Ecological Assessment

Lapstone Station Upgrade

SNC Lavalin Pty Ltd

10 October 2019

Final

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Glossary

Term	Definition
BC Act	Biodiversity Conservation Act 2016
Biosecurity Act	NSW Biosecurity Act 2015
BOS	Biodiversity Offset Scheme
CBD	Sydney Central Business District
DDA	Commonwealth Disability Discrimination Act 1992
DSAPT	Disability Standards for Accessible Public Transport
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
ISCA	Infrastructure Sustainability Council
Locality	The area surrounding the Proposal Area within a 5 km radius
PCT	Plant Community Type
Proposal	The proposed Lapstone Station accessibility upgrade
Proposal Area	The area of land subject to the proposal
REF	Review of Environmental Factors
RMS	Random meander survey
SHTF	Sydney Hinterlands Transition Forest
TAP	Transport Access Program
TEC	Threatened Ecological Communities
TfNSW	Transport of New South Wales
WoNS	Weeds of National Significance

Executive Summary

S1 Introduction

Cumberland Ecology was commissioned by SNC-Lavalin on behalf of Transport of New South Wales (TfNSW) to prepare a specialist assessment of ecological values to assess the impacts of the proposed Lapstone Station Upgrade (the Proposal). This specialist assessment forms part of the Review of Environmental Factors (REF) which is being prepared to assess the impacts of the Proposal, in the considerations for approval under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

S1.1 Background and Overview of the Proposal

TfNSW is proposing to upgrade Lapstone Station as part of the NSW Government's Transport Access Program (TAP) which aims to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. Lapstone Station has been identified for an accessibility upgrade as it does not currently meet key requirements of the *Disability Standards for Accessible Public Transport* (DSAPT) or the Commonwealth Disability Discrimination Act 1992 (DDA). As part of the TAP program, the Proposal would aim to provide a station precinct that is accessible for all sections of the community including people with a disability, limited mobility, parents/carers with prams, and customers with luggage.

S2 Results

S2.1 Vegetation Communities

Vegetation within the Proposal Area is comprised of four vegetation communities. However, one community, Sydney Hinterland Transition Woodland, is present in three condition states. The vegetation within the Proposal Area (i.e. area of land subject to the Proposal) has been subject to disturbance and clearing for linear infrastructure. Previous land use of the Proposal Area and immediate surrounds has removed and/or modified much of the fauna habitat complexity.

Following field surveys, Cumberland Ecology identified the following vegetation communities to persist within the Proposal Area.

- Sydney Hinterland Transition Woodland – Moderate Condition;
- Sydney Hinterland Transition Woodland – Degraded Condition;
- Sydney Hinterland Transition Woodland – Scattered Trees;
- Urban Native/Exotic Plantings;
- Exotic Vegetation; and
- Exotic grassland.

S2.2 Threatened Species

No threatened flora species were recorded within the Proposal Area. An analysis of the likelihood of occurrence of the Proposal Area for each threatened flora species recorded within the locality is provided in **Appendix A**.

It is considered unlikely that any threatened flora species would naturally occur within the Proposal Area as the majority of the habitat is highly disturbed or comprises previously cleared and replanted vegetation.

Urban adapted, highly mobile and aerial groups of threatened fauna species may have the potential to utilise the foraging resources within the Proposal Area, particularly within the relatively higher quality habitat on the western side of the station. Such fauna groups include:

- Megachiropteran bats;
- Microchiropteran bats,
- Arboreal mammals;
- Large forest owls; and
- Diurnal woodland birds.

S2.3 Fauna Habitat

The Proposal Area provides limited habitat for fauna species due to the artificial nature of the planted vegetation on the western side and the degraded nature of the immediately adjacent bushland on the eastern side of the Proposal Area. Although there are some areas of potential habitat for urban adapted species and small reptiles, the potential habitat is not considered to be a reliable resource and it is most likely to be used for foraging by urban adapted bird species. On a precautionary basis, the Proposal Area is considered to constitute marginal foraging habitat for a range of highly mobile threatened fauna species that may utilise the Proposal Area as part of a larger foraging range.

S2.4 Habitat Connectivity

The vegetation on the western side of the Proposal Area comprised of Urban Native/Exotic Vegetation and Sydney Hinterland Transition Woodland (SHTW) – Scattered Trees has been assessed to not contain significant habitat connectivity as per the ISCA definitions. These areas of low condition vegetation are less than 50 m in width and do not provide a sole link or one of several links to other native vegetation in good condition.

Vegetation on the eastern side of the Proposal Area is considered to have a moderate degree of connectivity as per ISCA definitions as it is comprised of native vegetation considered to be in good condition, is 50- 100m wide and forms part of a sole link between other vegetation in good condition. This vegetation forms part of a >100 m wide habitat corridor bounded by the railway line in the west and the Nepean River in the east.

S3 Impact Assessment

S3.1 Direct Impacts

One native vegetation community occurs within the Proposal Area and will be directly impacted by the Proposal. Up to ~0.13 ha of SHTW - Moderate Condition and~0.03 ha of SHTW - Degraded Condition vegetation is proposed to be disturbed within the Proposal Area in the areas directly surrounding the station.

Nevertheless, minimal tree loss is anticipated with only three (3) small native trees to be potentially removed. Additionally, a ~0.01 ha area of SHTW – Degraded Condition vegetation may be subject to canopy trimming to facilitate the construction of a site compound at the end of Dawes Place. Other vegetation to be impacted includes up to ~0.11 ha of Urban Native/Exotic vegetation with the removal of up to ten (10) native trees, ~0.10 ha of Exotic Vegetation and ~0.12 ha of Exotic Grassland.

Whilst the habitat to the east of the Proposal Area offers a moderate degree of connectivity as described in ***Section 3.4.2***, the impacts of the proposal will have a marginal impact on the habitat connectivity values of the vegetation in question.

No threatened flora species were recorded within the Proposal Area. The Proposal Area and surrounding areas have been significantly modified and therefore it is considered that habitat within the Proposal Area is not suitable for the occurrence of threatened flora species endemic to the area. The removal or modification of a ~0.28 ha area of marginal foraging habitat is considered highly unlikely to result in significant impacts on potentially occurring threatened diurnal woodland birds, Microchiropteran bats, Megachiropteran bats, arboreal mammals and large forest owls.

S3.2 Indirect Impacts

In general, construction activities and vegetation removal have the potential to indirectly impact the remaining vegetation and habitats of Proposal Area. Such impacts may include:

- **Habitat fragmentation**: affects biodiversity and natural systems through reduction of available habitat and connectivity between habitat patches and corridors;
- **Edge effects**: affects biodiversity through changes in light, temperature, humidity and wind that can favour an array of different species and thus drive significant change in ecological processes;
- **Increased sedimentation and erosion**: affects biodiversity through the smothering of vegetation, increasing turbidity of waterways and transportation of weed matter and nutrients;
- **Introduction and spread of invasive species**: affects biodiversity through increased competition for resources; and
- **Habitat disturbance**: changes in noise and light levels during the construction phase.

S4 Mitigation Measures

S4.1 Vegetation Management and Removal

Vegetation management and removal must be undertaken in accordance with the TfNSW *Vegetation Management (Protection and Removal) Guidelines SD-111* (TfNSW, 2019) and TfNSW *Fauna Management Guidelines SD-113* (TfNSW 2019). As outlined in the guidelines, pre, during and post-construction management strategies should be utilised for sufficient protection and clearing of vegetation and fauna management.

S4.2 Delineation of Clearing Areas

Areas that require clearance will be flagged and clearly delineated by highly visible temporary fencing and appropriate signage to ensure that no areas intended for retention will be inadvertently cleared during the construction process.

S4.3 Tree Protection Measures

Prior to clearance, trees and vegetation to be retained are to be identified and marked to be protected, whilst trees to be cleared must be marked for removal. Where construction activities are in close proximity to trees, trunk and branch protection must be installed in accordance with Figure 2 of the TfNSW *Vegetation Management (Protection and Removal) Guidelines SD-111 (TfNSW 2019b).*

S4.4 Pre-clearance Surveys

In order to avoid impacts to fauna species during construction, pre-clearance surveys will be conducted in all areas of vegetation that are required to be cleared or altered. Pre-clearing surveys will be undertaken approximately one week ahead of clearing, to limit fauna injury and mortality, to identify newly formed or existing habitat features to be relocated and to identify priority weeds.

S4.5 Clearance Supervision

An ecologist will supervise the removal of any habitat items (e.g. nests, tree hollows) identified in the pre-clearance surveys. Clearance supervision will include the inspection of habitat items prior to and post felling in order to minimise impacts on native fauna.

S4.6 Translocation of Course Woody Debris

Where possible, any course woody debris such as log piles identified within the Proposal Area will be translocated to beyond the Proposal Area boundary within a suitable location in adjacent bushland.

S4.7 Weed Removal

Due to the presence of weeds listed as Priority weeds under the Biosecurity Act and WoNS within the Proposal Area, all vegetation removed from site must not be reused as mulch within the Proposal Area or off-site. During pre-clearance surveys, Priority weeds should be demarcated in order for these to be disposed of separately from native material. All groundcover should be disposed of in a manner that will prevent spread as the majority comprises of exotic species.

S4.8 Sedimentation, Erosion and Pollution Control

To reduce possible sedimentation on the Proposal Area, erosion control measures must be implemented. This includes minimising the amount of exposed soils on the site at any given time. All soil stockpiles should be adequately covered when not in use to prevent air quality impacts in windy conditions and erosion during heavy rainfall. To reduce the potential impacts of sediment/erosion runoff, it is recommended that no works be carried out during periods of heavy rainfall. Sediment fences should be set up in all areas down slope of proposed works.

S4.9 Offsets

TfNSW has prepared a Vegetation Offset Guide to assist in meeting biodiversity sustainability targets and providing a framework for a consistent approach for offsetting impacts to vegetation on TfNSW projects. It has been determined that a total of 30 trees are to be replanted to offset the loss of ~13 native trees within or surrounding the Proposal Area following provision of detailed design and consultation with Sydney Trains in accordance with the TfNSW *Vegetation Offset Guide* (TfNSW 2019c).

S5 Conclusion

The proposed works involve disturbance to SHTW, Urban Native/Exotic vegetation, Exotic Vegetation and Exotic Grassland to enable construction works associated with the proposed Lapstone Station Upgrade. Up to 17 trees are proposed to be impacted by the Proposal including 13 native trees and 4 exotic trees. With the implementation of the proposed mitigation measures and the establishment of offset plantings it is considered that the impacts to biodiversity will be minimal and can be appropriately managed.

1. Introduction

1.1. Purpose

Cumberland Ecology was commissioned by SNC-Lavalin on behalf of Transport of New South Wales (TfNSW) to prepare a specialist assessment of ecological values to assess the impacts of the proposed Lapstone Station Upgrade (the Proposal). This specialist assessment forms part of the Review of Environmental Factors (REF) which is being prepared to assess the impacts of the Proposal, in the considerations for approval under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1.1. Aims

The upgrades to Lapstone Station is subject to the associated REF and is seeking approval under Part 5 of the EP&A Act. Entry into the Biodiversity Offset Scheme (BOS) is not mandatory for Part 5 activities unless the proponent chooses to opt in to the scheme, or if the project is classified as State Significant Development or a State Significant Infrastructure project. Due to the limited scope of impacts to biodiversity resulting from the Proposal, TfNSW will utilise their *Vegetation Offset Guidelines* (TfNSW 2012).

The aims of this assessment are to:

- Provide a description and assessment of the ecological values of the Proposal Area (i.e. the area of land subject to the Proposal) including an assessment of habitat connectivity;
- Identify threatened species, populations or ecological communities in the Proposal Area listed under the *Biodiversity Conservation Act 2016* (BC Act) (*Threatened Species Conservation Act 1995* – repealed) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Assess the potential impacts of the Proposal on any threatened species, populations and communities identified as having the potential to occur within the Proposal Area;
- Identify the location and identity of species listed as 'Priority Weeds' under the NSW *Biosecurity Act 2015* (Biosecurity Act) at the Proposal Area;
- Provide recommendations on how to minimise impacts of the Proposal on the ecological values of the Proposal Area.
- Provide recommendations as to how the ecological values of the Proposal Area can be maintained during the construction and operational phases of the Proposal;
- Provide recommendations on whether further ecological assessment is required under the BC Act and/or EPBC Act; and

1.2. Background

TfNSW is the lead agency for integrated delivery of public transport services across all modes of transport in NSW. TfNSW is proposing to upgrade Lapstone Station as part of the NSW Government's Transport Access Program (TAP) which aims to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

Lapstone Station has been identified for an accessibility upgrade as it does not currently meet key requirements of the *Disability Standards for Accessible Public Transport* (DSAPT) or the Commonwealth Disability Discrimination Act 1992 (DDA).

