hollows.	Nil. No suitable habitat is present.	Nil.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	In NSW the Brush-tailed Rock-wallaby occurs from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. The species occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. It typically shelters or basks during the day in rock crevices, caves and overhangs and are most active at night when foraging.	Nil. Rocky escarpment habitat is not present in the study area.	Nil.
<i>Phascolarctos cinereus</i>	Koala	V	V	48 records within 10km (EES, 2021a); Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. The species inhabit eucalypt woodlands and forests, and 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.	Low. Large number of local records mostly restricted to Georges River National Park to the north. Very limited foraging habitat.	Very low.
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	Species or species' habitat may occur within 10km (DAWE, 2021a)	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. It inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	Nil. Site does not contain breeding habitat or sandstone landscapes used by this species.	Nil.
<i>Pseudomys novaehollandiae</i>	New Holland Mouse		V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. The species is known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes	Nil. No local records and no suitable habitat present in the study area.	Nil.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	1353 records within 10km (EES, 2021a); Roosting known to occur within 10km (DAWE, 2021a)	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. The species 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.	High. Large number of local records. Likely to feed on blossom within planted trees in Ron Whitehead Place.	Very low. No roost camps or foraging habitat would be affected.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V		14 records within 10km (EES, 2021a)	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. It forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Low. Modest number of local records. Limited foraging habitat above planted trees. No roosting habitat was recorded.	Very low.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		11 records within 10km (EES, 2021a)	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. The species utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	Low. Modest number of local records. Limited foraging habitat above planted trees. No roosting habitat was recorded.	Very low.

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<b>REPTILES</b>							
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		1 record within 10km (EES, 2021a)	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 and found in heath, open forest and woodland. Rosenberg's Goanna is associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat and shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens. Runs along the ground when pursued (as opposed to the Lace Monitor, which climbs trees). Feeds on carrion, birds, eggs, reptiles and small mammals.	Nil. No suitable habitat is present.	Nil.
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	V	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	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. The species shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring.	Nil. Exposed cliff habitat is absent from the study area.	Nil.

Notes: V= vulnerable, E= endangered, CE = critically endangered, C= migratory bird listed under the China-Australia Migratory Bird Agreement (CAMBA), J= migratory bird listed under the Japan-Australia Migratory Bird Agreement (CAMBA), K= migratory bird listed under the Korea-Australia Migratory Bird Agreement (KAMBA)

### Migratory fauna within 10 km of the study area

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Apus pacificus</i>	Fork-tailed Swift		C,J,K	1 record within 10km (EES, 2021a)	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. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	Low. Suitable habitat not present.	Nil
<i>Cuculus optatus</i>	Oriental Cuckoo		C,J,K	Species or species' habitat may occur within 10km (DAWE, 2021a)	This species migrates to northern and eastern Australia in the warmer months. Occurs south to the Shoalhaven area. Occurs in a range of habitats, including monsoon forest, rainforest edges, leafy trees in paddocks, river flats, roadsides and mangroves.	Low. Suitable habitat not present.	Nil
<i>Hirundapus caudacutus</i>	White-throated Needletail			Species or species' habitat known to occur within 10km (DAWE, 2021a)	White-throated Needletails often occur in large numbers over eastern and northern Australia. White-throated Needletails are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.	Low. However may fly overhead on occasion.	Nil
<i>Monarcha melanopsis</i>	Black-faced Monarch			Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Black-faced Monarch is found along the coast of eastern Australia, becoming less common further south. It is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Low. Suitable habitat not present.	Nil
<i>Monarcha trivirgatus</i>	Spectacled Monarch			Species or species' habitat may occur within 10km (DAWE, 2021a)	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. Prefers thick understorey in rainforest, wet gullies and waterside vegetation as well as mangroves.	Low. Suitable habitat not present.	Nil
<i>Motacilla flava</i>	Yellow Wagtail		C,J,K	Species or species' habitat likely to occur within 10km (DAWE, 2021a)	The Yellow Wagtail breeds in temperate Europe and Asia. They occur within Australia in open country habitat with disturbed ground and some water. Recorded in short grass and bare ground, swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and town lawns.	Low. Marginal habitat present in exotic grassland.	Very low