Lapstone Station is approximately 63 kilometres from Central Station, Sydney on the Blue Mountains Line of the Intercity Trains Network. The station is located on the eastern edge of the settlement of Lapstone, with the Nepean River about 330m to the south-east. It is a dual platform station with the northbound side of the station (Platform 1) providing services to Central Station, Sydney, and the south bound side (Platform 2) providing services to the Blue Mountains and beyond to Lithgow.

The station building is located on the western side of the station on Platform 1 and contains a waiting room, staff office with ticketing window, storeroom and toilet facilities.

The station and western platform (Platform 1) are accessed via a combination of paths, ramps, and stairs from the station car park and pedestrian footpaths from adjoining roads.

The eastern side of the station (Platform 2) is accessed from the station and western side of the rail corridor via a steel pedestrian footbridge located towards the northern end of the platforms. A dirt track provides informal access to pedestrians from the east, and the neighbouring residential settlement of Leonay, through the adjoining bushland.

The commuter car park is located on the western side of the station. It currently provides one accessible parking space. Untimed on-street parking on surrounding streets is also available on the western side of the station.

Figure 1and **Figure 2** provide the regional and local site context for the Proposal.

1.3. Overview of the Proposal

As part of the TAP program, the Proposal would aim to provide a station precinct that is accessible for all sections of the community including people with a disability, limited mobility, parents/carers with prams, and customers with luggage.

Key features of the Proposal are:

- installation of one new lift to the eastern end of the existing footbridge and a new footpath from the base of the lift to connect to the existing station platform;
- construction of a new DSAPT complaint ramp that provides access on the western side of station from the carpark to the footbridge;
- construction of a new entrance point south of the station building on Platform 1;
- relocation of the existing non-compliant accessible parking space within the commuter car park close to the new entrance, with construction of the relocated space compliant to current standards;
- closure of a pedestrian access ramp immediately north of the station building that provides access to Platform 1;

- inclusion of a kiss and ride bay;
- construction of a new DSAPT compliant ramp that provides direct access from the accessible parking space to a new entrance to Platform 1;
- all stairs upgraded with compliant handrails, tactile ground surface indicators (TGSIs) and stair nosings;
- installation of TGSIs along to the full length of both platforms;
- regarding the platform area in front of the station building to achieve DSAPT compliance;
- modifications to the existing station building layout including:
    - the existing male toilet will be converted into a family accessible toilet and store room;
    - the female toilet will be converted to male and female ambulant toilets and a store room;
    - floor slab in the toilets and waiting room to be lowered to provide level access to the platform;
- installation of seating cut into the sandstone rail cutting on Platform 1;
- closed circuit television (CCTV) cameras to provide coverage to meet security standards for new infrastructure ;
- electrical supply upgrade to support new infrastructure;
- trimming and removal of trees and vegetation as minimally required to accommodate new infrastructure; and
- ancillary works including installation of platform hearing loops, service relocation, lighting, opal car reader, landscaping, drainage works, way finding signage, relocation of bins and furniture, and new bin storage area.

Subject to planning approval, construction is expected to commence in mid-2020 and take around 15 months to complete. Temporary site compound facilities would be needed for laying down equipment and machinery, parking plant and vehicles and storage of materials. The proposed area is the vegetated road reserve at the eastern end of Dawes Place.

Figure 3 shows the general layout of key elements of the Proposal based on the strategic concept design. The design would be further refined during the detailed design phase.

2. Methodology

2.1. Desktop Assessment

2.1.1. Database Search

A review of government databases was conducted on 16th August 2019 utilising the NSW Wildlife Atlas (OEH 2019a) and the EPBC Protected Matters Database (DotEE 2019), to identify threatened species, populations and ecological communities that occur or are likely to occur within a five (5) kilometre radius (the locality) of the Proposal Area.

2.1.2. Likelihood of Occurrence Assessment

All threatened species, populations and ecological communities identified in the database search were assessed for their likelihood to occur within the Proposal Area. Factors considered in the likelihood of occurrence assessment for each threatened species, population and ecological community included:

- Habitat requirements;
- Number, age and location of previous records from the locality; and
- The availability of suitable habitat within the Proposal Area.

The likelihood of occurrence assessments of threatened species, populations and communities are provided in **Appendix A**. It has been determined that targeted threatened species surveys are not required.

2.2. Site Assessment

Field surveys were undertaken on 5th August 2019 by Cumberland Ecology staff Michael Davis (ecologist) and Dr Rohan Mellick (botanist). Inspections involved traversing the Proposal Area on foot and visually inspecting the areas where ecological disturbance is proposed. Photographs were taken at various locations of proposed disturbance to document the condition of vegetation, habitat value and habitat connectivity within the Proposal Area. The locations of surveys conducted during the site assessment are shown in **Figure 4** and a detailed description of the methodology implemented is provided below.

2.2.1. Flora Surveys

Flora surveys were conducted to verify and update any existing mapping, with particular reference to Threatened Ecological Communities (TECs), as listed under the BC Act and/or EPBC Act.

The vegetation within the Proposal Area was ground-truthed via a random meander survey (RMS) and the condition and composition of vegetation was assessed as per the TfNSW *Vegetation Offset Guidelines* (TfNSW, 2013).

The vegetation survey consisted of the following methods:

- The establishment of a 10m x 100m plot to sample the vegetation within the Proposal Area. The following details were recorded:
    - Cover and abundance of native and exotic species (in a 10m x 40m plot nested within the 10m x 100m plot);

- Presence of mature trees (Diameter at Breast Height (DBH) ≥30cm);
- Structural information of each stratum;
- Identification of hollow-bearing trees, logs/timber, rock cover and leaf litter; and
- Condition and connectivity of vegetation.

- Targeted survey for threatened flora species known to occur within the locality.

Under the NSW *Biosecurity Act 2015* (Biosecurity Act) state and regional listed Priority Weeds have specific legal requirements for management and have higher management priorities. A survey for Priority Weeds and Weeds of National Significance (WoNS) within the Proposal Area was also carried out.

2.2.2. Fauna Habitat Assessment

A fauna habitat assessment was completed within the Proposal Area with consideration of significant indicators of habitat availability, condition and complexity. A search for the following indicators of fauna habitat was conducted:

- Ground, shrub/understorey and canopy cover;
- Tree hollows, noting the number and size of hollows;
- Habitat features such as bush rock, fallen logs and decorticating bark; and
- Indirect indicators such as scats, scratches, nests, burrows, paths and runways.

Additionally, an assessment of the structural complexity and connectivity of vegetation, age of structure and nature and extent of human disturbance was also undertaken to infer the degree of connectivity in accordance with the Infrastructure Sustainability Council (ISCA) v1.2 Guidelines. **Table 1** below was utilised to determine the degree of habitat connectivity within the Proposal Area.

Table 1 - Guidelines utilised to measure habitat connectivity within the Proposal Area (ISCA).

Degree of connectivity	Definition
High	Native vegetation in good condition >100m wide that forms a sole link between other native vegetation in good condition.
Moderate	Low condition native vegetation >100m wide or native vegetation in good condition 50- 100m wide that forms part of a sole link between other vegetation in good condition.
Low	Low condition native vegetation >100m wide or native vegetation in good condition >50m wide that is part of one of several links to other native vegetation in good condition.
Nil	None of the above.

2.3. Limitations

Flora of the locality is well known based upon a sizeable database of past records and various published reports. The field survey undertaken by Cumberland Ecology added to this existing database and has helped to provide an indication of the likelihood that various species occur or are likely to occur within the Proposal Area. The data obtained from database assessment and surveys of the Proposal Area furnished an appropriate level of information to support this assessment. It should be noted that some areas of the Proposal Area were inaccessible for safety reasons.

It is considered that the flora species of conservation value have been adequately targeted within the Proposal Area to enable this assessment to be prepared. A range of threatened flora is known to occur in the locality, however based on site conditions, a number of these are unlikely to occur in the Proposal Area.

The area values presented within this report are approximate and are derived from a combination of aerial photo-interpretation, field-based mapping and data extrapolation. This approach provides adequate and reliable information for this ecological assessment.

3. Results

3.1. Database Search

The results of the database search and likelihood of occurrence assessment are shown in **Appendix A**. No threatened flora species were identified as having the potential to occur on the Proposal Area due to the degraded condition of the majority of the vegetation, limited Proposal Area and a lack of records within the locality. Urban adapted, highly mobile and aerial groups of threatened fauna species may have the potential to occur including:

- Megachiropteran bats;
- Microchiropteran bats,
- Arboreal mammals;
- Large forest owls; and
- Diurnal woodland birds.
- These species and/or species groups may occasionally and opportunistically utilise the foraging resources within the Proposal Area as part of a larger foraging range, however they would not be expected to solely rely on the available habitat within the Proposal Area. These species are considered in greater detail in subsequent subsections and **Appendix A** and **Appendix C**.

3.2. Vegetation Communities

Vegetation within the Proposal Area is comprised of four vegetation communities. However, one community, Sydney Hinterland Transition Woodland, is present in three condition states. The vegetation within the Proposal Area has been subject to disturbance and clearing for linear infrastructure. Previous land use of the Proposal Area and immediate surrounds has removed and/or modified much of the fauna habitat complexity.

Following field surveys, Cumberland Ecology identified the following vegetation communities to persist within the Proposal Area.

- Sydney Hinterland Transition Woodland – Moderate Condition;
- Sydney Hinterland Transition Woodland – Degraded Condition;
- Sydney Hinterland Transition Woodland – Scattered Trees;
- Urban Native/Exotic Plantings;
- Exotic Vegetation; and
- Exotic grassland.

Plant Community Types (PCTs) were selected for naturally occurring vegetation communities with the utilisation of the Bionet Vegetation Classification System (OEH 2019b). A PCT was then chosen based upon number of floristic matches and physical environmental attributes such as landform and underlying geology

and soils. A description of each vegetation community is provided below and the total area of extent within the Proposal Area is identified in **Table 2**. The extent of each community is detailed in **Figure 5**.

Table 2 - Vegetation Communities within the Proposal Area

Vegetation Community	Area (ha)
Sydney Hinterland Transition Woodland - Moderate Condition	0.13
Sydney Hinterland Transition Woodland - Degraded Condition	0.03
Sydney Hinterland Transition Woodland - Scattered Trees	0.01
Urban Native/ Exotic Vegetation	0.11
Exotic Vegetation	0.10
Exotic Grassland	0.12
Cleared Land	0.53

3.2.1. Sydney Hinterland Transition Woodland – Moderate Condition;

BC Act Status: Not listed

EPBC Act Status: Not listed

PCT 1081: Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion

Moderate condition Sydney Hinterland Transition Woodland (SHTW) occupies 0.13 ha of the total area and was found adjacent to the eastern end of the Proposal Area and to the east of the rail line along the majority of the Proposal Area. The dominant canopy species are *Eucalyptus punctata* (Grey Gum), *Angophora floribunda* (Rough-barked Apple) and *Corymbia eximia* (Yellow Bloodwood).

The small tree stratum is primarily comprised of regenerating canopy species and *Acacia parramattensis* (Parramatta Wattle) with less frequent *Notelaea longifolia* (Mock Olive) and *Allocasuarina torulosa* (Forest Oak). Common species o within the shrub stratum include *Cryptandra spinescens* and *Pittosporum undulatum* (Sweet Pittosporum) with less frequent *Exocarpos cupressiformis* (Cherry Ballart), *Hibbertia aspera* (Rough Guinea Flower), *Acacia falcata* and *Hakea sericea* (Needlebush). The ground stratum included the exotic grass *Eragrostis curvula* (African Lovegrass) and native species such as *Dianella revoluta* (Blueberry Lilly), *Dianella caerulea* (Blue Flax-lily), *Entolasia stricta* (Wiry Panic), *Lomandra obliqua* and *Lomandra multiflora* (Many-flowered Mat-rush). The climbers *Passiflora herbertiana* and *Hardenbergia violacea* (False Sarsaparilla) are also present in the understorey.

This community is not listed under the BC Act or the EPBC Act.