Scientific name	Common name	BC Status	EPBC Status	Source	Habitat association	Likelihood of occurrence	Level of impact
<i>Myiagra cyanoleuca</i>	Satin Flycatcher			Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. The Satin Flycatcher is not a commonly seen species, especially in the far south of its range, where it is a summer breeding migrant. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low. Suitable habitat not present.	Nil
<i>Rhipidura rufifrons</i>	Rufous Fantail			Species or species' habitat known to occur within 10km (DAWE, 2021a)	The Rufous Fantail is found along NSW coast and ranges. Inhabits rainforest, dense wet forests, swamp woodlands and mangroves. During migration, it may be found in more open habitats or urban areas.	Low. Suitable habitat not present.	Nil

Notes: C= migratory bird listed under the China-Australia Migratory Bird Agreement (CAMBA), J= migratory bird listed under the Japan-Australia Migratory Bird Agreement (CAMBA), K= migratory bird listed under the Korea-Australia Migratory Bird Agreement (KAMBA)



## **Appendix B** – Species recorded in the study area

### Flora species recorded within the study area

Family name	Scientific name	Common name	Abundance in study area
Araucariaceae	* <i>Araucaria heterophylla</i>	Norfolk Island Pine	u
	<i>Brunoniella pumilio</i>	Dwarf Blue Trumpet	u
Amaranthaceae	* <i>Amaranthus retroflexus</i>	Redroot Amaranth	u
Anacardiaceae	* <i>Schinus molle</i> var. <i>areira</i>	Peppercorn	u
Apiaceae	<i>Centella asiatica</i>	Gotu Kola	o
	* <i>Foeniculum vulgare</i>	Fennel	u
Apocynaceae	* <i>Araujia sericifera</i>	Moth Vine	o
	* <i>Gomphocarpus fruticosus</i>	Narrow-leaved cotton bush	u
	* <i>Plumeria rubra</i>	Frangipani	u
Apiaceae	<i>Hydrocotyle acutiloba</i>	-	u
Asteraceae	* <i>Ageratina adenophora</i>	Crofton Weed	o
	* <i>Aster subulatus</i>	Bushy Starwort	u
	<i>C Bidens pilosa</i>	Pitchforks	u
	* <i>Cirsium vulgare</i>	Thistle	u
	* <i>Conyza sumatrensis</i>	Tall fleabane	u
	<i>Euchiton sphaericus</i>	Cudweed	u
	* <i>Hypochaeris radicata</i>	Cat's Ear	u
	<i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i>	Indian-weed	u
	* <i>Sonchus oleraceus</i>	Common Sowthistle	u
	* <i>Taraxacum officinale</i>	Dandelion	u
Basellaceae	* <i>Anredera cordifolia</i>	Madeira Vine	u
Berberidaceae	* <i>Nandina domestica</i>	Sacred Bamboo	u
Bignoniaceae	* <i>Jacaranda mimosifolia</i>	Jacaranda	u
	<i>Pandorea pandorana</i> subsp. <i>pandorana</i>	Wonga Wonga Vine	o
Brassicaceae	* <i>Capsella bursa-pastoris</i>	Shepherd's Purse	u
Cactaceae	* <i>Opuntia ficus-indica</i>	Indian Fig	u
Caryophyllaceae	* <i>Cerastium glomeratum</i>	Mouse-ear Chickweed	u
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak	c
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>linifolia</i>	Climbing Saltbush	o
	<i>Einadia trigonos</i> subsp. <i>trigonos</i>	Fishweed	o
Convolvulaceae	* <i>Convolvulus arvensis</i>	-	c
	<i>Convolvulus erubescens</i>	Australian Bindweed	u
	<i>Dichondra repens</i>	Kidney Weed	u