The main structural features of this community are shown in **Photograph 1.**

Photograph 1 – SHTW – Moderate Condition

3.2.2. Sydney Hinterland Transition Woodland – Degraded Condition;

BC Act Status: Not Listed

EPBC Act Status: Not Listed

PCT 1081: Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion

The degraded condition SHTW occupies 0.03 ha of the Proposal Area and was found within and adjacent to the Proposal Area. An intact canopy was absent. The small tree stratum was represented by an individual of two individuals of *Corymbia eximia* (Yellow Bloodwood) and *Acacia parramattensis* (Parramatta Wattle). Common species within the shrub stratum include *Exocarpos cupressiformis* (Cherry Ballart), *Pittosporum undulatum* (Sweet Pittosporum) with less frequent *Acacia falcata* and *Hakea sericea* (Needlebush). The ground stratum is largely dominated by exotics such as the grass *Eragrostis curvula* (African Lovegrass) with less frequent *Agave americana* (Centaury Plant) and *Bryophyllum delagoense* (Mother-of-millions).

This community is not listed under the BC Act or the EPBC Act.

The main structural features of this community are shown in **Photograph 2.**

Photograph 2 - SHTW – Degraded Condition

3.2.3. Sydney Hinterland Transition Woodland – Scattered Trees

BC Act Status: Not Listed

EPBC Act Status: Not Listed

PCT 1081: Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion

Scattered SHTW trees occupied 0.01 ha of the Proposal Area and was found above exotic grassland in the west of the Proposal Area. The canopy consisted of two mature *Eucalyptus punctata* (Grey Gum) of approximately 20 m in height were present; and, one *Corymbia eximia* (Yellow Bloodwood) of approximately 15 m in height. The small tree stratum was represented by a single *Allocasuarina torulosa* (Forest Oak) of approximately 7m in height. The shrub stratum was absent besides a few small *Lantana camara* (Lantana) individuals around the base of the mature trees. The ground stratum contained mostly exotic grasses and forbs with occasional native species such as *Cyperus gracilis* (Slender Flat-sedge) and *Glycine clandestina* (Twining Glycine).

This community is not listed under the BC Act or the EPBC Act.

The main structural features of this community are shown in **Photograph 3.**

Photograph 3 - SHTW – Scattered trees

3.2.4. Urban Native/Exotic

- BC Act Status: Not Listed

EPBC Act Status: Not Listed

PCT: Not Defined

The Proposal Area includes 0.11 ha of Urban Native/Exotic vegetation, represented mainly as planted scattered trees and garden beds planted with mainly native species distributed throughout the western side of the Proposal Area. The assemblage of species in this community within the Proposal Area does not conform to the description of any locally-defined vegetation community. The small tree stratum was represented by cultivated *Ceratopetalum gummifera* (Christmas Bush), *Callistemon viminalis* (Weeping Bottlebrush) and *Banksia serrata* (Old-man Banksia). The shrub stratum was represented by cultivated *Grevillea kedumbensis*, *Boronia anethifolia*, *Callistemon citrinus* (Crimson Bottlebrush), *Austromyrtus dulcis* (Midgen Berry) and *Crowea saligna*. The ground stratum occurred mostly as exotic forbs and weeds scattered amongst the garden beds.

This community is not listed under the BC Act or the EPBC Act.

The main structural features of this community are shown in **Photograph 4.**

Photograph 4 - Urban Native/Exotic vegetation represented mainly as scattered trees and garden beds

3.2.5. Exotic Vegetation

BC Act Status: Not Listed

EPBC Act Status: Not Listed

PCT: Not defined

The Proposal Area includes 0.10 ha of Exotic Vegetation, represented mainly as exotic shrubs and weeds within areas along the eastern side of the rail corridor. The assemblage of species in this community within the Proposal Area does not conform to the description of any locally-defined vegetation community. The shrub stratum was represented by an infestation of the exotic shrub *Tecoma stans* (Yellow Bells). and *Lantana camara* (Lantana). The ground stratum is largely dominated by the exotic grass *Eragrostis curvula* (African Lovegrass) and forb *Coreopsis lanceolata* (Coreopsis) with less frequent *Agave americana* (Centaury Plant) and *Bryophyllum delagoense* (Mother-of-millions).

This community is not listed under the BC Act or the EPBC Act.

The main structural features of this community are shown in **Photograph 5.**

Photograph 5 - Urban Native/Exotic vegetation represented mainly as scattered trees and garden beds

3.2.6. Exotic Grassland

BC Act Status: Not Listed

EPBC Act Status: Not Listed

PCT: Not defined

The Proposal Area includes 0.12 ha of Exotic Grassland maintained as lawns throughout the Proposal Area. The main grass species used for the lawns is the non-endemic native grass *Cynodon dactylon* (Couch) and to a lesser extent *Cenchrus clandestinus* (Kikuyu Grass). Exotic forbs such as *Oxalis corniculata* (Creeping Oxalis) are scattered throughout. Scattered native groundcover species present include *Rumex brownii* (Swamp Dock) and *Cyperus gracilis* (Slender Flat-sedge).

This community is not listed under the BC Act or the EPBC Act.

The main structural features of this community are shown in **Photograph 6.**

Photograph 6 - Exotic Grassland represented as lawns throughout the western side of the Proposal Area

3.3. Flora

3.3.1. General Species

A total of 108 flora species were identified within the Proposal Area. Species present are comprised of a mix of remnant trees, planted native and non-endemic native species (56%) and exotic species (44%). A flora species list for the Proposal Area is provided in **Appendix B** documenting all species recorded during the flora surveys.

3.3.2. Threatened Species

No threatened flora species were recorded within the Proposal Area. An analysis of the likelihood of occurrence of the Proposal Area for each threatened flora species recorded within the locality is provided in **Appendix A**.

It is considered unlikely that any threatened flora species would naturally occur within the Proposal Area as the majority of the habitat is highly disturbed or comprises previously cleared and replanted vegetation.

Additionally, no threatened flora species were found during surveys and there are limited records of occurrence as shown in **Appendix A**.

3.3.3. Priority Weeds

A total of 13 Priority weeds and Weeds of National Significance (WoNS) were identified within the Proposal Area. A list of Priority weeds and their Sydney Region Weed Management Plan (*Biosecurity Act 2015*) and WoNS status is provided in **Table 3** below (LLS: Greater Sydney 2017).

Table 3 - Priority weeds and WoNS within the Proposal Area

Scientific Name	Common Name	WONS	Biosecurity Act Status
Asparagus aethiopicus	Asparagus Fern	Yes	SP
Asparagus plumosus	Climbing Asparagus Fern	Yes	SP
Bryophyllum delagoense	Mother-of-millions		OWRC
Cenchrus clandestinus	Kikuyu Grass		OWRC
Cenchrus setaceus	Fountain Grass		OWRC
Eragrostis curvula	African Lovegrass		OWRC
Lantana camara	Lantana	Yes	SP
Ligustrum lucidum	Large-leaved Privet		OWRC
Murraya paniculata	Sweet Jessamine		OWRC
Ochna serrulata	Mickey Mouse Plant		OWRC
Rosa rubiginosa	Sweet Briar		OWRC
Senecio madagascariensis	Fireweed	Yes	SP
Tecoma stans	Yellow Bells		OWRC

Note: OWRC = Other Weeds of Regional Concern, SP = State level determined priority weeds

3.4. Fauna

3.4.1. Fauna Habitat

The Proposal Area provides limited habitat for fauna species due to the artificial nature of the planted vegetation on the western side and the degraded nature of the bushland on the eastern side of the Proposal Area. Although there are some areas of potential habitat for urban adapted species and small reptiles, the potential habitat is not considered to be a reliable resource and it is most likely to be used for foraging by urban adapted bird species such as the Noisy Miner (*Manorina melanocephala*) and Rainbow Lorikeet (*Trichoglossus haematodus)*. On a precautionary basis, the Proposal Area is considered to constitute marginal foraging habitat for a range of highly mobile threatened fauna species that may utilise the Proposal Area as part of a larger foraging range as detailed in ***Section 3.4.4***. A log pile occurs within the degraded SHTW within the western extent of the Proposal Area.

3.4.2. Fauna Habitat Connectivity

The vegetation on the western side of the Proposal Area comprised of Urban Native/Exotic Vegetation and SHTW – Scattered Trees has been assessed to not contain significant habitat connectivity as per the ISCA definitions. These areas of low condition vegetation are less than 50 m in width and do not provide a sole link or one of several links to other native vegetation in good condition.

Vegetation on the eastern side of the Proposal Area is considered to have a moderate degree of connectivity as per ISCA definitions as it is comprised of native vegetation considered to be in good condition, is 50- 100m wide and forms part of a sole link between other vegetation in good condition. This vegetation forms part of a >100 m wide habitat corridor bounded by the railway line in the west and the Nepean River in the east.

3.4.3. General Fauna Species

A total of 11 native fauna species were identified within the Proposal Area and immediate surrounds including ten (10) bird species and one (1) reptile. A fauna list for the Proposal Area is provided in **Appendix B**. Common urban adapted species such as the Noisy Miner (*Manorina melanocephala*) and the Rainbow Lorikeet (*Trichoglossus moluccanus*) were observed within the Urban Native/Exotic planted vegetation and would be expected to utilise the entirely of the available habitat within the Proposal Area as foraging habitat. Woodland bird species such as the New Holland Honeyeater (*Phylidonyris novaehollandiae*) and the Bell Miner (M*anorina melanophrys*) would be expected to mostly utilise the bushland on the eastern side of the Proposal Area but may occasionally and opportunistically access the marginal foraging resources within Urban Native/Exotic planted vegetation on the western side of the Proposal Area.

3.4.4. Threatened Species

A number of threatened species have been recorded within the locality that have the potential to occur within the Proposal Area. An analysis of the likelihood of occurrence of threatened fauna to occupy the Proposal Area has been conducted and is included in **Appendix A**.

The likelihood of occurrence assessments indicate that a small number of threatened species listed under the BC Act and/or EPBC Act have potential to occur based on the foraging habitat available, including highly mobile and aerial groups of fauna species. No migratory species would be anticipated to utilise the Proposal Area due to a lack of suitable habitat and a lack of prior records of occurrence within the locality as discussed in **Appendix A** (OEH 2019a). The vegetation present on the eastern side of the Proposal Area may have the potential to be utilised by the following threatened species on occasion as part of a much broader foraging range:

- Grey-headed Flying Fox (*Pteropus poliocephalus*), listed as Vulnerable under the BC Act and the EPBC Act;
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*), listed as Vulnerable under the BC Act;
- Koala (*Phascolarctos cinereus*), listed as Vulnerable under the BC Act and the EPBC Act;
- Greater Glider (*Petauroides volans*), listed as Vulnerable under the EPBC Act;
- Yellow-bellied Glider (*Petaurus australis*), listed as Vulnerable under the BC Act;

- Powerful Owl (*Ninox strenua*), listed as Vulnerable under the BC Act;
- Masked Owl (*Tyto novaehollandiae*), listed as Vulnerable under the BC Act;
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*), listed as Vulnerable under the BC Act;
- Gang-gang Cockatoo (*Callocephalon fimbriatum*), listed as Vulnerable under the BC Act;
- Square-tailed Kite (*Lophoictinia isura*), listed as Vulnerable under the BC Act;
- Varied Sittella (*Daphoenositta chrysoptera*), listed as Vulnerable under the BC Act; and
- Swift Parrot (*Lathamus discolour*), listed as Endangered under the BC Act and as Critically Endangered under the EPBC Act.

4. Impact Assessment

4.1. Removal of Vegetation

4.1.1. Impacts to Vegetation Communities

The vegetation to be impacted within the Proposal Area includes the removal of up to approximately 17 trees including 13 native trees and 4 exotic trees. **Table 10** in **Appendix B** provides a list of native and exotic trees proposed for removal whilst **Table 4** shows areas of vegetation to be disturbed. **Figure 6** details the location of each of these trees to be impacted.

One native vegetation community occurs within the Proposal Area and will be directly impacted by the Proposal. Up to ~0.13 ha of SHTW - Moderate Condition and~0.03 ha of SHTW - Degraded Condition vegetation is proposed to be disturbed within the Proposal Area in the areas directly surrounding the station, however minimal tree loss is anticipated with only three (3) small native trees to be potentially removed. Additionally, a ~0.01 ha area of SHTW – Degraded Condition vegetation may be subject to canopy trimming to facilitate the construction of a site compound at the end of Dawes Place. Other vegetation to be impacted includes up to ~0.11 ha of Urban Native/Exotic vegetation with the removal of up to ten (10) planted native trees and four (4) exotic trees, ~0.10 ha of Exotic Vegetation and ~0.12 ha of Exotic Grassland.

Table 4 Areas of vegetation within the Proposal Area to be removed or modified

Vegetation Community	Disturbance Area (ha)
Sydney Hinterland Transition Woodland - Moderate Condition	0.13
Sydney Hinterland Transition Woodland - Degraded Condition	0.03
Sydney Hinterland Transition Woodland - Scattered Trees	0.01
Urban Native/ Exotic Vegetation	0.11
Exotic Vegetation	0.10
Exotic Grassland	0.12
Cleared Land	0.53

4.1.2. Impacts to Habitat Connectivity

Whilst the habitat to the east of the Proposal Area offers a moderate degree of connectivity as described in ***Section 3.4.2***, the impacts of the proposal will have a marginal impact on the habitat connectivity values of the vegetation in question. The Proposal Area only encroaches ~9 m into the edge of treed habitat, leaving ~390 m between the Proposal Area and the Nepean River. This is not considered to be a significant impact to the habitat connectivity values of the vegetation.

4.1.3. Impacts to Threatened Flora

No threatened flora species were recorded within the Proposal Area. The Proposal Area and surrounding areas have been significantly modified and therefore it is considered that habitat within the Proposal Area is not suitable for the occurrence of threatened flora species endemic to the area.

4.1.4. Priority Weeds and WoNS

The Proposal will require the potential removal of the Priority Weeds and WoNS within the Proposal Area (see **Table 3**). Precautionary actions and recommendations are provided in **Chapter 5** to aid efficient removal and minimise the spread of these species into adjacent land.

4.1.5. Impacts to Threatened Fauna

The western extent of the Proposal Area is located within a previously cleared, ecologically degraded urban environment containing mixed native and exotic plantings, surrounded by residential allotments. The eastern extent of the Proposal Area encroaches into a large patch of SHTW in varying condition states. The SHTW within ~10 m of the existing platform is in a highly degraded state due to a general lack of canopy species and the prevalence of exotic vegetation throughout the understorey, offering significantly reduced threatened fauna habitat. SHTW beyond the degraded patch is in a moderate condition state and offers relatively greater habitat values for threatened fauna.

The main groups of fauna that would be anticipated to utilise the Proposal Area includes Megachiropteran bats, Microchiropteran Bats, Large Forest Owls, Diurnal Woodland Birds and Arboreal Mammals. All of these highly mobile groups of threatened fauna would be expected to occasionally and opportunistically utilise the foraging habitat within the Proposal Area as part of a larger foraging range and would not be solely reliant on the habitat to be impacted. The Proposal Area does not contain breeding habitat for any of the fauna groups considered likely to occur, as no breeding habitat features were present such as caves, tree hollows, nests or known breeding camps. Tests of Significance under Section 7.3 of the BC Act have been prepared for the threatened fauna species that have potential to utilise the Proposal Area as detailed in **Appendix C.** The removal or modification of a ~0.28 ha area of marginal foraging habitat is considered highly unlikely to result in significant impacts on potentially occurring threatened diurnal woodland birds, Microchiropteran bats, Megachiropteran bats, arboreal mammals and large forest owls.

4.2. Indirect Impacts

In general, construction activities and vegetation removal have the potential to indirectly impact the remaining vegetation and habitats of Proposal Area. Such impacts may include:

- **Habitat fragmentation**: affects biodiversity and natural systems through reduction of available habitat and connectivity between habitat patches and corridors. Localised impacts to planted native and exotic trees are anticipated on the western side of the station, however these impacts are unlikely to result in increased habitat fragmentation further than the currently highly fragmented conditions. Impacts to vegetation on the eastern side of the station involve the disturbance of vegetation on the edge of treed habitat and will not result in increased fragmentation;

- **Edge effects**: affects biodiversity through changes in light, temperature, humidity and wind that can favour an array of different species and thus drive significant change in ecological processes (Lindenmayer and Fischer 2006). As the Proposal Area is located at an existing railway station and railway corridor, the habitat in question is already subject to significant edge effects as a result. Subsequently, edge effects are not anticipated to be increased further than current conditions;

- **Increased sedimentation and erosion**: affects biodiversity through the smothering of vegetation, increasing turbidity of waterways and transportation of weed matter and nutrients. Provided that appropriate sedimentation and erosion mitigation measures are followed, significant sedimentation and erosion impacts are considered unlikely to occur;
- **Introduction and spread of invasive species**: affects biodiversity through increased competition for resources. Provided that appropriate weed management mitigation measures are followed as described in ***Section 5.1.5***, significant sedimentation and erosion impacts are unlikely to occur; and
- **Habitat disturbance**: changes in noise and light levels during the construction phase. Whilst the Proposal is likely to involve temporary increases in noise and light levels during the construction phase, the Proposal Area is located within and adjacent to an operational railway station and railway corridor and subsequently, the occurring flora and fauna are subject to ongoing noise and light disturbance. Subsequently, the Proposal is unlikely to result in habitat disturbance further than current conditions in the longer term.
- Further indirect impacts are not anticipated during the operational phase as the use of the Proposal Area will remain consistent with that prior to commencement of the Project.

5. Mitigation Measures

The following recommendations have been provided to minimise impacts of the proposed works on the biodiversity values of the Proposal Area.

5.1. Vegetation Clearing

5.1.1. Vegetation Management and Removal

Vegetation management and removal must be undertaken in accordance with the TfNSW *Vegetation Management (Protection and Removal) Guidelines SD-111* and TfNSW *Fauna Management Guidelines SD-113* (TfNSW 2019b, a). As outlined in the guidelines, pre, during and post-construction management strategies should be utilised for sufficient protection and clearing of vegetation and fauna management.

5.1.1.1. Delineation of Clearing Areas

Areas that require clearance will be flagged and clearly delineated by highly visible temporary fencing and appropriate signage to ensure that no areas intended for retention will be inadvertently cleared during the construction processs (TfNSW 2019b). No machinery will be parked on areas beyond the temporary fencing and no access will be allowed during construction. Ancillary facilities such as stockpile sites, site compounds and construction zones will not be located beyond the limits of clearing. Defined access tracks and entry/exit points must be utilised for all vehicle movements. Site inductions are to be provided by the civil contractor to ensure all site workers and visitors are aware of any no-access areas.

5.1.1.2. Tree Protection Measures

Prior to clearance, trees and vegetation to be retained are to be identified and marked to be protected, whilst trees to be cleared must be marked for removal. Where construction activities are in close proximity to trees, trunk and branch protection must be installed in accordance with Figure 2 of the TfNSW *Vegetation Management (Protection and Removal) Guidelines SD-111* (TfNSW 2019b). All temporary exclusion fencing must be located outside of the tree protection zones of trees to be retained.

5.1.2. Pre-clearance Surveys

In order to avoid impacts to fauna species during construction, pre-clearance surveys will be conducted in all areas of vegetation that are required to be cleared or altered. Pre-clearing surveys will be undertaken approximately one week ahead of clearing, to limit fauna injury and mortality, to identify newly formed or existing habitat features to be relocated and to identify priority weeds. Pre-clearance surveys will be conducted by suitably qualified and experienced ecologists, and all fauna found during these surveys will be encouraged to move on or relocated by the ecologists in areas of similar habitat nearby that will not be impacted.

Pre-clearing surveys will be undertaken by a suitably qualified ecologist. Pre-clearing surveys will include:

- Demarcation of key habitat features, such as log piles or hollow-bearing trees within or directly adjacent to the Proposal Area;
- Checking trees for the presence of bird nests and arboreal mammals, such as possums, and bats, prior to felling; and

- Safe removal of animals found to be occupying trees and habitat before the clearing of trees and relocation into nearby wooded habitat.

To minimise impacts to native fauna species, clearing will be undertaken in the following two-stage process under the supervision of a suitably qualified ecologist:

- The initial phase of clearing will involve clearing around identified habitat features and leaving the features overnight to provide the opportunity for fauna to self-relocate; and
- The second stage will involve clearing of the habitat features left overnight followed by an inspection.

5.1.3. Clearance Supervision

An ecologist will supervise the removal of any habitat items (e.g. nests, tree hollows) identified in the pre-clearance surveys. Clearance supervision will include the inspection of previously identified habitat items prior to and post felling in order to minimise impacts on native fauna.

Provisions will be made to protect any native fauna during clearing activities by the following means:

- All staff working on the vegetation clearing will be briefed about the possible fauna present and should avoid injuring any present;
- Animals disturbed or dislodged during the clearance but not injured will be assisted to move to adjacent bushland or other specified locations; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal (either taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanised).

Provision of a report following the completion of clearing works will be provided detailing the total number and species of individuals recorded and details of their release/health.

5.1.4. Translocation of Course Woody Debris

Where possible, any course woody debris such as log piles identified within the Proposal Area will be translocated to beyond the Proposal Area boundary within a suitable location in adjacent bushland.

5.1.5. Weed Removal

Due to the presence of weeds listed as Priority weeds under the Biosecurity Act and WoNS within the Proposal Area, all vegetation removed from site must not be reused as mulch within the Proposal Area or off-site. During pre-clearance surveys, Priority weeds should be demarcated in order for these to be disposed of separately from native material. All groundcover should be disposed of in a manner that will prevent spread as the majority comprises of exotic species. Additionally, check all items are free of soil and vegetative material before moving through a weed free area and before leaving the site, including machinery, vehicles, tools and footwear.

To supplement this, weed removal, management and disposal must be undertaken in accordance with the TfNSW *Weed Management and Disposal Guide* (TfNSW 2019d). This guideline outlines the necessity to prevent, control and dispose of weeds in order to preserve biodiversity values present within the Proposal Area.

5.1.6. Sedimentation, Erosion and Pollution Control

To reduce possible sedimentation on the Proposal Area, erosion control measures must be implemented. This includes minimising the amount of exposed soils on the site at any given time. All soil stockpiles should be adequately covered when not in use to prevent air quality impacts in windy conditions and erosion during heavy rainfall. To reduce the potential impacts of sediment/erosion runoff, it is recommended that no works be carried out during periods of heavy rainfall. Sediment fences should be set up in all areas down slope of proposed works.

5.1.7. Offsetting

TfNSW has prepared a *Vegetation Offset Guide* to assist in meeting biodiversity sustainability targets and providing a framework for a consistent approach for offsetting impacts to vegetation on TfNSW projects (TfNSW 2019c).

As an offset site has not been identified for the Proposal, actions are to be undertaken in accordance with Figure 3 of the TfNSW *Vegetation Offset Guide (TfNSW 2019c)*. Subsequently, secondary offsets are being sought to offset the impacts of the Proposal. The parameters detailed in **Table 5** below have been gathered during the site assessment and will provide relevant information for the provision of an appropriate offset. All proposed offset plantings must be designed and located with the guidance of a suitably experienced and qualified ecologist following provision of detailed designs. Offset plantings must be designed to ensure that habitat connectivity within offset area is maximised with a suitable species composition utilising species characteristic of SHTW.

Table 5 - Ecological Parameters of the Proposal Area

Parameter	Result
Proportion of native species on the Proposal Area	56%
Mature Trees Present (DBH>30cm)	No
Proportion of native species in over-storey	76%
Proportion of native species in mid-storey	86%
Proportion of native species in ground layer	35%
Habitat Connectivity	Low-Moderate
Endangered Ecological Community present?	No
Timber length (m) /1000m^2	24
Hollow Bearing Trees /1000m^2	0
Leaf Litter	76%

The TfNSW *Vegetation Offset Guide* specifies the ratios required for replacement planting for the removal of single or a group of trees (TfNSW 2019c). The following tree replacement ratios that apply to this Proposal include:

- Eight planted trees for every tree removed with a DBH >60cm;
- Four planted trees for every tree removed with a DBH of 15cm-60cm; and
- Two planted trees for every tree removed with a DBH <15cm.

Table 6 below details the recommended offsetting ratios required for tree removal associated with the Proposal. Whilst the Proposal involves the removal of four (4) exotic trees, an offset is not being sought for these trees as they offer limited ecological value and do not offer significant heritage or visual amenity, community or intrinsic value (TfNSW 2019c).