Family name	Scientific name	Common name	Abundance in study area
<b>Elaeocarpaceae</b>	<i>Elaeocarpus reticulatus</i>	Blueberry Ash	u
<b>Fabaceae (Caesalpinoideae)</b>	* <i>Senna pendula</i> var. <i>glabrata</i>	Cassia	u
<b>Fabaceae (Faboideae)</b>	* <i>Castanospermum australe</i>	Black Bean	u
	<i>Desmodium varians</i>	-	u
	<i>Dillwynia sieberi</i>	-	u
	<i>Glycine microphylla</i>	Small-leaved Glycine	u
	<i>Hardenbergia violacea</i>	Warraburra	u
	<i>Pultenaea villosa</i>	Hairy Bush-pea	u
	* <i>Robinia pseudoacacia</i>	Black Locust	u
	* <i>Trifolium fragiferum</i>	Strawberry Clover	u
	* <i>Trifolium repens</i>	Clover	o
	<i>Zornia dyctiocarpa</i> var. <i>dyctiocarpa</i>	Zornia	u
<b>Fabaceae (Mimosoideae)</b>	<i>Acacia decurrens</i>	Sydney Green wattle	o
	<i>Acacia implexa</i>	Hickory	u
	<i>Acacia maidenii</i>	Maiden's Wattle	u
	<i>Acacia parramattensis</i>	Parramatta Green Wattle	o
	<i>Acacia pubescens</i>	Downy Wattle	u
	<i>Acacia pubescens</i> x (?) <i>Acacia decurrens</i>	-	u
	* <i>Acacia saligna</i>	Golden Wreath Wattle	u
<b>Gentianaceae</b>	* <i>Centaurium erythraea</i>	Pink Stars	u
	<i>Hypericaceae</i>		
	<i>Hypericum gramineum</i>	Small St John's Wort	u
<b>Lobeliaceae</b>	<i>Lobelia purpurascens</i>	Whiteroot	u
<b>Magnoliaceae</b>	<i>Magnolia champaca</i>	Champak	u
<b>Malvaceae sens lat.</b>	<i>Brachychiton acerifolius</i>	Illawarra Flame	u
	* <i>Hibiscus splendens</i>	Hollyhock Tree	u
	* <i>Malva parviflora</i>	Mallow	u
	* <i>Modiola caroliniana</i>	Red-flowered Mallow	u
	* <i>Sida rhombifolia</i>	Paddy's Lucerne	o
<b>Meliaceae</b>	<i>Melia azedarach</i>	White Cedar	u
	<i>Moraceae</i>		
	* <i>Morus alba</i>	Mulberry	u
<b>Myrtaceae</b>	* <i>Austromyrtus dulcis</i>	Midgen Berry	u
	<i>Backhousia myrtifolia</i>	Ironwood	u

Family name	Scientific name	Common name	Abundance in study area
	<i>*Callistemon 'Harkness'</i>	Bottlebrush	c
	<i>*Callistemon 'Kings Park Special'</i>	Bottlebrush	c
	<i>Callistemon salignus</i>	Pink Tips	o
	<i>*Callistemon viminalis</i>	River Bottlebrush	o
	<i>*Corymbia citriodora x C. maculata hybrid</i>	Lemon-scented Gum	u
	<i>Corymbia eximia</i>	Yellow Bloodwood	u
	<i>Corymbia gummifera</i>	Red Bloodwood	u
	<i>Corymbia maculata</i>	Spotted Gum	u
	<i>Eucalyptus crebra</i>	Narrow-leaved ironbark	u
	<i>*Eucalyptus curtisii</i>	Plunkett Mallee	u
	<i>*Eucalyptus haemastoma</i>	Scribbly Gum	u
	<i>Eucalyptus longifolia</i>	Woollybutt	u
	<i>*Eucalyptus microcorys</i>	Tallowood	u
	<i>*Eucalyptus nicholii</i>	New England Black Peppermint	u
	<i>Eucalyptus paniculata subsp. paniculata</i>	Grey Ironbark	u
	<i>*Eucalyptus scoparia</i>	Wallangarra White Gum	u
	<i>Eucalyptus tereticornis</i>	Forest Redgum	u
	<i>Kunzea ambigua</i>	Tick Bush	u
	<i>*Lophostemon confertus</i>	Brushbox	u
	<i>Melaleuca decora</i>	White Feather Honey-myrtle	u
	<i>Melaleuca ericifolia</i>	Honey Bracelet-myrtle	o
	<i>Melaleuca erubescens</i>	Pink Honeymyrtle	o
	<i>Melaleuca linariifolia</i>	Snow in Summer	o
	<i>Melaleuca nodosa</i>	Ball Honeymyrtle	o
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	u
	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	c
	<i>Sannantha pluriflora</i>	-	u
<b>Ochnaceae</b>	<i>*Ochna serrulata</i>	Mickey Mouse Plant	u
<b>Oleaceae</b>	<i>*Ligustrum lucidum</i>	Large-leaved Privet	u
	<i>*Ligustrum sinense</i>	Small-leaved Privet	u
	<i>*Olea europaea subsp. cuspidata</i>	African Olive	o
<b>Phyllanthaceae</b>	<i>Breynia oblongifolia</i>	Coffee Bush	u