Table 6 - Tree Replacement Planting Ratio

DBH (cm)	No. Trees Removed	Planting Ratio	Replacement Plantings
>60	0	8:1	0
15-60	2	4:1	8
<15	11	2:1	22
Total	13		30

Please note that the total number of trees proposed for removal are indicative only and subject to change relative to detailed design and the extent of construction works. The offsetting requirements and ratios calculated have been done so to account for clearance of trees identified during the site assessment on 5 August 2019.

TfNSW has confirmed that the offset liability of the Proposal can be met with the establishment of native tree plantings within and surrounding the Proposal Area following consultation with Sydney Trains. The proposed offset plantings provide an opportunity for the enhancement of habitat connectivity on the eastern side of the station throughout the area of Degraded and Moderate Condition SHTW with the reinstatement of native trees. Other areas identified as suitable for offset tree planting include garden beds east or south of the station building. The locations of all offset plantings will be determined during the detailed design phase of the Proposal.

6. Conclusion

The proposed works involve disturbance to SHTW in three condition forms, Urban Native/Exotic vegetation, Exotic Vegetation and Exotic Grassland to enable construction works within the Proposal Area associated with the proposed Lapstone Station Upgrade.

Up to 17 trees are proposed to be impacted by the Proposal including 13 native trees and 4 exotic trees. The location and details of these trees are provided in **Figure 6** and **Table 10**. Areas of shrubs and groundcovers are also expected to be removed within the existing garden beds, the majority of which are exotic species. General disturbance to groundcover and shrubs is anticipated throughout the entirety of the Proposal Area resulting from construction activities. No vegetation to be impacted is listed as a TEC under the BC Act or EPBC Act.

No threatened flora species were identified within the Proposal Area, and none are likely to occur due to the degraded and fragmented condition of the available habitat. Although some threatened fauna species may utilise the Proposal Area occasionally and opportunistically for foraging, none are likely to solely rely on the Proposal Area. Highly mobile and aerial threatened fauna species would be expected to forage throughout a larger foraging range extending far beyond the Proposal Area.

TfNSW has prepared a *Vegetation Offset Guide* to assist in meeting biodiversity sustainability targets and providing a framework for a consistent approach for offsetting impacts to vegetation on TfNSW projects. It has been determined that a total of 30 trees are to be replanted within or surrounding the Proposal Area following provision of detailed design and consultation with Sydney Trains in accordance with the TfNSW Vegetation Offset Guide (See **Table 6**). With the implementation of the proposed mitigation measures and the establishment of offset plantings described previously, it is considered that the impacts to biodiversity will be minimal and can be appropriately managed.

7. References

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APPENDIX A :
Likelihood of Occurrence Tables

Table 7 - Threatened Flora Likelihood of Occurrence Table

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E	V	Species or species habitat likely to occur within area	Found in heath and woodland on sandy soils. Prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Unlikely. The Proposal Area may comprise potential habitat for the species, however no individuals were found and there are no records of the species within the locality.
Casuarinaceae	*Allocasuarina glareicola*	-	E	E	Species or species habitat likely to occur within area	Grows in Castlereagh woodland on lateritic soil with *Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla* and *Melaleuca decora*. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	Unlikely. The Proposal Area does not contain suitable vegetation types and is outside of the specified area of occurrence.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue-orchid	V	V	Species or species habitat may occur within area	Occur in a wide variety of habitats including heathlands, heathy woodlands, sedgelands, *Xanthorrhoea* spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests. Soils are generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils. Is associated with the community Bloodwood / Scribbly Gum / Silver-top Ash Forest on the South Coast. Species is known to have occurrence associated with other *Cryptostylis* species. Flowering occurs generally from November to February.	Unlikely. The Proposal Area may comprise potential habitat for the species, however no individuals were found and there are no records of the species within the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E	E	Species or species habitat likely to occur within area	Usually associated with dry rainforest vegetation and in coastal communities. Can occur in clay influenced woodland associated with *Eucalyptus tereticornis* and *Corymbia maculata*.	Unlikely, no suitable habitat due to lack of rainforest and coastal community found within the Proposal Area.
Fabaceae (Faboideae)	*Dillwynia tenuifolia*	-	V	-	3	Locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Unlikely. The Proposal Area may comprise potential habitat for the species, however no individuals were found and there are limited records of the species within the locality.
Myrtaceae	*Eucalyptus aggregata*	Black Gum	V	V	Species or species habitat may occur within area	Grows on alluvial soils, on cold, poorly drained flats and hollows adjacent to creeks and small rivers. Also sometimes occurs as isolated paddock trees in modified native and exotic pastures.	Unlikely, no suitable habitat found within the Proposal Area due to lack of waterbodies.
Myrtaceae	*Eucalyptus benthamii*	Camden White Gum	V	V	1	Occurs on alluvial flats of the Nepean River and tributaries. Occurs in open forests and require a combination of deep alluvial	Unlikely, Proposal Area is not located on alluvial flats or prone to flooding.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						sands and a flooding regime to promote seed establishment.	
Orchidaceae	*Genoplesium baueri*	Yellow Gnat-orchid	-	E	Species or species habitat may occur within area	Grows in dry sclerophyll forest and in moss gardens over sandstone and flowers February to March.	Unlikely, whilst the Proposal Area contains dry sclerophyll forest, moss gardens do not occur and there are no records of the species within the locality.
Haloragaceae	*Haloragis exalata subsp. Exalata*	Wingless Raspwort	V	V	Species or species habitat may occur within area	Species requires protected and shaded damp situations in riparian habitats.	Unlikely, no suitable habitat found within the Proposal Area due to lack of riparian areas.
Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and	E	-	3	Grows in vine thickets and open shale woodlands.	Unlikely, no vine thickets or shale woodland is found within the Proposal Area.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
		Penrith local government areas					
Myrtaceae	*Melaleuca deanei*	Deane's Paperbark	V	V	1	Grows in wet heath on sandstone, sandy soils and woodlands. The majority of populations occur in clefts within granite outcrops on skeletal soils, though also occurs at lower altitudes in damp situation.	Unlikely, no wet heath was found within the Proposal Area.
Polygonaceae	*Persicaria elatior*	Knotweed	V	V	Species or species habitat may occur within area	Grows in damp places, especially beside streams and lakes. Occasionally occurs in swamp forest.	Unlikely, no suitable habitat found within the Proposal Area due to lack of waterbodies.
Proteaceae	*Persoonia hirsuta*	Hairy Geebung	E	E	3	Has a scattered distribution along the east coast from Singleton in the north to Bargo in the south, and the Blue Mountains to the west. It is found in mostly small populations on sandy soils in dry sclerophyll forest , woodland, and heath.	Unlikely. The Proposal Area may comprise potential habitat for the species, however no individuals were found and there are limited records of the species within the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Proteaceae	*Persoonia nutans*	Nodding Geebung	-	E	Species or species habitat may occur within area	Occurs on aeolian and alluvial sediments in woodland to dry sclerophyll forest, below 60 m above sea level.	Unlikely, Proposal Area is located above 60 m above sea level.
Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E	E	Species or species habitat known to occur within area	Found on well-structured clay soils in Cumberland Plain and Illawarra environments. In the inland Cumberland Plain sites it is associated with Grey Box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	Unlikely, as the Proposal Area is located outside of the Cumberland Plain.
Rhamnaceae	*Pomaderris brunnea*	Rufous Pomaderris	E	V	Species or species habitat likely to occur within area	Limited range around the Colo, Nepean and Hawkesbury Rivers where it grows in moist woodland or forests on clay and alluvial soils of flood plains and creek lines.	Unlikely, no suitable habitat due to lack of flood plains and creek lines within the Proposal Area.
Orchidaceae	*Pterostylis chaetophora*	-	V	-	1	Grows in seasonally moist, dry sclerophyll forest with a grass and shrub understorey.	Unlikely, whilst the Proposal Area contains dry sclerophyll forest, there are no records of

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
							the species within the locality.
Orchidaceae	*Pterostylis saxicola*	Sydney Plains Greenhood	E	E	Species or species habitat may occur within area	The species occurs in small pockets of shallow soil in flat areas on top of sandstone rock shelves above cliff lines, or on mossy rocks in gullies. Sclerophyll forest/woodland often occurs growing above where the species occurs, on shale or shale/sandstone transition soils. Flowering occurs between October and December. It is currently only known to occur at five locations within western Sydney: Georges River National Park, close to Yeramba Lagoon, Peter Meadows Creek, and St Marys Towers.	Unlikely, as the Proposal Area does not contain shale/sandstone transition soils. Additionally, the Proposal Area is outside of the currently known locations where this species is known to occur.
Fabaceae (Faboideae)	*Pultenaea glabra*	-	V	V	Species or species habitat likely to occur within area	The species occurs in discrete populations within swamp margins, hillslopes, gullies and along creeks within dry sclerophyll forest and tall damp heath in sandstone areas. Within NSW the species is only	Unlikely, the Proposal Area does not contain swamps or creeks and is located in the lower areas of the Blue Mountains.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						known to occur in the higher areas of the Blue Mountains.	
Fabaceae (Faboideae)	*Pultenaea parviflora*	-	E	V	Species or species habitat may occur within area	Endemic to the Cumberland Plain. Core distribution is from Windsor to Penrith and east to Dean Park. Found in scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays and in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Unlikely, Proposal Area located out of core distribution.
Orchidaceae	*Rhizanthella slateri*	Eastern Underground Orchid	V	E	Species or species habitat may occur within area	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. The species is highly cryptic given that it grows almost completely below the soil	Unlikely, due to the highly disturbed nature of the Proposal Area.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						surface, with flowers being the only part of the plant that can occur above ground. Flowers September to November.	
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E	V	Species or species habitat may occur within area	Species occurs naturally from Forster in the north to Jervis Bay in the south. It is found in rainforest on sandy soils or on sand dunes at low altitude in coastal areas. It is most commonly associated with littoral and gallery rainforest types. The species is extensively cultivated as an ornamental plant.	Unlikely, due to the lack of rainforest on sandy soil within the Proposal Area.
Elaeocarpaceae	*Tetratheca glandulosa*	-	V	-	1	Restricted to the Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong Local Government Areas. It is associated with shale-sandstone transitional areas, where shale overlays sandstone, generally in ridgetop and upper slope areas. It occurs in a variety of vegetation types including heath and scrub, and open forests and woodlands.	Unlikely, Proposal Area located out of core distribution.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	*Thelymitra kangaloonica*	Kangaloon Sun Orchid	E	CE	Species or species habitat may occur within area	Species 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 and in sedgelands over grey silty grey loam soils. It is thought to be a short-lived perennial, flowering in late October and early November.	Unlikely, no suitable habitat present as the Proposal Area lies outside of the species known range.
Santalaceae	*Thesium australe*	Austral Toadflax	V	V	Species or species habitat may occur within area	Found in very small populations scattered across eastern NSW. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (Themeda australis).	Unlikely, no suitable habitat or associated species found within the Proposal Area.

Table 8 - Threatened Fauna Likelihood of Occurrence Table

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Amphibia							
Myobatrachidae	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	1	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat is generally soaks or pools within first or second order streams and are commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Largely confined to sandstone in the Sydney Basin.	Unlikely, no suitable habitat found within the Proposal Area due to lack of soaks and pools.
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	V	V	Species or species habitat likely to occur within area	Marshes, dams, stream sides, particularly those containing bulrushes or spikerushes; unshaded water bodies free of Gambusia form optimum habitat; vegetation and/or rocks are needed for sheltering.	Unlikely, no suitable habitat found within the Proposal Area due lack of proximity to suitable water bodies.
Hylidae	*Litoria littlejohni*	Little John's Tree Frog	V	V	Species or species habitat may occur	Found in heath forests and woodlands under leaf litter and low vegetation. Breeds in the upper reaches of permanent streams and in perched swamps.	Unlikely, no suitable habitat found within the Proposal Area due to lack of

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
					within area		permanent streams and limited leaf litter.
Myobatrachidae	*Mixophyes balbus*	Stuttering Frog	E	V	Species or species habitat likely to occur within area	Found in rainforest and wet, open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Occurs in deep leaf litter and thick understorey vegetation, and breeds in streams after heavy rain.	Unlikely, no suitable habitat found within the Proposal Area due to lack of suitable watercourses.
Myobatrachidae	*Pseudophryne australis*	Red-crowned Toadlet	V	-	29	Has a distribution restricted to the Sydney Basin, from Pokolbin in the north, Nowra to the south, and Mt Victoria in the Blue Mountains to the west. It inhabits ephemeral drainage lines below sandstone ridges that often have shale caps, in open forests on Hawkesbury and Narrabeen Sandstones. The species utilises dense vegetation and debris besides water in the breeding season. Outside of breeding season the species is	Unlikely, no breeding habitat found within the Proposal Area or in the nearby area.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						found under rocks, logs, and leaf litter nearby to breeding areas.	