Family name	Scientific name	Common name	Abundance in study area
<b>Pittosporaceae</b>	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Blackthorn	u
	* <i>Hymenosporum flavum</i>	Native Frangipani	u
	<i>Pittosporum undulatum</i>	Brush Daphne	o
<b>Plantaginaceae</b>	<i>Plantago debilis</i>	Slender Plantain	u
	* <i>Plantago lanceolata</i>	Plantain	o
<b>Polygonaceae</b>	<i>Rumex brownii</i>	Swamp Dock	u
	* <i>Rumex crispus</i>	Curled Dock	u
<b>Proteaceae</b>	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	u
	* <i>Buckinghamia celsissima</i>	Ivory Curl	u
	<i>Grevillea cultivars</i>	-	o
	* <i>Grevillea robusta</i>	Silky Oak	u
	<i>Hakea sericea</i>	Needlebush	u
<b>Ranunculaceae</b>	* <i>Ranunculus muricatus</i>	Sharp Buttercup	u
<b>Rosaceae</b>	* <i>Cotoneaster pannosus</i>	Cotoneaster	u
	* <i>Prunus persica</i>	Peach	u
<b>Rubiaceae</b>	* <i>Galium aparine</i>	Goosegrass	u
<b>Rutaceae</b>	<i>Correa reflexa</i> var. <i>reflexa</i>	Common Correa	u
	* <i>Murraya paniculata</i>	Mock Orange	u
<b>Sapindaceae</b>	<i>Dodonaea</i> (?) <i>multijuga</i>	-	u
<b>Scrophulariaceae</b>	* <i>Eremophila</i> (?) <i>maculata</i>	Emu Bush	u
	<i>Myoporum acuminatum</i>	Boobialla	u
	<i>Veronica plebeia</i>	-	o
<b>Solanaceae</b>	* <i>Cestrum parqui</i>	Green Cestrum	o
<b>Ulmaceae</b>	* <i>Ulmus parvifolia</i>	Chinese Elm	u
<b>Urticaceae</b>	* <i>Parietaria judaica</i>	Pellitory	u
<b>Amaryllidaceae</b>	* <i>Clivia miniata</i>	Kaffir Lily	u
<b>Asparagaceae</b>	* <i>Asparagus aethiopicus</i>	Asparagus fern	u
	* <i>Asparagus plumosus</i>	Climbing Asparagus	u
<b>Commelinaceae</b>	<i>Commelina cyanea</i>	Scurvy Weed	u
	* <i>Tradescantia fluminensis</i>	Wandering Jew	u
<b>Cyperaceae</b>	* <i>Cyperus brevifolius</i>	Mullumbimby Couch	u
	<i>Cyperus difformis</i>	-	u
	* <i>Cyperus eragrostis</i>	-	u
	<i>Cyperus gracilis</i>	Slender Flat-sedge	u
	<i>Cyperus laevis</i>	-	u

Family name	Scientific name	Common name	Abundance in study area
<b>Iridaceae</b>	<i>*Romulea longifolia</i>	Guildford Grass	u
<b>Juncaceae</b>	<i>Juncus usitatus</i>	Common Rush	o
<b>Lomandraceae</b>	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	o
<b>Phormiaceae</b>	<i>Dianella caerulea</i> var. <i>caerulea</i>	Blue Flax Lily	u
<b>Poaceae</b>	<i>Anisopogon avenaceus</i>	Oat Speargrass	u
	<i>*Axonopus fissifolius</i>	Carpet Grass	c
	<i>Bothriochloa macra</i>	Redleg Grass	u
	<i>*Bromus catharticus</i>	Prairie Grass	o
	<i>*Cenchrus clandestinus</i>	Kikuyu	c
	<i>*Chloris gayana</i>	Rhodes Grass	c
	<i>Cynodon dactylon</i>	Couch	o
	<i>*Digitaria ciliaris</i>	Summer Grass	u
	<i>Entolasia stricta</i>	Wiry Panic	u
	<i>Eragrostis brownii</i>	Brown's Lovegrass	u
	<i>*Eragrostis curvula</i>	African Lovegrass	u
	<i>*Eragrostis cilianensis</i>	Stink Grass	u
	<i>*Ehrharta erecta</i>	Panic Veldtgrass	o
	<i>Imperata cylindrica</i>	Blady Grass	o
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	c
	<i>Oplismenus imbecillis</i>	Basket Grass	o
	<i>Paspalum dilatatum</i>	Paspalum	o
	<i>Rytidosperma tenuius</i>	Wallaby Grass	u

Notes: \*not indigenous to Bankstown LGA (see James *et al.* 1999)