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Aves							
Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	E	CE	1	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: *E. microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea*, and *Angophora floribunda*. Nectar and fruit from the *mistletoes A.*	Unlikely, no suitable foraging habitat due to the disturbed nature of the Proposal Area and the lack of key eucalyptus species containing mistletoes. Additionally, there is only a single record from the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						miquelii, A. pendula, A. cambagei are also eaten during the breeding season.	

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Apodidae	*Apus pacificus*	Fork-tailed Swift	-	Mig	1	Species has been recorded throughout NSW, but mostly east of the Great Divide. The species is almost exclusively aerial in Australia and breeds overseas. It forages from a metre above the ground, up to hundreds of metres in altitude, and mostly occur over inland plains, though sometimes over foothills, and coastal areas.	Unlikely, the Proposal Area does not occur within an inland plain, foothills or coastal areas. Additionally, there is only a single record from the locality.
Ardeidae	*Ardea ibis*	Cattle Egret	-	Mig	5	Utilises temperate and tropical grasslands, wooded lands and terrestrial wetlands, Often forages away from water on low-lying grasslands.	Unlikely, limited suitable habitat as the Proposal Area does not contain grasslands or terrestrial wetlands. Whilst the Proposal Area does contain wooded land, there are few records of the species in the locality and this habitat is unlikely to be utilised.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow	V	-	4	Occurs from Atherton Tableland in Queensland, down to Tasmania and west to the Eyre Peninsula in South Australia. In NSW it occurs from the coast to the western slopes of the Great Dividing Range and farther west. It breeds primarily on the western slopes of the Great Dividing Range in woodland and open dry forest. The species often occurs in eucalypt woodland and forest, though is also found in shrubland and heathland. It forages both above and below the canopy primarily for invertebrates, though will occasionally consume nectar, fruit and seed.	Unlikely, breeding habitat is on the western side of the Great Divide. Furthermore, the degraded nature of the majority of the Proposal Area offers very limited foraging habitat for the species. Additionally, there are limited records of the species in the locality.
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	E	E	1	Occurs in freshwater wetlands, and more rarely, estuarine wetlands. It favours wetlands with tall, dense vegetation, and forages in shallow water up to a depth of 0.3m. It nests in deep vegetative cover over shallow pools.	Unlikely, no suitable foraging or nesting habitat due to lack of water bodies within the Proposal Area. Additionally, there are limited records of the species in the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	E	CE	Species or species habitat likely to occur within area	Occurs around coastal areas and is widespread inland. The species occupies mainly intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps. They forage for invertebrates at the edges of shallow waters. The species generally roosts in dunes and sandy areas.	Unlikely, no suitable habitat due to the location of the Proposal Area away from the coast and swamps. Additionally, there are no records of the species in the locality.
Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V	-	9	Occurs within a variety of forest and woodland types. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well-timbered country through which it habitually flies as it moves about.	Potential, the species may occasionally and opportunistically utilise the use the canopy trees as foraging habitat.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V	-	19	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m ASL in which stands of She-Oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur.	Potential, the species may occasionally and opportunistically utilise the *Allocasuarina* trees within the Proposal Area for foraging resources as part of a larger foraging habitat range.
Charadriidae	*Charadrius veredus*	Oriental Plover	-	Mig	1	Generally found inland, in open grasslands in arid and semi-arid zones. It prefers flat inland plains, sparsely vegetated short grass with hard bare-ground including playing fields, lawns and cattle camps.	Unlikely, limited habitat found within the Proposal Area due to lack of open grassland. Additionally, there are limited records of the species in the locality.
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	9	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Potential, the species may occasionally and opportunistically utilise the use the canopy trees as foraging habitat.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Meliphagidae	*Grantiella picta*	Painted Honeyeater	V	V	Species or species habitat likely to occur within area	Sparsely distributed from south-eastern Australia to north-western Queensland and eastern North Territory. Most records and all breeding records are from the inland slopes of the Great Dividing Range between the Grampians in Victoria, to Roma in Queensland. It moves north-south following the fruiting of mistletoe species. It feeds predominately on mistletoe fruits, but occasionally nectar of eucalypts, mistletoes, and potentially banksias, and arthropods. The species prefers woodlands with large numbers of mature trees which host mistletoes. The species nests in mistletoes.	Unlikely, no suitable foraging and nesting habitat found within the Proposal Area due to lack of mistletoes. Additionally, there are no records of the species in the locality.
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V	Mig	1	Found in coastal habitats and around terrestrial wetlands, including rivers, swamps, lakes and the sea.	Unlikely, no suitable habitat found within the Proposal Area due to lack of proximity to suitable water bodies. Additionally, there are limited records of the species in the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Apodidae	*Hirundapus caudacutus*	White-throated Needletail	-	Mig	2	Species is almost exclusively aerial, and is found commonly overhead of wooded areas and heathland. Is less commonly found overhead of grassland and swamps.	Unlikely, but may utilise the aerial habitat overhead the Proposal Area as part of a foraging range which extends far beyond the Proposal Area. Additionally, there are limited records of the species in the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Psittacidae	*Lathamus discolor*	Swift Parrot	E	CE	18	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	Potential, as the species may occasionally and opportunistically utilise the foraging resources within the Proposal Area as part of a larger foraging range. Due to the species high mobility, it would highly unlikely to be solely reliant on the foraging habitat within the Proposal Area.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V	-	5	Found in a variety of timbered habitats including dry woodlands and open forests. It is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings and insects occurring in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near watercourses.	Potential, as the species may occasionally and opportunistically utilise the foraging resources within the Proposal Area as part of a larger foraging range. Due to the species high mobility, it would highly unlikely to be solely reliant on the foraging habitat within the Proposal Area.
Psittacidae	*Neophema pulchella*	Turquoise Parrot	V	-	2	Lives on the edge of eucalypt woodland adjoining clearings, timbered ridges and creeks. May be quite tolerant of disturbance. Usually forages on the ground for seeds or grasses and herbaceous plants.	Unlikely, as the habitat within the Proposal Area does not adjoin timbered ridges or creeks. Whilst the Proposal Area is within the vicinity of timbered ridges throughout

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
							the lower Blue Mountains, there are limited records of the species in the locality indicating that the potential habitat is unlikely to be utilised.
Strigidae	*Ninox connivens*	Barking Owl	V	-	1	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. Nests in hollows of large, old eucalypts. Hunts small arboreal mammals such as Squirrel Gliders and Ringtail Possums, but when loss of tree hollows decreases these prey populations it becomes more reliant on birds, invertebrates and terrestrial mammals. Requires very large permanent territories in most habitats due to sparse prey densities.	Unlikely, as the Proposal Area does not contain large tree hollows. Whilst the vegetation found within the Proposal Area may comprise suitable foraging habitat, a lack of records from the locality suggest that this potential habitat is unlikely to be utilised.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Strigidae	*Ninox strenua*	Powerful Owl	V	-	26	The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. It breeds and hunts in open or closed sclerophyll forests or woodlands and occasionally hunts in open habitats. Roosting during the day time occurs in dense vegetation of Eucalypts and species such as *Syncarpia glomulifera* (Turpentine), *Angophora floribunda* (Rough-barked Apple), and other species. Prey species are medium-sized arboreal mammals such as the Greater Glider, Common Ringtail Possum, and Sugar Glider. As most prey species require hollows and a shrub layer these are important habitat components also of the Powerful Owl. Nests are in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Potential, although no roosting habitat is present due to lack of large hollows, the vegetation found within the Proposal Area may comprise suitable foraging habitat.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	-	CE	Species or species habitat may occur within area	Breeds in the Northern Hemisphere and spends the non-breeding season in all states of Australia in coastal areas and rarely inland. In NSW it is distributed along all coastal areas but it mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River and Richmond River. It occupies lakes, inlets, bays and estuarine habitat. It is mainly found in intertidal mudflats and sometimes saltmarsh. It forages at the edge of shallow water and roosts on sandy spits and islets especially on dry beach sand.	Unlikely, no suitable habitat found within the Proposal Area due to its distance from the coast and estuarine water bodies. Additionally, there are no records of the species in the locality.
Scolopacidae	*Numenius minutus*	Little Curlew	-	Mig	1	Gathers in large flocks on coastal and inland grasslands, near swamps and flooded areas. Also feeds on playing fields and paddocks.	Unlikely, limited habitat found within the Proposal Area due to lack of open grassland.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Petroicidae	*Petroica phoenicea*	Flame Robin	V	-	3	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. Ground layer of the breeding habitat is dominated by native grasses with shrub layer either sparse or dense. Often nests near the ground and are built in sheltered sites e.g. shallow cavities in trees, stumps or banks.	Unlikely, no suitable habitat as the Proposal Area does not contain moist eucalypt forests or woodlands. Additionally, there are limited records of the species in the locality.
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	E	E	Species or species habitat likely to occur within area	Inhabits fringes of shallow inland wetlands, swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely, no suitable habitat found within the Proposal Area due to lack of proximity to water bodies.
Tytonidae	*Tyto novaehollandiae*	Masked Owl	V	-	11	Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet	Potential, although no suitably large hollow are present for the species to roost, the Proposal Area may provide foraging habitat for the species.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						consists of tree-dwelling and ground mammals, especially rats.	
Tytonidae	*Tyto tenebricosa*	Sooty Owl	V	-	2	Occurs in coastal rainforest, including dry, subtropical, and temperate rainforests, and moist eucalypt forests. Utilises tall trees in heavily vegetated areas for day time resting. It hunts during the night for small ground or tree dwelling mammals such as the Common Ringtail Possum or Sugar Glider. The species requires very large tree hollows for nesting.	Unlikely, no suitably habitat as the Proposal Area does not contain coastal rainforest, or moist eucalypt forest. Additionally, there are limited records of the species in the locality.
Gastropoda							
Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E	-	27	Primarily inhabits Cumberland Plain Woodland (an endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose	Unlikely, the vegetation community within the Proposal Area does not comprise

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						soil around grass clumps. Occasionally shelters under rubbish.	Cumberland Plain Woodland.
Camaenidae	*Pommerhelix duralensis*	Dural Land Snail	-	E	Species or species habitat known to occur within area	Inhabits areas that are between shale-derived and sandstone-derived soils with forested vegetation that have good native cover and woody debris. Species prefers sheltering under rocks, inside curled-up bark and underneath leaf litter and light woody debris.	Unlikely, Proposal Area is outside its known distribution.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Mammalia							
Burramyidae	*Cercartetus nanus*	Eastern Pygmy-possum	V	-	2	Species is found in a broad range of habitats from rainforest to wet and dry sclerophyll forests through to woodland and heath. Woodland and heath habitats are preferred. The species feeds on pollen and nectar from banksias, eucalypts, and bottlebrushes, though will eat soft fruits when flowers are unavailable, and will also eat insects throughout the year. They shelter in tree hollows, rotten stumps, holes in the ground, abandoned birds' nests and Ringtail Possum dreys, and thickets of vegetation. Tree hollows are preferred for nesting but the species will also nest under tree bark and shredded bark in tree forks.	Unlikely, limited foraging habitat is found within the Proposal Area due its degraded nature and the limited number of pollen and nectar species. Additionally, there are limited records of the species in the locality.
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	3	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. Found in well-timbered areas containing gullies.	Unlikely, no suitable roosting habitat within the Proposal Area due to lack of caves and mines. Additionally, there are limited records

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
							of the species in the locality.
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	10	Occurs in wide variety of habitats; rainforest, open forest, woodland, coastal heath and riparian forest. Uses hollows in trees, logs and rock crevasses as den sites.	Unlikely, no suitable habitat found within the Proposal Area due to lack of suitable hollows and logs, in addition to the disturbed nature of the Proposal Area.
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	1	Occurs in moist habitat with trees over 20m in height, hunting insects above or just below the tree canopy. Roosts in eucalypt hollows, under bark and in buildings	Unlikely, as the Proposal Area does not occur within moist habitat, nor does it contain eucalypt hollows. Additionally, there are limited records of the species in the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Molossidae	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V	-	3	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows but will also roost under bark or in man-made structures.	Unlikely as no suitable breeding habitat features occur within the Proposal Area. Additionally, few records are recorded within the locality.
Miniopteridae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V	-	11	Roosts mainly in caves but also in tunnels, mines or buildings. Non-breeding populations disperse within a 300 km range of maternity caves. Hunting for moths and other insects takes place in forested areas above the canopy.	Potential, no suitable roosting habitat found within the Proposal Area due to the lack of caves and tunnels. However, the species may utilise the foraging resources within the Proposal Area occasionally and opportunistically.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Vespertilionidae	*Myotis macropus*	Southern Myotis	V	-	10	Roosts close to water in caves, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish. Known from a range of habitats close to water from lakes, small creeks to large lakes and mangrove lined estuaries	Unlikely, no suitable habitat found within the Proposal Area due to the lack of suitable water bodies.
Pseudocheiridae	*Petauroides volans*	Greater Glider	-	V	6	Restricted to eastern Australia, and occurring from the Windsor Tableland in Queensland south to Wombat State Forest in central Victoria. Largely restricted to eucalypt forests and woodlands. The diet is predominately comprised of eucalypt leaves, and more rarely flowers. Highest abundances occur in tall montane forests with old trees and abundant hollows.	Potential, as the Proposal Area may contain suitable foraging habitat. Additionally, there are records of the species within the locality relatively close to the Proposal Area.
Petauridae	*Petaurus australis*	Yellow-bellied Glider	V	-	6	Occurs in tall, mature eucalypt forest, mostly in areas with high rainfall and soil nutrients. Forest types include mixed coastal forests, dry escarpment forests, moist coastal gullies and creek flats, to tall montane forests. Feeds primarily on plant	Potential, as the Proposal Area may contain suitable foraging habitat. Additionally, there are records of the

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
						and insect exudates, including nectar, sap, honeydew, and manna, supplemented with insects to provide protein. The species dens in family groups, in hollows in large trees.	species within the locality relatively close to the Proposal Area.
Petauridae	*Petaurus norfolcensis*	Squirrel Glider	V	-	1	Occurs in mature box, Box-Ironbark woodlands and River Red Gum forests west of the Great Dividing Range and Blackbutt-Bloodwood forest with heathy understorey along the coast. Prefers mixed species with a shrub or Acacia understorey and required abundant tree hollows for refuge and nesting sites.	Unlikely, as no suitable vegetation types or suitable hollows are present within the Proposal Area. Additionally, there are limited records within the locality.
Macropodidae	*Petrogale penicillata*	Brush-tailed Rock Wallaby	E	V	Species or species habitat likely to occur within area	Occupies rock outcrops, escarpments and cliffs with features such as caves, fissures and ledges. Browses on adjacent vegetation. Has a home range of about 15 ha and shelters in caves.	Unlikely, no suitable habitat due to the highly modified and degraded nature of the Proposal Area. Additionally, there are no records of the species within the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Phascolarctidae	*Phascolarctos cinereus*	Koala	V	V	23	Inhabits eucalypt woodlands and forests, feeding on the leaves of Eucalyptus species. They feed on the foliage of more than 70 Eucalypt species and 30 non-eucalypt species.	Potential, *Eucalyptus punctata* is a preferred koala feed tree which is abundant within the Proposal Area.
Muridae	*Pseudomys novaehollandiae*	New Holland Mouse	-	V	Species or species habitat may occur within area	Occurs in open habitats (heathland, woodland and forest) with a heath understorey and vegetated sand dunes. The species prefers deep soft top soils in order to burrow.	Unlikely, no suitable habitat found within the Proposal Area to due lack of heath understorey and sand dunes. Additionally, there are no records of the species within the locality.
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	150	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Commonly found in gullies, close to water, in vegetation with a dense canopy.	Likely, potential foraging habitat due to the canopy trees found within the Proposal Area and its proximity to urban gardens.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-	4	Found mainly in the gullies and river systems that drain the Great Dividing Range. Usually roosts in tree hollows and buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects. Species is not known to occur in areas of high urban density.	Unlikely, Proposal Area is highly modified and lacks suitable tree hollows. Additionally, there are limited records of the species within the locality.
Reptilia							
Scincidae	*Eulamprus leuraensis*	Blue Mountains Water Skink	E	E	1	Restricted to the middle and upper Blue Mountains, at elevations between 560 - 1140 m. It is found in habitat of sedge and shrub swamps that have boggy soils and appear permanently wet.	Unlikely, Proposal Area located to low in altitude and lack the required water bodies.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Records	Habitat Requirements	Likelihood of Occurrence
Elapidae	*Hoplocephalus bungaroides*	Broad-headed Snake	E	V	1	Found in rocky outcrops and adjacent sclerophyll forest and woodland. The most suitable sites occur on sandstone ridgetops. During autumn, winter, and spring the species shelters in rock crevices and under flat exposed sandstone rocks on cliff edges. In Summer it shelters in the hollows of large trees, within 200 m of escarpments.	Unlikely, limited habitat due to the lack of cliffs and tree hollows within the Proposal Area. Additionally, there are limited records of the species within the locality.

APPENDIX B :
Flora and Fauna Species List

Table 9 - Flora species identified within the Proposal Area

Family	Scientific Name	Common Name	Exotic	WoNS	Biosecurity Act Status
Agavaceae	*Agave americana*	Century Plant	*	-	
Amaryllidaceae	*Clivia miniata*		*		
Apiaceae	*Actinotus helianthi*	Flannel Flower			
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*	Yes	SP
Asparagaceae	*Asparagus plumosus*	Climbing Asparagus Fern	*	Yes	SP
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	*		-
Asteraceae	*Cirsium vulgare*	Spear Thistle	*		
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	*		
Asteraceae	*Coreopsis lanceolata*	Coreopsis	*		
Asteraceae	*Cotula australis*	Common Cotula			
Asteraceae	*Dimorphotheca fruticosa*		*		
Asteraceae	*Facelis retusa*		*		
Asteraceae	*Gamochaeta pensylvanica*	Cudweed	*		
Asteraceae	*Hypochaeris radicata*	Catsear	*		
Asteraceae	*Olearia viscidula*	Wallaby Weed			
Asteraceae	*Senecio madagascariensis*	Fireweed	*	Yes	SP
Asteraceae	*Soliva sessilis*	Bindyi	*		
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*		
Asteraceae	*Taraxacum officinale*	Dandelion	*		
Asteraceae	*Xerochrysum bracteatum*	Golden Everlasting			
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*		
Bigoniaceae	*Tecoma stans*	Yellow Bells	Yes		OWRC
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse	*		
Caprifoliaceae	*Abelia x grandiflora*		*	-	
Caryophyllaceae	*Cerastium glomeratum*	Mouse-ear Chickweed	*		
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	*		
Caryophyllaceae	*Stellaria media*	Common Chickweed	*		
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak			
Crassulaceae	*Bryophyllum delagoense*	Mother-of-millions	*		OWRC

Family	Scientific Name	Common Name	Exotic	WoNS	Biosecurity Act Status
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush			
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge			
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower			
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower			
Fabaceae (Faboideae)	*Bossiaea obcordata*	Spiny Bossiaea			
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine			
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla			
Fabaceae (Faboideae)	*Hovea linearis*				
Fabaceae (Faboideae)	*Indigofera australis*	Australian Indigo			
Fabaceae (Faboideae)	*Pultenaea villosa*	Hairy Bush-pea			
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	*		
Fabaceae (Mimosoideae)	*Acacia falcata*				
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle			
Goodeniaceae	*Goodenia hederacea*	Ivy Goodenia			
Hamamelidaceae	*Liquidambar spp.*		*		
Lamiaceae	*Westringia fruticosa*	Coastal Rosemary			
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush			
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush			
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush			
Lomandraceae	*Lomandra obliqua*				
Malvaceae	*Hibiscus rosa-sinensis*	Chinese Hibiscus	*		
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	*		
Malvaceae	*Pavonia hastata*		*		
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*		
Meliaceae	*Melia azedarach*	White Cedar			
Moraceae	*Ficus pumila*	Creeping Fig	*		

Family	Scientific Name	Common Name	Exotic	WoNS	Biosecurity Act Status
Moraceae	*Ficus rubiginosa*	Port Jackson Fig			
Myrtaceae	*Angophora floribunda*	Rough-barked Apple			
Myrtaceae	*Austromyrtus dulcis*	Midgen Berry			
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush			
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush			
Myrtaceae	*Corymbia eximia*	Yellow Bloodwood			
Myrtaceae	*Eucalyptus punctata*	Grey Gum			
Myrtaceae	*Eucalyptus sparsifolia*	Narrow-leaved Stringybark			
Myrtaceae	*Melaleuca armillaris subsp. armillaris*	Bracelet Honey-myrtle			
Nandinaceae	*Nandina domestica*	Japanese Sacred Bamboo	*		
Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*		OWRC
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*		OWRC
Oleaceae	*Notelaea longifolia*	Large Mock-olive			
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*		
Oxalidaceae	*Oxalis perennans*				
Passifloraceae	*Passiflora herbertiana*				
Phormiaceae	*Dianella caerulea*	Blue Flax-lily			
Phormiaceae	*Dianella revoluta*	Blueberry Lily			
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum			
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	*		
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	*		OWRC
Poaceae	*Cenchrus setaceus*	Fountain Grass	*		OWRC
Poaceae	*Cynodon dactylon*	Common Couch			
Poaceae	*Entolasia stricta*	Wiry Panic			
Poaceae	*Entolasia stricta*	Wiry Panic			
Poaceae	*Eragrostis curvula*	African Lovegrass	*		OWRC
Poaceae	*Melinis repens*	Red Natal Grass	*		
Poaceae	*Paspalum dilatatum*	Paspalum	*		
Poaceae	*Poa annua*	Winter Grass	*		
Poaceae	*Sporobolus africanus*	Parramatta Grass	*		
Poaceae	*Themeda triandra*				
Polygonaceae	*Rumex brownii*	Swamp Dock			

Family	Scientific Name	Common Name	Exotic	WoNS	Biosecurity Act Status
Proteaceae	*Banksia ericifolia*	Heath-leaved Banksia			
Proteaceae	*Banksia serrata*	Old-man Banksia			
Proteaceae	*Grevillea kedumbensis*				
Proteaceae	*Grevillea longifolia*				
Proteaceae	*Grevillea mucronulata*				
Proteaceae	*Grevillea 'Robyn Gordon'*		*		
Proteaceae	*Grevillea sericea*	Pink Spider Flower			
Proteaceae	*Hakea salicifolia*	Willow-leaved Hakea			
Proteaceae	*Hakea sericea*	Needlebush			
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung			
Proteaceae	*Petrophile pedunculata*				
Rhamnaceae	*Cryptandra spinescens*				
Rosaceae	*Rosa rubiginosa*	Sweet Briar	*		OWRC
Rubiaceae	*Pomax umbellata*	Pomax			
Rubiaceae	*Richardia stellaris*		*		
Rutaceae	*Boronia anethifolia*				
Rutaceae	*Crowea saligna*				
Rutaceae	*Murraya paniculata*		*		OWRC
Rutaceae	*Philotheca hispidula*				
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart			
Verbenaceae	*Lantana camara*	Lantana	*	Yes	SP

Key: OWRC = Other Weed of Regional Concern, SP = State level determined priority weeds

Table 10 – Native Trees proposed to be offset

Tree ID	Species	Easting	Northing	Height (m)	DBD (cm)	Size Class
1	*Callistemon citrinus*	281663	6260522	3	< 15	Small
2	*Callistemon citrinus*	281667	6260522	3	< 15	Small
3	*Callistemon citrinus*	281670	6260522	3	< 15	Small
4	*Callistemon citrinus*	281679	6260522	3	< 15	Small
5	*Callistemon citrinus*	281682	6260521	3	< 15	Small
6	*Melaleuca armillaris*	281686	6260525	5	< 15	Small
7	*Callistemon viminalis*	281685	6260533	3	< 15	Small
8	*Ceratopetalum gummifera*	281706	6260410	5	< 15	Small
9	*Callistemon citrinus*	281665	6260522	3	< 15	Small
10	*Callistemon citrinus*	281668	6260522	3	< 15	Small
11	*Eucalyptus punctata*	281736	6260493	20	> 15	Medium
12	*Corymbia eximia*	281732	6260493	20	> 15	Medium
13	*Acacia parramattensis*	281734	6260497	10	< 15	Small
14	*Jacaranda mimosifolia*	281702	6260474	5	> 15	Medium
15	*Liquidambar styraciflua*	281702	6260468	5	> 15	Medium
16	*Jacaranda mimosifolia*	281711	6260460	4	< 15	Small
17	*Tecoma stans*	281712	6260461	3	< 15	Small

Note: DBH = Diameter at Breast Height

Table 11 - Fauna Species List

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Detection Method
Aves					
Artamidae	*Gymnorhina tibicen*	Australian magpie			Heard
Artamidae	*Strepera graculina*	Pied Currawong			Seen
Corvidae	*Corvus coronoides*	Australian raven			Heard
Meliphagidae	*Manorina melanocephala*	Noisy Miner			Seen
Meliphagidae	*Manorina melanophrys*	Bell miner			Heard
Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater			Heard
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird			Heard
Meliphagidae	*Phylidonyris novaehollandiae*	The New Holland Honeyeater			Heard

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Detection Method
Psittaculidae	*Platycercus elegans*	Crimson rosella			Seen
Psittaculidae	*Trichoglossus moluccanus*	Rainbow lorikeet			Seen
Reptilia					
Scincidae	*Lampropholis sp.*	Skink			Seen

APPENDIX C :
Tests of Significance

C.1. Introduction

This appendix contains the formal Test of Significance required under Section 7.3 of the BC Act that have been prepared in accordance with the DRAFT Threatened Species Test of Significance Guidelines (OEH 2017). The Test of Significance is used for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

A Test of Significance has been prepared to collectively assess potential impacts on threatened fauna species listed under the BC Act that are considered to have the potential to occur within the Proposal Area as described in **Appendix A**. Each Test of Significance is a series of factors (shown as italicised text below) for which a response has been supplied beneath in plain text.