C cosmopolitan

c common

o occasional

u uncommon



### *Fauna species recorded within the study area*

Common name	Scientific name	Exotic	Observation Type
Australian Magpie	<i>Cracticus tibicen</i>		OW
Australian White Ibis	<i>Threskiornis molucca</i>		OW
Common Myna	<i>Sturnus tristis</i>	*	OW
Crested Pigeon	<i>Ocyphaps lophotes</i>		OW
Little Corella	<i>Cacatua sanguinea</i>		OW
Noisy Miner	<i>Manorina melanocephala</i>		OW
Pied Butcherbird	<i>Cracticus nigrogularis</i>		O
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>		OW
Rock Dove	<i>Columba livia</i>	*	OW
Spotted Turtle-Dove	<i>Streptopelia chinensis</i>	*	OW
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>		W

Notes: O= observed, W= heard

# Appendix C – Tree table

Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
1	*# <i>Eucalyptus nicholii</i>	New England Black Peppermint	12	3	M	G	M	2A	0.31 0.34	3.7 2.1	Curve in leader; probably in response to location	Retain
2	* <i>Callistemon viminalis</i>	Weeping Bottlebrush	8	5	M	G	M	2A	multi	3 1.5	<i>Pittosporum undulatum</i> self- recruited within bed	Retain
3	<i>Casuarina cunninghamiana</i>	River Oak	13	2.5	M	M	M	3A	0.24 0.26	2.9 1.9	Suppressed growth; evidence of secondary virus infection; biased platform	Retain
	* <i>Callistemon</i> 'Kings Park Special' x 5	Bottlebrush cultivar	6 (av.)	2 (av.)	M	M	M	3A	multi	2.9 1.9		
4	* <i>Callistemon</i> 'Kings Park Special' x 4	Bottlebrush cultivar	6 (av.)	2 (av.)	M	M	M	3A	multi	3 1.5		Retain
5	* <i>Callistemon</i> 'Kings Park Special' x 4	Bottle-brush cultivar	6 (av.)	2 (av.)	M	M	M	3A	multi	3 1.5	Suppressed growth	Retain
	* <i>Callistemon viminalis</i>	Weeping Bottle-brush	9	3	M	F	F	3B	multi	3 1.5		
6	* <i>Callistemon</i> 'Kings Park Special' x 3	Bottle-brush cultivar	5 (av.)	2 (av.)	M	M	M	3A	multi	3 1.5	Suppressed growth	Retain
7	* <i>Callistemon</i> 'Kings Park Special' x 2	Bottle-brush cultivar	6 (av.)	2 (av.)	M	M	M	3A	multi	3 1.5		May require trimming or partial removal
8	* <i>Callistemon</i> 'Kings Park Special' x 2	Bottle-brush cultivar	6 (av.)	2 (av.)	M	M	M	3A	multi	3 1.5		Retain
9	<i>Corymbia maculata</i> x <i>Corymbia citriodora</i>	Spotted Gum hybrid	10	4	M	G	M	2A	0.83 0.68	10 3.1	Co-dominant leaders	Retain
	<i>Corymbia maculata</i> x <i>Corymbia citriodora</i>	Spotted Gum hybrid	9	2.5	M	G	M	2A	0.32 0.35	3.8 2.1	Co-dominant leaders	Retain

Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
	<i>Acacia maidenii</i>	Maiden's Wattle	8	3	OM	F	M	4B	0.26 0.28	3.1 1.9	Specimen in decline; sparse platform	Retain
10	<i>Eucalyptus paniculata</i> subsp. <i>paniculata</i>	Grey Ironbark	14	4	M	G	M	2A	0.29 0.33	3.5 2.1	Co-dominant leaders	Retain
11	<i>Corymbia maculata</i>	Spotted Gum	21	7	M	G	M	2A	1.02 1.18	12.2 3.5	Co-dominant leaders; recent mechanical damage, including loss of laterals	Retain
12	<i>Corymbia maculata</i> x <i>Corymbia</i> <i>citriodora</i> hybrid x 3	Spotted Gum	21 (av.)	6 (av.)	M	G	G	1A	0.83 0.88 (av.)	10 3.1	Adjacent line of 10 suppressed <i>Casuarina</i> <i>glauca</i> against wall not included in assessment	Retain
	<i>Eucalyptus longifolia</i>	Woollybutt	20	5	M	G	G	1A	0.64 0.67	7.7 2.8		
13	<i>Eucalyptus crebra</i>	Narrow- leaved Ironbark	8	3	M	G	G	1A	0.27 0.30	3.2 2.0	Suppression of platform by adjacent line of larger specimens	Retain
	* <i>Eucalyptus microcorys</i>	Tallowwood	8	3	M	G	M	1A	0.29 0.32	3.5 2.1		
14	<i>Corymbia maculata</i> <i>Corymbia maculata</i>	Spotted Gum Spotted Gum	19	7	M	G	G	1A	0.87 0.91	10.4 3.2	Bias in leader	Retain
15	* <i>Hymenosporum flavum</i> x 2	Native Frangipani	6 (av.)	2 (av.)	M	G	G	3A	0.19 0.22 (av.)	2.3 1.8		Retain
	<i>Corymbia maculata</i>	Spotted Gum	21	7	M	G	G	1A	0.87 0.91	10.4 3.2		
	* <i>Melaleuca bracteata</i>	River Tea- tree	5	2	M	G	G	3A	multi	3 1.5		
16	<i>Eucalyptus tereticornis</i>	Forest Red Gum	14	3	M	G	M	2A	0.35 0.38	4.2 2.2	Bias in leader, possibly as a response to location	Retain
	<i>Callistemon</i> 'Harkness'	Hybrid Bottlebrush	5	2	M	G	G	3A	multi	3 1.5	<i>Grevillea</i> CV x3 also occur within bed but	

Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	7	3	M	G	G	2A	0.26 0.28	3.1 2.0	not included in assessment	
	<i>Corymbia maculata</i>	Spotted Gum	6	2	EM	G	G	1A	0.18 0.21	2.2 1.7		
17	<i>Callistemon</i> 'Harkness'	Hybrid Bottlebrush	5	1.5	M	G	G	3A	multi	3 1.5		Retain
18	<i>Callistemon</i> 'Harkness'	Hybrid Bottlebrush	6	1.5	M	G	G	3A	multi	3 1.5		Retain
	* <i>Murraya paniculata</i> x 3	Mock Orange	2.5	1	M	G	M	3A	multi	1.5 1	Trimmed; invasive exotic species	
19	<i>Casuarina glauca</i> x 14	Swamp Oak	18 (av.)	2	M	G	G	2A	0.27 0.29 (av.)	3.2 2.0	Trees growing along railway boundary fence	Will require top pruning to allow access for crane jib
20	<i>Brachychiton</i> <i>acerifolium</i> x 4	Illawarra Flame Tree	7	2	M	G	G	2A	0.23 0.26 (av.)	2.8 1.9		Retain
21	* <i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	5	3	M	G	G	5A	Multi	NA	Invasive species; remove and replace with indigenous species	Retain
	* <i>Castanospermum</i> <i>australe</i>	Moreton Bay Chestnut	5	3	M	G	M	2A	0.23 0.24	2.8 1.8	Growth suppressed by adjacent African Olive	
	<i>Melaleuca</i> <i>styphelioides</i> x 5	Prickly- leaved Paperbark	7 (av.)	3 (av.)	M	G	M	3A	0.33 0.36 (av.)	4.0 2.2	Terminal growth lopped; growing beneath wires; some specimens occupied by Ibis. Co-dominant leaders	
22	<i>Melaleuca</i> <i>styphelioides</i> x 4	Prickly- leaved Paperbark	7 (av.)	3 (av.)	M	G	M	3A	0.33 0.36 (av.)	4.0 2.2	Terminal growth lopped; growing beneath wires; Co- dominant leaders	Retain

Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
	<i>*Plumeria rubra</i>	Frangipani	5	3	M	G	G	3A	multi	2.5	Growing adjacent to transformer	
	<i>*Schinus molle</i> var. <i>areira</i>	Pepper Tree	5	3	M	G	M	3A	multi	1.5 2.5	Suppressed growth	
	<i>*Buckinghamia celsissima</i>	Ivory Curl	6	2	M	G	M	3A		1.5	Suppressed growth	
	<i>Corymbia eximia</i>	Yellow Bloodwood	12	3	M	M	F	3A	0.24 0.25	2.9 1.9	Co-dominant leaders; Suppressed growth	
23	<i>#Acacia pubescens</i>	Downy Wattle	4	1.5	M	G	G	3A	Multi	3 1.5		Retain
	<i>Corymbia maculata</i>	Spotted Gum	6	1.5	EM	G	G	2A	0.14 0.15	2 1.5		
	<i>*Callistemon viminalis</i> x 2	Weeping Bottlebrush	5	2	M	G	G	3A	Multi	3 1.5		
	<i>*Jacaranda mimosifolia</i>	Jacaranda	7	1	EM	M	M	3A	0.11 0.12	2 1.5		
	<i>*Melaleuca bracteata</i>	River Tea- Tree	5	2	M	G	G	3A	multi	3 1.5		
	<i>Myoporum acuminatum</i>	Boobialla	5	2	M	G	G	3A	multi	3 1.5		
24	<i>*(?)Hibiscus splendens</i>	Hollyhock Tree	5	2	M	G	M	3A	Multi	3 1.5		Retain
	<i>Callistemon salignus</i>	Pink Tips	6	2	M	G	G	2A	0.14 0.15	2 1.5		
	<i>*Callistemon viminalis</i>	Weeping Bottlebrush	7	2	M	M	M	3A	0.12 0.14	2 1.5		
	<i>Casuarina glauca</i>	Swamp Oak	7	2	EM	G	G	2A	0.15 0.17	2 1.6		
	<i>*Cestrum parqui</i>	Green Cestrum	4	1.5	M	G	G	5A	multi	NA	Invasive exotic.	



Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
25	# <i>Acacia pubescens</i>	Downy Wattle	3	1.5	M	G	G	3A	Multi	3 1.5		Retain
	* <i>Cestrum parqui</i>	Green Cestrum	3	1.5	M	G	G	5A	Multi	NA	Invasive exotic.	
	<i>Acacia parramattensis</i>	Parramatta Wattle	5	2	EM	G	G	3A	0.15 0.18	2 1.6		
	<i>Casuarina glauca x 2</i>	Swamp Oak	6	2	M	G	G	2A	0.21 0.24	2.5 1.8		
	<i>Corymbia gummifera</i>	Red Bloodwood	6	1.5	EM	G	G	3A	0.17 0.19	2 1.7		
26	# <i>Acacia pubescens</i>	Downy Wattle	3	1.5	M	G	G	3A	Multi	3 1.5	Requires protection	Retain
	<i>Acacia parramattensis</i>	Parramatta Wattle	6	2	EM	G	G	3A	0.14 0.16	2 1.5		
	* <i>Jacaranda mimosifolia</i>	Jacaranda	5	1.5	EM	M	M	4A	0.15 0.17	2 1.5	Etiolated growth	
	<i>Kunzea ambigua</i>	Tick Bush	5	2	M	G	G	3A	Multi	2 1.5		
	<i>Acacia decurrens</i>	Sydney Green Wattle	5	2	M	G	G	3A	Multi	2 1.5		
	<i>Casuarina glauca</i>	Swamp Oak	5	2	M	M	M	3A	multi	2 1.5	Terminal growth recently removed	
27	* <i>Araucaria heterophylla</i>	Norfolk Island Pine	17	4	M	G	M	2A	0.38 0.42	4.7 2.3	Co-dominant leader; probably in response to mechanical damage	Remove
	<i>Melaleuca styphelioides</i>	Prickly- leaved Paperbark	14	2.5	M	G	G	2A	0.27 0.31	3.2 2.0		
	<i>Eucalyptus haemastoma</i>	Scribbly Gum	15	4	M	G	G	2A	0.34 0.38	4.1 2.2	Biased growth, do- dominant leaders	

Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
	<i>*Prunus persica x 3</i>	Peach	4	1.5	M	M	M	4A	0.16 0.18	2.0 1.6		
	<i>Callistemon salignus</i>	Pink Tips River	6	1.5	M	M	M	3A	0.14 0.15	2.0 1.5	Sparse canopy	
	<i>*Callistemon viminalis x 2</i>	Bottlebrush	6	2	M	G	M	3A	0.17 0.20	2.0 1.7		
28	<i>Elaeocarpus reticulatus</i>	Blueberry Ash	6	2	M	G	G	3A	0.16 0.17	2.0 1.6	Suppressed growth	Remove
	<i>Eucalyptus haemastoma</i>	Scribbly Gum	6	1.5	EM	G	M	2A	0.22 0.25	2.6 1.9	Co-dominant leaders	
	<i>Casuarina glauca</i>	Swamp Oak	12	3	M	G	M	2A	0.35 0.40	4.2 2.3	Co-dominant leaders	
29	<i>Backhousia myrtifolia</i>	Ironwood	7	2	M	G	G	3A	0.21 0.23			Remove Ironwood, Swamp Oaks, Plunkett Mallee and Prickly- leaved Ironbark. Retain other trees.
	<i>*Olea europaea subsp. cuspidata</i>	African Olive	6	2	M	G	G	5A	Multi	NA	Invasive exotic; remove and replace with indigenous species	
	<i>Casuarina glauca</i>	Swamp Oak	10	2	M	G	G	2A	0.23 0.24	2.8 1.8		
	<i>Casuarina glauca</i>	Swamp Oak	14	3	M	G	G	2A	0.37 0.40	4.4 2.3		
	<i>*Eucalyptus curtisii</i>	Plunkett Mallee	9	4	M	M	M	3A	0.27 0.34	3.4 2.1	Suppressed growth	
	<i>Acacia parramattensis</i>	Parramatta Wattle	5	1.5	M	G	G	3A	0.13 0.15	2 1.5		
	<i>*Morus alba</i>	Mulberry	5	2	M	G	G	4A	Multi	NA		
	<i>*Ligustrum lucidum</i>	Large-leaved Privet	5	2.5	M	G	G	5A	Multi	NA	Invasive exotic	
	<i>Melaleuca styphelioides</i>	Prickly- leaved Paperbark	10	2.5	M	G	G	2A	0.21 0.24	2.5 1.8		