C.2. Test of Significance

C.2.1. Threatened Fauna Species

The vegetation to be impacted comprising potential habitat for threatened fauna species is comprised of artificial Urban Native/Exotic Vegetation and SHTW in a degraded condition. The habitat within the Proposal Area is only considered to constitute marginal foraging habitat for the assessed species due to its degraded condition and a lack of habitat features typically utilised for breeding. Subsequently, impacts of the Proposal upon threatened fauna likely to occur within the Proposal Area have been assessed together in a single Assessment of Significance. This Assessment of Significance covers the following species:

Megachiropteran Bats including:

- Grey-headed Flying Fox (*Pteropus poliocephalus*), listed as Vulnerable under the BC Act and the EPBC Act.

Microchiropteran Bats including:

- Large Bent-winged Bat (*Miniopterus orianae oceanensis*), listed as Vulnerable under the BC Act.

Arboreal Mammals including:

- Koala (*Phascolarctos cinereus*), listed as Vulnerable under the BC Act and the EPBC Act;
- Greater Glider (*Petauroides volans*), listed as Vulnerable under the EPBC Act; and
- Yellow-bellied Glider (*Petaurus australis*), listed as Vulnerable under the BC Act.

Large Forest Owls including:

- Powerful Owl (*Ninox strenua*), listed as Vulnerable under the BC Act; and
- Masked Owl (*Tyto novaehollandiae*), listed as Vulnerable under the BC Act.

Diurnal Woodland Birds including:

- Glossy Black-Cockatoo (*Calyptorhynchus lathami*), listed as Vulnerable under the BC Act;

- Gang-gang Cockatoo (*Callocephalon fimbriatum*), listed as Vulnerable under the BC Act;
- Square-tailed Kite (*Lophoictinia isura*), listed as Vulnerable under the BC Act;
- Varied Sittella (*Daphoenositta chrysoptera*), listed as Vulnerable under the BC Act; and
- Swift Parrot (*Lathamus discolour*), listed as Endangered under the BC Act and as Critically Endangered under the EPBC Act.

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

None of the species being assessed have been recorded within the Proposal Area; however, they have been recorded within a 5 km radius of the Proposal Area (i.e. the locality) and subsequently, the local populations of these potentially occurring species is considered to extend beyond the Proposal Area. The assessed species would be expected to utilise the foraging resources within the Proposal Area occasionally or opportunistically as part of a broader habitat range.

Due to the highly modified, artificial and degraded nature of the majority of the various habitats within the Proposal Area, it is not likely to constitute breeding habitat for any of the species being assessed. The Proposal Area does not contain suitable breeding habitat in the form of caves for the Large Bent-winged Bat, nor does it contain hollow-bearing trees suitable for utilisation for breeding by Large Forest Owls, the Glossy Black-Cockatoo, the Gang-gang Cockatoo or arboreal mammals. No Grey-headed Flying Fox camps occur within the Proposal Area or the immediate surrounds (OEH 2019c, e, d). Additionally, no diurnal woodland bird nests were observed within the Proposal Area. Accordingly, the Proposal is not considered to have an adverse effect on the life cycle of these species such that a viable local population is likely to be placed at risk of extinction.

a. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

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

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

These highly mobile fauna species will primarily be impacted by the Proposal through the removal and modification of a ~0.38 ha area of marginal foraging habitat, comprised of planted native and exotic woody vegetation (~0.21 ha), and SHTW in varying condition states (~0.17 ha). The primary foraging habitat feature within this area of vegetation is the existing canopy of planted native vegetation and SHTW, comprising foliage, blooms and associated invertebrates. The potential impacts to woody vegetation comprising habitat for the assessed species are expected to be localised and are not considered to cause a substantial change in the extent of the broader habitat within the locality.

The Proposal will not significantly increase fragmentation habitat within the eastern side of the Proposal Area further than currently current conditions, as the encroachment into SHTW occurs at the edge of treed habitat within a degraded patch largely lacking a canopy layer. The removal of planted Urban Native/Exotic Vegetation on the western side of the Proposal Area may result in a minor degree of increased fragmentation between isolated patches of trees outside of the Proposal Area which may be considered to be "stepping stone" habitat for highly mobile and aerial species, moving across the urban habitat to the west of the Proposal Area. Past land use associated with the existing railway station and rail corridor has resulted in the modification of the habitat of the Proposal Area. A significant increase in edge effects to adjacent vegetation is not anticipated further than current conditions as the vegetation to the west of the Proposal Area is directly adjacent to an existing rail corridor. Given the condition of the habitat, the small area of habitat directly and indirectly impacted by the Proposal is not important for the long-term survival of the assessed species in the locality.

a. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the Proposal Area. The Blue Mountains national Park is located over 800m south of the Proposal Area; however it is not listed as an area of outstanding biodiversity value. Therefore, the Proposal is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

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

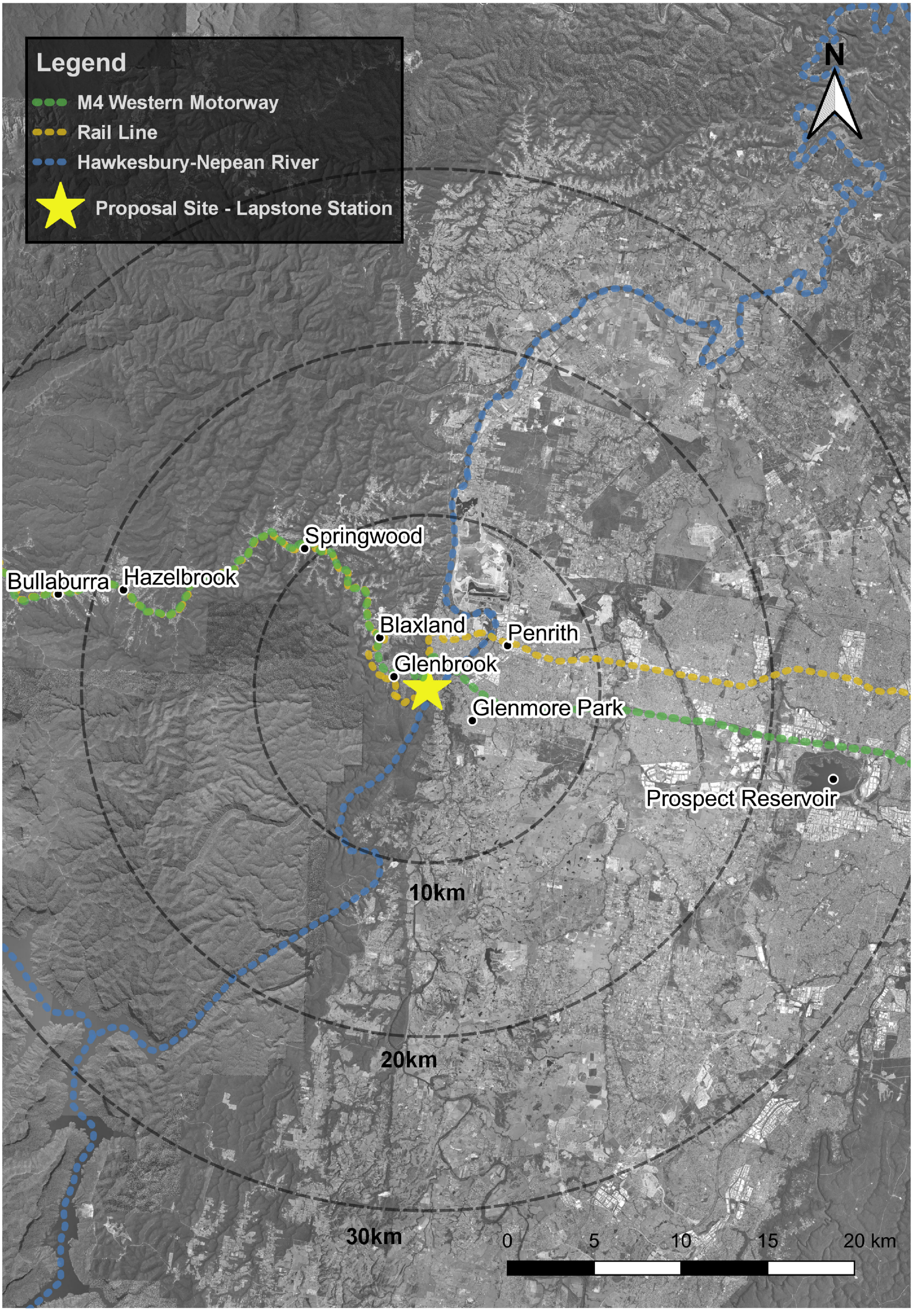
The Proposal may exacerbate the following key threatening processes, relevant to the species being assessed:

- 'Clearing of native vegetation' as this reduces the area of foraging habitat available for all assessed threatened fauna species. The Proposal will only remove a relatively small area (~0.38 ha) of planted native vegetation and degraded SHTW; and
- 'Removal of dead wood and dead trees' as this will result in a reduction of habitat features available for species known to utilise such features. However, only two fallen log dead wood features occur within the Proposal Area.

Conclusion

Previous clearing and historic land use of the Proposal Area as a railway station and railway corridor has resulted in the degradation of the available habitat, such that it is considered to be marginal foraging habitat only used occasionally and opportunistically by highly mobile and aerial threatened fauna species. The removal of a ~0.38 ha area of marginal foraging habitat comprised of native and exotic planted vegetation and varying condition SHTW is highly unlikely to result in significant impacts on potentially occurring threatened diurnal woodland birds, Microchiropteran bats, Megachiropteran bats, arboreal mammals and large forest owls.

APPENDIX D :
Figures



I:\...\19121\Figures\RP1\20191004\Figure 1. Regional Context

Image Source: TfNSW (2019)

Figure 1. Regional Context

I:\...\19121\Figures\RP1\20191004\Figure 2. Local Context

Image Source: TfNSW (2019)

Figure 2. Local context

Image Source: TfNSW (2019)

I:\...\19121\Figures\RP1\20191004\Figure 3. Overview of the Project

Figure 3. Overview of the Proposal

Legend

Proposal Area

BAM Plot (10 x 100 m)

Survey Tracks

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © Nearmap (2019)
Dated: 20/01/2018

cumberland ecology

0 10 20 30 40 m

I:\...\19121\Figures\RP1\20190916\Figure 4. Survey locations

Figure 4. Survey locations

Figure 5. Vegetation Communities and habitat features within the Proposal Area

Legend

Proposal Area

Native Trees to be Removed and Offset

Medium Native Tree

Small Native Tree

Exotic Trees to be Removed

Exotic Tree

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © Nearmap (2019)
Dated: 20/01/2018

cumberland ecology

0 10 20 30 40 m

I:\...\19121\Figures\RP1\20191004\Figure 6. Tree Impacts_Proposal Site

Figure 6. Impacts to trees within the Proposal Area