Tree/ Tree group No.	Botanical name	Common Name	Height (m)	Canopy Radius (m)	Age1	Health2	Form3	SULE4	Dbh (m) / D at base	TPZ5 / SRZ6 (m)	Comments	Prescription
	* <i>Schinus molle</i> var. <i>areira</i>	Peppercorn	5	2	M	G	G	4A	multi	2 1.5		
30	<i>Casuarina glauca</i>	Swamp Oak	15	2	M	G	M	3A	0.29 0.33 (av.)	3.5 2.0	Thicket of stems deriving from single rootstock	Remove
31	#* <i>Eucalyptus scoparia</i>	Wallangarra White Gum	18	6	M	G	M	2A	0.49 0.52	6 2.5	Strongly biased growth	Retain Wallangarra White Gum. Remove all other trees
	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i> x 2	Coast Banksia	7 (av.)	2 (av.)	M	G	G	2A	0.19 0.22 (av.)	2.3 1.8		
	<i>Melaleuca styphelioides</i>	Prickly- leaved Paperbark	9	1.5	M	G	M	3A	0.29 0.33	3.5 2.0	Co-dominant leaders from base	
	<i>Casuarina glauca</i>	Swamp Oak	11	2.5	M	G	G	2A	0.31 0.34	3.7 2.1		
	<i>Callistemon salignus</i>	Pink Tips	9	1.5	M	G	G	3A	0.19 0.22	2.3 1.8		

1. Age Class: OM = Mature; M = Mature; EM = Early Mature
  2. Health: G = good; M = moderate; F = fair
  3. Form: G = good; M = moderate; F = fair
  4. SULE: Safe Useful Life Expectancy (see SULE matrix - Appendix A);
  5. TPZ: Tree Protection Zone
  6. SRZ: Structural Root Zone
- ^\* Native species not indigenous to Bankstown Council LGA
- \* Introduced species
- # Threatened species under the BC and/or EPBC Acts
- (?) Tentatively identified

## **Appendix D** – Safe Useful Life Expectancy (SULE)

The SULE value generated by the below matrix gives an indication of the time a tree is expected to be usefully retained: Adapted from Barrell (2001).

	1 Long SULE	2 Medium SULE	3 Short SULE	4 Removal	5 Move or Replace
<b>A</b>	Tree that appear to be retainable at the time of assessment for >40 years with an acceptable degree of risk, assuming reasonable maintenance.	Tree that appear to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Tree that appear to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Trees which should be removed within the next 5 years.	Trees which can be readily moved or replaced.
<b>B</b>	Structurally sound trees located in positions that can accommodate for future growth.	Trees that may only live for 15-40 years.	Trees that may only live for another 5-15 years.	Dead, dying, suppressed or declining trees.	Small trees <5 (m) in height.
<b>C</b>	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.	Dangerous trees because of instability or loss of adjacent trees.	Young trees less than 15 years old but over 5m in height.
<b>D</b>	Trees of special significance that would warrant extraordinary efforts to secure their long term retention.	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.	Dangerous trees because of structural defects.	
<b>E</b>		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees not safe to retain.	
<b>F</b>				Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.	
<b>G</b>				Trees that are damaging or may cause damage to existing structures within 5 years.	

## **Appendix E** – Tree protection zone fencing example





**LEGEND:**

- 1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
- 2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
- 3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
- 4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

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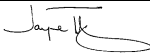

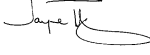

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